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Ontario Legislative Assembly

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(42)

SESSIONAL PAPERS.

VOL. XXXV.—PART II.

FIRST SESSION, TENTH LEGISLATURE

OF THE

60728
19/9/03

PROVINCE OF ONTARIO.

SESSION 1903.

TORONTO:
PRINTED AND PUBLISHED BY L. K. CAMERON
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1903.

LIST OF SESSIONAL PAPERS.

ARRANGED ALPHABETICALLY.

TITLE.	No.	REMARKS.
Accounts, Public.....	1	<i>Printed.</i>
“ and Awards (<i>Dom. and the Provinces</i>).....	73	“
Agricultural College, Report.....	14	“
“ and Experimental Union, Report.....	15	“
Archæology, Report, <i>part of</i>	12	“
Asylums, Report.....	38	“
Awards on Unsettled Accounts.....	73	“
Bee-Keepers' Association, Report.....	20	<i>Printed.</i>
Births, Marriages and Death, Report.....	9	“
Blind Institute, Report.....	41	“
Boys and Girls committed to Gaol.....	72	<i>Not printed.</i>
Bribery Charges, Commission, Report, etc.....	51	<i>Printed.</i>
Browning, James A., correspondence.....	81	<i>Not printed.</i>
Children, Neglected, Report.....	43	<i>Printed.</i>
Common Gaols, Prisons, etc., Report.....	39	“
Crown Lands, Report.....	3	“
Cyclone in Dundas County.....	52	<i>Not printed.</i>
Dairymens' Associations, Report.....	22	<i>Printed.</i>
Deaf and Dumb Institution, Report.....	42	“
Division Courts, Report.....	33	“
Education, Report of Minister.....	12	<i>Printed.</i>
“ Orders-in-Council, Department of.....	56	<i>Not printed.</i>
“ “ Kingston University.....	57	“
“ “ Publication of School Books.....	58.	“
“ “ “.....	59	“
“ “ Public Schools.....	60	<i>Printed.</i>
“ “ Publication of School Books.....	61	<i>Not printed.</i>
“ “ “.....	62	“
“ “ School Libraries.....	63	“
Elections, Return from Records.....	46	<i>Printed.</i>
Elzevir and Grimsthorpe, Timber in.....	67	<i>Not printed.</i>
Entomology, Report.....	19	<i>Printed.</i>
Estimates 1903.....	2	“
Factories, Report.....	8	<i>Printed.</i>
Fairs and Exhibitions, Report.....	26	“
Farmers' Institutes, Report.....	25	“
Fidelity Bonds, 1903.....	32	“

TITLE.	No.	REMARKS.
Fisheries, Report.....	31	<i>Printed.</i>
Fishing rights, or concessions, in Lake Nepigon.....	75	<i>Not printed.</i>
Fronteuac, Sheriff of, correspondence.....	80	"
Fruit Experiment Stations, Report.....	17	<i>Printed.</i>
Fruit Growers' Association, Report.....	16	"
Fumigation Appliances, Report.....	18	"
Game Commission, Report.....	30	<i>Printed.</i>
Gamey Bribery Charges.....	51	"
Gaols, Prisons, etc., Report.....	39	"
" Commitment of Boys and Girls to ..	72	<i>Not printed.</i>
Hare, J F., commutation.....	53	<i>Not printed.</i>
Health Report.....	36	<i>Printed.</i>
Highway Commissioner, Report.....	27	"
Hospitals and Charities, Report.....	40	"
Imperial Institute, Canadian Section.....	54	<i>Not printed.</i>
Industries, Bureau of, Report.....	28	<i>Printed.</i>
Insurance, Report.....	10	"
Inter-Provincial Conference, proceedings.....	4	"
Judicature Act, Order-in-Council.....	53	<i>Not printed.</i>
Kingston University, Specialists Courses.....	57	<i>Not printed.</i>
Labour Bureau, Report.....	29	<i>Printed.</i>
Legal Offices, Report.....	34	"
Library, Report on state of.....	47	<i>Not printed.</i>
Liquor Act 1902, Referendum Vote.....	48	<i>Printed.</i>
Liquor Licenses, Report.....	44	"
Live Stock Associations, Report.....	23	"
Live Stock, Registrar of, Report.....	24	"
Loan Corporations, Report.....	11	"
McHugh, Judge, payment to.....	53	<i>Not printed.</i>
McMaster, John, appointment of.....	76	"
Mines, Report.....	5	<i>Printed.</i>
Mines Act, Annual Expenditure under.....	77	<i>Not printed.</i>
Nepigon and Manitou, Lakes, fishing in.....	75	<i>Not printed.</i>
Ontario Fairs, Report.....	8	<i>Printed.</i>
Ontario Historical Society, Report.....	68	<i>Not printed.</i>
Provincial Municipal Auditor, Report.....	45	<i>Printed.</i>
Prisons and Reformatories, Report.....	39	"
Public Accounts, 1902.....	1	"
Public Works, Report.....	7	"
Pulp Agreements.....	{ 66, 78 79	"

LIST OF SESSIONAL PAPERS.

Arranged in numerical Order with their titles at full length; the dates when presented to the Legislature; the name of the Member who moved the same; and whether Ordered to be Printed or not.

CONTENTS PART I

- No. 1.. Public Accounts of the Province for the year 1902. Presented to the Legislature, 21st March, 1903
- No. 2.. Estimates (*Vote of Credit*) for the year 1903. Presented to the Legislature, 11th March, 1903. *Not printed.* Estimates (*Vote of Credit*) for the year 1903. Presented to the Legislature, 31st March, 1903. *Not printed.* Estimates for the year 1903. Presented to the Legislature, 23rd April, 1903. *Printed.* Estimates (*Supplementary*) for the year 1903. Presented to the Legislature, 10th June, 1903. *Printed.*
- No. 3.. Report of the Commissioner of Crown Lands for the year 1902. Presented to the Legislature, 23rd March, 1903. *Printed.*
- No. 4.. Report of the Proceedings of the Inter-Provincial Conference held at the City of Quebec from the 18th to the 20th December, inclusive. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 5.. Report of the Bureau of Mines for the year 1902. Presented to the Legislature, 30th April, 1903. *Printed.*

CONTENTS PART II.

- No. 6.. Report of the Commissioners for the Queen Victoria Niagara Falls Park for the year 1902. Presented to the Legislature, 5th May, 1903. *Printed.*
- No. 7.. Report of the Commissioner of Public Works for the year 1902. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 8.. Report of the Inspectors of Factories for the year 1902. Presented to the Legislature, 3rd June, 1903. *Printed.*
- No. 9.. Report relating to the Registration of Births, Marriages and Deaths for the year 1901. Presented to the Legislature, 21st March, 1903. *Printed*

CONTENTS PART III.

- No. 10.. Report of the Inspector of Insurance and Registrar of Friendly Societies for the year 1902. Presented to the Legislature, 11th June, 1903. *Printed.*
- No. 11.. Loan Corporations Statements for the year 1902. Presented to the Legislature, 19th May, 1903. *Printed.*

CONTENTS PART IV.

- No. 12. . Report of the Minister of Education—Parts I. and II.—with Report on Archæology for the year 1902. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 13. . Auditor's Report to the Board of Trustees on Capital and Income Accounts, and Report of the President of the University of Toronto for the year 1902. Presented to the Legislature, 21st March and 8th May, 1903. *Printed.*

CONTENTS PART V.

- No. 14. . Report of the Ontario Agricultural College and Experimental Farm for the year 1902. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 15. . Report of the Ontario Agricultural and Experimental Union for the year 1902. Presented to the Legislature, 2nd June, 1903. *Printed.*
- No. 16. . Report of the Fruit Growers' Association of Ontario for the year 1902. Presented to the Legislature, 8th June, 1903. *Printed.*
- No. 17. . Report of the Fruit Experiment Stations of Ontario for the year 1902. Presented to the Legislature, 26th May, 1903. *Printed.*
- No. 18. . Report of the Inspector of Fumigation Appliances for the year 1902. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 19. . Report of the Entomological Society for the year 1902. Presented to the Legislature, 21st April, 1903. *Printed.*
- No. 20. . Report of the Bee-Keepers' Association of Ontario for the year 1902. Presented to the Legislature, 8th June, 1903. *Printed.*
- No. 21. . Report of the Inspector of San José Scale for the year 1902. Presented to the Legislature, 23rd March, 1903. *Printed.*

CONTENTS PART VI

- No. 22. . Reports of the Dairymen's Associations for the year 1902. Presented to the Legislature, 5th May, 1903. *Printed.*
- No. 23. . Reports of the Live Stock Associations of Ontario for the year 1902. Presented to the Legislature, 8th June, 1903. *Printed.*
- No. 24. . Report of the Registrar of Live Stock of Ontario for the year 1902. Presented to the Legislature, 8th June, 1903. *Printed.*
- No. 25. . Report of the Farmer's Institutes of Ontario for the year 1902. Presented to the Legislature, 8th June, 1903. *Printed.*
- No. 26. . Report of the Ontario Fairs and Exhibitions for the year 1902. Presented to the Legislature, 21st March, 1903. *Printed.*

CONTENTS PART VII

- No. 27. . Report of the Commissioner of Highways for the year 1902. Presented to the Legislature, 11th June, 1903. *Printed.*
- No. 28. . Report of the Bureau of Industries for the year 1902. Presented to the Legislature, 8th June, 1903. *Printed.*
- No. 29. . Report of the Bureau of Labour for the year 1902. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 30. . Report of the Ontario Game Commission for the year 1902 Presented to the Legislature, 23rd March, 1903. *Printed.*
- No. 31. . Report of the Department of Fisheries for the year 1902. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 32. . Report of the Treasurer *in re* Fidelity Bonds, 1903. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 33. . Report of the Inspector of Division Courts for the year 1902. Presented to the Legislature, 19th May, 1903. *Printed.*
- No. 34. . Report of the Inspector of Legal Offices for the year 1902. Presented to the Legislature, 15th May, 1903. *Printed.*
- No. 35. . Report of the Inspector of Registry Offices for the year 1902. Presented to the Legislature, 3rd June, 1903. *Printed.*

CONTENTS PART VIII.

- No. 36. . Report of the Provincial Board of Health, of Ontario, for the year 1902. Presented to the Legislature, 8th June, 1903. *Printed.*
- No. 37. . Report of the Secretary and Registrar of the Province for the year 1902. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 38. . Report upon the Lunatic and Idiot Asylums of the Province for the year ending 30th September, 1902. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 39. . Report upon the Prisons and Reformatories of the Province for the year ending 30th September, 1902. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 40. . Report upon the Hospitals and Charities of the Province for the year ending 30th September, 1902. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 41. . Report upon the Ontario Institution for the Education of the Blind, Brantford, for the year ending 30th September, 1903. Presented to the Legislature, 21st March, 1902. *Printed.*

- No. 42.. Report upon the Ontario Institution for the Education of the Deaf and Dumb, Belleville, for the year ending 30th September, 1902. Presented to the Legislature, 21st March, 1903. *Printed.*

CONTENTS PART IX.

- No. 43.. Report upon Neglected and Dependent Children for the year 1902. Presented to the Legislature, 23rd March, 1903. *Printed.*
- No. 44.. Report upon the Inspection of Liquor Licenses for the year 1902. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 45.. Report of the Provincial Municipal Auditor for the year 1902. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 46.. Return from the Records of the General Elections to the Legislative Assembly on 29th May, 1902, shewing:—(1) The number of Votes polled for each Candidate in each Electoral District in which there was a contest. (2) The majority whereby each successful Candidate was returned. (3) The total number of Votes polled in each District. (4) The number of Votes remaining Unpolled. (5) The number of Names on the Voters' Lists in each District. (6) The Population of each District as shewn by the last Dominion Census. (7) Similar Statements as to any Elections held since the General Election. (8) A General Summary of Votes cast in each Electoral Division. Presented to the Legislature, 10th March, 1903. *Printed.*
- No. 47.. Report of the Librarian on the state of the Library. Presented to the Legislature, 10th March, 1903. *Not Printed.*
- No. 48.. Return from the Records on the vote for and against the adoption of the Liquor Act, 1902, shewing:—(1) The number of Polling Subdivisions. (2) The number of votes for and against the adoption of the Act. (3) The total number of Votes polled. (4) The number of votes remaining unpolled. (5) The number of names on the Voters' Lists. (6) The number of Ballot papers sent out to each sub-division. (7) The number of Ballot papers used. (8) The number unused. (9) The number of rejected and spoiled Ballots, and (10) The Population of each Electoral District. Presented to the Legislature, 10th March, 1903. *Printed.*
- No. 49.. Report of the Temiskaming Northern Railway Commission for the year 1902. Presented to the Legislature, 21st March, 1903. *Printed.*
- No. 50.. Report upon the Sugar Beet Experiments in Ontario for the year 1902. Presented to the Legislature, 12th May, 1903. *Printed.*

CONTENTS PART X.

- No. 51.. Copy of Commission of Enquiry in the matter of certain charges made by Robert Roswell Gamey, a member of the Legislative Assembly, against James Robert Stratton, a Member of the Executive Council of Ontario, and also a Member of the Legislative

- Assembly; and the Report of the Royal Commission appointed, together with the Arguments of Counsel and Evidence taken before the Commission. Presented to the Legislature on the 18th March, and the 4th June, 1903. *Printed.*
- No. 52. . Report into the loss and damage caused by the Cyclone which devastated a portion of the Province, in Dundas and Stormont during the year 1902. Presented to the Legislature, 25th March, 1903. *Not printed.*
- No. 53. . Copies of Orders-in-Council under the provisions of the Judicature Act commuting fees J F. Hare, Local Master in Essex, and authorizing certain payment to Judge McHugh, of Essex. Presented to the Legislature, 21st March, 1903. *Not printed.*
- No. 54. . Report of the Commercial Work of the Canadian Section of the Imperial Institute, during the year 1902. Presented to the Legislature, 21st March, 1903. *Not printed.*
- No. 55. . Copy of Order-in-Council with respect to Regulations under the Succession Duties Act. Presented to the Legislature, 21st March, 1903. *Not printed.*
- No. 56. . Copies of Orders in-Council *in re* recommendations of the Education Department Presented to the Legislature, 21st March, 1903. *Not printed.*
- No. 57. . Copy of Order-in-Council, respecting Specialist's Courses in the University of Kingston. Presented to the Legislature, 21st March, 1903. *Not printed.*
- No. 58. . Copy of Order-in-Council as to agreement with the Canada Publishing Company, Limited; the Copp, Clark Company, Limited, and the W. J. Gage Company, Limited, regarding the Public School Phonic Primer. Presented to the Legislature, 21st March, 1903. *Not printed.*
- No. 59. . Copy of Order-in-Council as to agreement with the Hunter Rose Company, Limited, respecting High School Euclid. Presented to the Legislature, 21st March, 1903. *Not printed.*
- No. 60. . Copy of Order-in-Council *in re* Regulations governing Public Schools. Presented to the Legislature, 21st, 1903. *Printed.*
- No. 61. . Copy of Order-in-Council as to agreement, amending a certain agreement with the George N. Morang Company, Limited, respecting publication of a first book of Geography. Presented to the Legislature, 21st March, 1903. *Not printed.*
- No. 62. . Copy of Order-in-Council as to agreements with the George N. Morang Company, Limited, respecting certain school books. Presented to the Legislature, 21st March, 1903. *Not printed.*

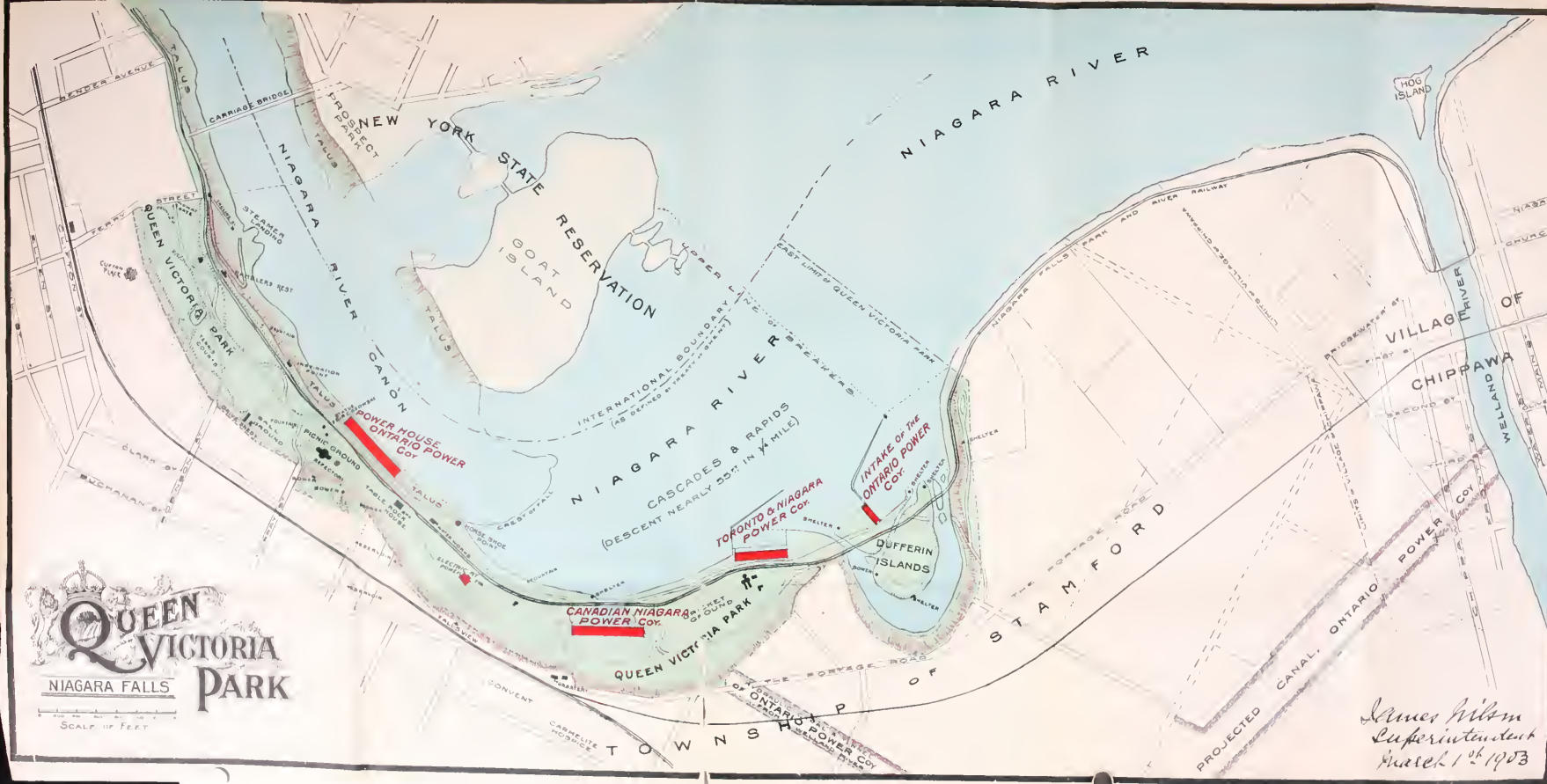
- No. 63.. Copy of an Order-in-Council *in re* Regulations pertaining to School Libraries. Presented to the Legislature, 21st March, 1903. *Not printed.*
- No. 64.. Statement as to the distribution of the Revised and Sessional Statutes, 1898-1902. Presented to the Legislature, 21st March, 1903. *Not printed.*
- No. 65.. Report of the Master of Titles in respect to the working of the Land Titles system, in the Province, during the years 1900, 1901 and 1902. Presented to the Legislature, 23rd March, 1903. *Printed.*
- No. 66.. Agreement between His Majesty, represented by the Commissioner of Crown Lands, and the Rainy Lake Pulp and Paper Company, Limited. Presented to the Legislature, 19th May, 1903. *Printed.*
- No. 67.. Return to an Order of the House of the twenty-third day of April, 1903, for a Return showing account in detail of timber dues paid or owing to the Province in respect of timber cut upon Crown lands in the Townships of Elzevir and Grimsthorpe in the season of 1901-2. Also, shewing amount due to the said municipalities during same period. Presented to the Legislature, 30th March, 1903. Mr. *Pearce.* *Not printed.*
- No. 68.. Report of the Ontario Historical Society, 1901, 1902. Presented to the Legislature, 1st May, 1904. *Not printed.*
- No. 69.. By-law No. 16, under the University Act *in re* Faculty of Medicine as to expenditure of \$50,000 towards completion of Building. Presented to the Legislature, 6th May, 1903. *Not printed.*
- No. 70.. Statement of fees received by the Master of Titles during the years 1900, 1901 and 1902. Presented to the Legislature, 8th May, 1903. *Not printed.*
- No. 71.. Return to an Order of the House of the twenty-fourth day of April, 1903, for a Return from the Office of the Master of Titles, shewing
1. Total number of Certificates issued. 2. Number of registrations for the past three years. 3. Fees received in all offices for the past three years. 4. Expenses. 5. Total amount received from the Guarantee Fund in the different offices during the past three years. 6. Total amount received from the Guarantee Fund since the same went into operation. 7. Losses and all other charges against the Guarantee Fund. 8. Total amount standing to the credit of the Guarantee Fund. Presented to the Legislature, 8th May, 1903. Mr. *St. John.* *Not printed.*
- No. 72.. Return to an Order of the House of the fourth day of May, 1903, for a Return shewing the number of young Boys and Girls committed to the County Gaols of the Province during the years 1900, 1901 and 1902 respectively. Presented to the Legislature, 11th May, 1903. Mr. *Hoyle.* *Not printed.*

- No. 73. . Return to an Address of the eighth day of May, 1903, to His Honour the Lieutenant-Governor praying that he will cause to be laid before this House a Return of copies of all Awards made by the Arbitrators between the Dominion and the Provinces, since the date of the last Return. Also, a statement of the Account between Ontario and the Dominion from 31st December, 1892, to 31st December, 1902, as settled by the Counsel for the Province and the Dominion. Together with copies of correspondence between the Minister of Finance of the Dominion and the Provincial Treasurer of Ontario. Presented to the Legislature, 14th May, 1903. Mr. *Mutheson*. *Printed*.
- No. 74. . Return to an Order of the House of the Eleventh day of May, 1903, for a Return of copies of all correspondence, agreements and other documents, relating to any application, or agreement between the Government and the Toronto and Niagara Power Company, or any other person, or persons, since the first day of January, 1902, for a grant, or proposed grant of water power from the Niagara or Welland Rivers, for the purpose of generating pneumatic, or other power. Presented to the Legislature, 21st May, 1903. Mr. *Foy*. *Not printed*.
- No. 75. . Return to an Order of the House of the Twentieth day of May, 1903, for a Return of copies of all correspondence between the Department of Public Works, or any officer thereof, and any applicant or applicants, for fishing rights or fishing concessions for commercial purposes, in Lakes Nepigon, Manitou and other Lakes in Ontario, since the first day of May, 1902, together with copies of all agreements for fishing rights, or fishing concessions, since said date. Presented to the Legislature, 28th May, 1903. Mr. *Hendrie*. *Not printed*.
- No. 76. . Return to an Order of the House of the Twentieth day of May, 1903, for a Return of copies of all correspondence, papers and documents relating in any way to the appointment of one John McMaster, in or about the month of May, 1902, as overseer of work to be performed on Markstay and Warren Road in Algoma or Nipissing, and to the work done, security given and money advanced or expended in connection therewith. Presented to the Legislature, 28th May, 1903. Mr. *Nesbitt*. *Not printed*.
- No. 77. . Return to an Order of the House of the twenty-seventh day of May, 1903, for a Return shewing the amount of money annually expended by the Province under the "Mines Act," for the encouragement of iron mining. The names of the persons, companies or firms to whom the money has been paid. The amount of iron ore annually mined and smelted in the Province; shewing as well the amount of foreign ore annually smelted in the Province. Presented to the Legislature, 29th May, 1903. Mr. *Hoyle*. *Not printed*.
- No. 78. . Copy of Order in Council approved by His Honour the Lieutenant Governor, on the eleventh day of June, 1902, respecting a certain

- Agreement with the Sturgeon Falls Pulp Company, Limited. Presented to the Legislature, 1st June, 1903. *Printed.*
- No. 79. . . Copy of an Agreement bearing date of the seventh day of May, 1903, by and between the Sturgeon Falls Pulp Company, Limited, and the Imperial Paper Mills of Canada, Limited. Presented to the Legislature, 1st June, 1903. *Printed.*
- No. 80. . . Return to an Order of the House of the fourth day of June, 1903, for a Return of copies of all correspondence between the Attorney-General or any other Member of the Government and the County Council of Frontenac, with reference to a Resolution of the County Council asking for the dismissal of the Sheriff of the County; together with copies of all correspondence between the Government, or any Member thereof, and James Dunkin Thompson, Registrar of the County of Frontenac, and Thomas Dawson, Sheriff of the said County, as to the appointment of a Returning Officer for the County, at the last Provincial Election. Presented to the Legislature, 16th June, 1903. Mr. *Gallagher*. *Not printed.*
- No. 81. . . Return to an Order of the House of the twenty-eighth day of May, 1903, for a Return of Copies of all correspondence between any Member of the Government and James A. Browning of Bellingham, Ontario, relating to the imprisonment of the latter, on a charge of obtaining property on false pretences. Presented to the Legislature, 26th June, 1903. Mr. *Smyth*. *Not printed.*
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QUEEN VICTORIA PARK
 NIAGARA FALLS

SCALE 1/2 INCH = 100 FEET

James Wilson
 Superintendent
 March 1st 1903

SEVENTEENTH ANNUAL REPORT

OF THE

COMMISSIONERS

FOR THE

QUEEN VICTORIA NIAGARA FALLS PARK

FOR THE YEAR ENDING

1902

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO.



TORONTO:

PRINTED AND PUBLISHED BY L. K. CAMERON,
Printer to the King's Most Excellent Majesty

1903



WARWICK BRO'S & RUTTER, PRINTERS,
TORONTO.

Toronto, March 4th, 1903.

The Hon. J. R. Stratton, M.P.P.,
Provincial Secretary Province of Ontario,
Parliament Buildings, Toronto.

Sir.—I have the honor to transmit herewith, for presentation to the Legislature of Ontario the Seventeenth Annual Report of the Commissioners for the Queen Victoria Niagara Falls Park, together with the appendices thereunto attached.

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

J. W. LANGMUIR, Chairman.

SEVENTEENTH ANNUAL REPORT OF THE COMMISSIONERS FOR
THE QUEEN VICTORIA NIAGARA FALLS PARK.

To the Honorable Sir Oliver Mowat, K.C.M.G.,
Lieutenant-Governor of the Province of Ontario.

May it please your Honor: The Commissioners of the Queen Victoria Niagara Falls Park beg to submit their Seventeenth Annual Report (being for the year 1902), to which is appended the usual statement of receipts and expenditures, the report of the Park Superintendent and the text of several agreements which were entered into during the year, together with the expert evidence obtained in connection with some of these agreements.

The vacancy which had existed on the Board of Commissioners since the decease of Mr. B. E. Charlton was filled during the past year by the appointment of Mr. Robert Jaffray of Toronto.

Before entering on a review of the proceedings and transactions of the Commission for the past twelve months, the Commissioners may be permitted to refer to certain strictures and adverse criticisms on the Management of the Park affairs which have appeared from time to time in the press. These criticisms evidently are based upon an entire misapprehension of the facts, and if allowed to pass unchallenged may be accepted by the public as being well founded and unanswerable. The chief stricture to which objection is taken by the Commissioners is, that in order to provide revenue they have committed acts of vandalism that will ultimately ruin the scenery of Niagara Falls, and one writer goes so far as to say "that it is scarcely possible to conceive how anything short of financial interest could have persuaded them (the Commissioners) so to play false to the whole spirit of their trust."

In view of such statements it appears to be necessary that the Commissioners should again clearly set forth the policy which was adopted at the time the Park was established, and which has been consistently adhered to throughout the fifteen years which have since elapsed, and in furtherance of this reference will be made (1) to the measures authorized by the Legislature for acquiring the Park and the duty cast upon the Commissioners to provide the funds needed for the improvement and maintenance of the property, (2) The area of the property originally selected about the Falls for Park purposes and the very extended territory that has since been placed under the jurisdiction of the Commissioners and, (3) The sources from which the funds are derived for carrying on the work.

When the Government of Ontario had the Park project under consideration two general principles were regarded as indispensable to the carrying out of the project, viz.: That no financial burden should be laid upon the Province for either the purchase or maintenance of the property, and in conformity with the plan adopted on the American side of the river that the Park should be made free.

Conforming to these initial conditions, obviously the only plan open to the Commissioners for securing the funds to establish the Park was through the issue of debentures guaranteed by the Province and secured by the lands

selected for the Park. Acting therefore on the recommendation of the Commissioners the Legislature authorized an issue of forty-year four per cent. debentures to the amount of \$525,000, and with the proceeds, the lands originally forming the Queen Victoria Niagara Falls Park were acquired, improved and thrown open to the public.

It should here be stated that the original design of the Commissioners was to include only the property running southwards along the bank of the river from the Clifton House to Cedar Island, about one mile in length and averaging about one-eighth of a mile in width, and comprising about 85 acres. From this territory the best views of both the American and Horse Shoe Falls can be obtained as well as the gorge of the river below the falls, while from the higher ground on the west the upper rapids can be seen in the distance. In order, however, to obtain nearer and better views of the magnificent rapids above the Falls and at the same time to secure for the Park the beautiful background and charming scenery surrounding what are now known as the Dufferin Islands, it was after careful deliberation decided to obtain an additional area extending about a mile and a half farther up the river to smooth water above the head of the rapids. For the greater part of this distance nature has provided an ideal background of beautifully wooded banks, which furnish the natural outline of a completed Park. These properties which originally comprised the Queen Victoria Niagara Falls Park cover about 154 acres. Subsequently additional lands (the property of the Crown) lying along the Niagara River were added to the Park from time to time or placed under the care of the Commissioners and the property known as Foster's Flats lying immediately north of the Whirl-pool and comprising about 100 acres of territory, unique in its unrivalled grandeur and primitive wildness, was purchased and added to the Park domain. With these additions the Park now practically extends the whole length of the Niagara River from Lake Erie to Lake Ontario and embraces an area of about 734 acres.

The acquisition of these additional lands and the maintenance and permanent improvement of this very extensive and diversified property necessitated a further issue of debentures for \$75,000, making a total debenture liability of \$600,000, bearing interest at 4 per cent. per annum.

Based upon the expenditures of the past fifteen years the average annual amount required for maintenance and permanent improvements has been as follows:—

4 per cent. on \$600,000 debentures.....	\$24,000
Permanent improvements—average per annum—.....	6,700
Maintenance and ordinary improvements.....	17,300
	\$48,000
Or an annual charge of.....	\$48,000

On the American side the lands expropriated for the purposes of the State Reservation have an area of 110 acres acquired at a cost of nearly one and a half million dollars. These lands were practically handed over to the Board of Commissioners as a gift from the State of New York, and in addition the State Legislature authorized a payment to the Commissioners of an annual appropriation sufficient for maintenance, while large sums are annu-

ally voted by the State for permanent improvements. In the case of Ontario, however, as has been shown the lands have neither been acquired, improved nor maintained by monies supplied by the Province, but the whole burden of providing for the outlay for all purposes devolved upon the Commissioners.

It now remains to show the methods adopted by the Commissioners to meet these heavy annual charges and the gravamen of the adverse criticisms referred to appear to be chiefly aimed at the principle of granting certain rights or franchises within the Park for the purpose of raising the necessary funds. The franchises granted are three-fold: viz: (1) For an electric railway (2) For a restaurant, photograph gallery and the privilege of operating an elevator to go under the Falls (3) For utilizing the water power of the falls for generating electrical energy.

These will be briefly considered in the order in which they are placed.

Owing to the great length of the Park domain extending from Chippewa to Queenston, a distance of nearly twelve miles, every portion of which is full of historic interest, and scenic grandeur, it was vitally important that all the objective points should be reached by an electric railway so that tourists might be able to visit every point at a reasonable cost. This was accomplished by inducing capitalists to construct an electric railway, the Commissioners granting the right to lay a double track through the Park and on the Chain reserve, for which they receive \$10,000 per annum. This line of railway has now become part of a belt-line system, giving visitors the magnificent views from the highland of the river bank on the Canadian side, together with the Niagara Glen and Queenston Heights Parks and the intermediate gorges descending to the river all within the Park domain and returning on the American side by the Gorge Railway, thus enabling visitors to view the banks and rapids from the lower levels. Whether the granting of this charter with permission to pass through the Park can, under the circumstances stated, be characterized as an act of vandalism, the Commissioners are quite content to leave to the verdict of the millions of visitors who have passed over this railway in the past ten years. That it has been a great boon to visitors both pecuniarily and visually in enabling them to view all points of interest with ease, comfort and satisfaction is almost universally admitted.

From a financial standpoint it is satisfactory to know that up to the present time the Commissioners have received over \$110,000 from this franchise.

To those who visited the Falls of Niagara under conditions existing prior to the regime of the Commissioners it will be remembered that the surroundings were disfigured by unsightly structures of various kinds, and visitors had to run the gauntlet of cab drivers and hotel runners in order to see the cataract or come within the scope of its influence. When the Commissioners assumed control of the property all these unseemly surroundings were dispensed with and visitors were permitted to roam at will throughout every part of the Park domain freed from all annoying importunities and interruption. For a great many years one of the attractions of Niagara Falls which appealed strongly to certain classes of visitors was a pilgrimage under the Falls, or sheet of water as it was then called, and

having photographs made showing the pilgrims encased in the oiled suits required for protection when under the heavy curtain of water. On the establishment of the Park, the Commissioners deemed it best to continue this interesting feature, and after providing improved means of access these privileges together with that of supplying refreshments to visitors were leased, subject to rigid regulations, for \$8,200 per annum. This franchise granted directly in the interests and comfort of visitors has produced over \$100,000 up to the present time.

The production of electrical power as a means of providing revenue has perhaps more than anything else been characterized as vandalistic in its ultimate effects on scenic conditions in the Park.

It should be borne in mind that at the time the Park was established the science of producing electrical energy for motive purposes was practically in its infancy, the first Electrical Street Railway in America having been put into operation in 1887. It was only when the practicability of transmitting electrical power had assumed shape that the matter was considered by the Commissioners as a possible means of obtaining revenue. The Commissioners do not claim that they acquired the portion of the Park lying south of Cedar Island looking to the utilization of this portion of the property as being eminently suited for this purpose. They do claim, however, that their recommendation to the Government which brought about the acquirement of this additional property has resulted in the greatest pecuniary advantage. Had the property not been expropriated when the Park was founded, viewing it now in the light of what has transpired on both sides of the river—that part of the property would doubtless have been acquired by capitalists and laid out as a manufacturing district without reference to its scenic environments, as has been done on the American side of the river north of the steel arch bridge, to the irreparable disfigurement of the river bank. On the other hand, had it been expropriated after its capabilities as a centre for production of electrical power on a large scale had been demonstrated, it is quite probable that the price of such expropriation instead of the original cost of \$100,000 would have been many millions of dollars, determinable only by the capitalization of the revenue obtainable from possible electrical franchises.

Coming now to the charge that the Commissioners have, in granting certain power privileges, committed acts of vandalism that will ultimately ruin the scenery of Niagara Falls, the Commissioners have to state that with the exception of the Ontario Power Company's Power House in the gorge under the Falls, hereafter referred to, all the proposed works connected with the generation of electricity are practically beyond the territory originally designed for park purposes. When the electrical power works are completed, not a single view of the Falls, rapids or gorge under the Falls will be obstructed in the slightest degree. On the contrary the filling in of the shore line above the Falls by excavated material from the tunnels will increase the Park area very considerably and will permit of roads and walks being constructed on the margin of the river which will greatly improve the views of the Upper Rapids, and at the same time cover the fore-shore which in some places has become exposed by the recession of the waters, owing to the breaking away of the cataract. The waters forming

the Dufferin Islands will be completely restored and improved by the construction of cascades and miniature falls, and besides, the area at that congested point in the park will be considerably enlarged. The unsightly iron and wooden bridges will be removed and solid masonry structures substituted, and when all the works are completed the Park surface from the Falls running south will all be laid out and improved to correspond with the completed Park overlooking the Falls.

Respecting the construction of the Ontario Power Company's power house in the gorge under the Falls, the Commissioners of the State Reservation made representations to the Board in July last and were granted a hearing with particular reference to the erection of the structure at that location. The contention of the Commissioners of the State Reservation being that the building would not only disfigure the landscape as viewed from several points in the American Reservation, but would also be objectionable from an aesthetic standpoint and at variance with the natural conditions desired by the Commissioners on both sides of the river.

On the other hand it was shown by the Canadian Commissioners that the location of the building in question would present no obstruction to the free views of the Falls or river from any point on the American side, and as the building would be far below the surface level of the Park, a portion of the roof and the two gable ends will be the only parts of the structure that would be seen from any point of view within the Queen Victoria Park. It was further pointed out that to make the building in any sense a conspicuous or objectionable feature of the landscape would depend solely upon the design and character given to it. Should, for instance, the building be designed upon the lines of the power house on the American side near the Steel Arch bridge, the public would have some grounds for complaint, but so far from the Commissioners sanctioning such a structure they have made the most stringent provisions to secure the highest degree of artistic treatment in outline, color and design which it is possible to secure, and they have no hesitation in asserting that upon the completion of the power house, with its facade covered by creepers and relieved by evergreens, and a roof harmonizing in color with the high limestone cliff forming the background, it will be found that not only will the structure itself be unobtrusive and entirely unobjectionable from every point of view, but that no violence will be done to the environment of the great Cataract.

The Commissioners have also arranged for the early removal of the large and unsightly building which is so conspicuous from the American side, and which was originally constructed for a museum but which has recently been used for a restaurant and shelter building. The removal of this structure which has formed quite a striking feature of the Park, and the substituting of a modern refectory near the centre of the picnic ground, will remove from the Park one of its most objectionable features, and more than counter-balance any temporary disfigurement which the construction of the power house in the Gorge may cause.

All of the works and structures connected with the electrical power projects have been designed with the object not only of doing the least possible injury to scenic conditions, but the Commissioners are confident in the belief that when the several works are completed, the consensus of opinion

by the vastly increased numbers of visitors that are expected to visit the Park will abundantly sustain them in their contention that the Park as a whole, with its wealth of electrical machinery, will then be of ten-fold greater interest to the great majority visiting it; and in addition not only will the immediate locality beyond the Park be built up into one of the great manufacturing centres of the world, but the quickening impulse and vivifying effects of the world's latest and most perfect form of energy—created and sent forth by the Falls of Niagara—will be felt from end to end of the Province.

In their annual report for 1901 the Commissioners outlined the changes which had been made in respect to the several agreements entered into whereby the Canadian Niagara Power Company and the Ontario Power Company of Niagara Falls were authorized to utilize a portion of the enormous water power of the Niagara River at the Falls for commercial purposes, and the nature and effect of the changes made in these agreements in their relation to the development of the Park design were at that time fully explained.

During the past year the Canadian Niagara Power Company have energetically prosecuted the important works connected with their enterprise and the greater part of the excavations required for the first instalment of power called for in their agreement, including the driving of the tunnel to carry away the waste water, have now been practically completed and a beginning has been made on the construction of the foundation walls of the power house. The Company has recently decided to go on and complete all the excavations necessary for the extension of the wheelpit, forebay and tunnel to the full extent contemplated for their maximum output of 100,000 electrical horse-power. The completion of this excavation will permit, greatly to the advantage of the Park, of the permanent restoration of the grounds in the vicinity of the works at a much earlier date than would otherwise be the case, or than was contemplated when the work was begun.

Under the agreement made with this company on 19th June, 1901, the Commissioners required that a forfeitable deposit of \$20,000 be made by the company to be returned should the company on or before 1st July, 1902, satisfy the Commissioner of Public Works for Ontario that :

(a) The sum of \$250,000 had been actually expended in the Province upon works, and in plant and materials used in carrying on the works contemplated by the agreement, and

(b) That it had expended or contracted to expend on or before 1st July, 1903, on these works, including machinery and appliances, the sum of \$1,500,000.

It having been shown to the Honorable the Commissioner of Public Works that the company had fulfilled both of these conditions, the \$20,000 deposited was returned to the company.

Under the agreements entered into with this company, provision was made for the construction of an ornamental steel truss bridge to carry the electric railway tracks and the new Park driveway over the intake leading the waters of the river to the works of the company. In preparing the designs for this bridge the commissioners considered it would be more in har-

mony with the environment to have a solid stone structure and to substitute arches of concrete and steel, faced with limestone, similar to the beautiful bridge erected by the Commissioners of the New York State Reservation between Prospect Park and Goat Island. The chief officials of the company realizing the importance of having the surroundings of their power station conform to the aesthetic requirements, accepted the suggestion, and this work is now well under way, although the cost to the company is considerably in excess of the original design.

A detailed statement of the works which have been carried on by this company during the year will be found in the report of the Superintendent of the Park appended hereto.

The Ontario Power Company made application early in the summer for an intake from the Niagara River above the Dufferin Islands in addition to the rights which had been granted them to conduct the waters of the Welland River by an open canal to and through the Park for the generation of electrical energy in a power house located below the Falls. Before granting any additional privileges to the company the Commissioners made a very careful survey of all the provisions of the several agreements which had been made in relation to the projects of the company with a view of securing the best possible results both in respect to the artistic features—the works being located in a public park—and to the financial position as well.

Upon mature consideration the Commissioners made the following stipulations an indispensable condition to the granting of any further rights or privileges, namely :

1. That the open hydraulic canal through the Park should be abandoned and all the works of the company north of the intake should be put underground.

2. That there should be no elevated forebay with gatehouse structure north of Table Rock house, but that the surface levels of this contracted portion of the Park should be restored to the original condition after the conduits or water pipes were laid.

3. That the penstocks should be carried down from the supply pipes to the power house by means of shafts and tunnels cut through the rock.

4. That the privilege of constructing a power house in the Park near the gravel pit, as provided in the agreement of 11th April, 1900, should be cancelled.

5. That the forebay works at the Dufferin Islands should be so constructed as to greatly improve and in no way mar the scenic beauty of the islands.

6. That the rental should be increased to \$30,000 a year as a minimum payment for any quantity of power under 20,000 electrical horse-power with the additional payment of \$1.00 per horse-power for all sold above 20,000 up to 30,000, 75 cents per horse-power for all above 30,000 up to 40,000, and 50 cents per horse-power for all power sold or disposed of above 40,000 electrical horse-power.

After protracted consideration and negotiations the Commissioners and the company reached an agreement on the 28th June embodying all of these conditions and granting to the company authority to take water for power purposes from the Niagara River near the extreme southerly limit of the Park, and by means of an intake and forebay constructed in the bed of the river east of the Dufferin Islands lead the waters of the river to a gatehouse located near Cascade Point and thence by means of conduits or pipes concealed beneath the surface of the ground conduct the water around the rear of the Park to north of Table Rock House, and from this point be distributed by means of penstocks to the water wheels in the power house under the cliff.

As the agreement could have no force or effect until approved by the Lieutenant-Governor-in-Council, strong opposition to its being so ratified was made by the Canadian Niagara Power Company, and a hearing was given all the parties interested before the Government on July 22nd and on the 2nd August before the Commissioners to the representatives of the Canadian Niagara Power Company. As, however, the arguments advanced in opposition to the granting of the franchise did not commend themselves to the Commissioners or the Government, the agreement was finally validated by Order-in-Council on the 7th August. The Order-in-Council imposes a condition that all plans submitted to the Commissioners for approval should be first approved by His Honor the Lieutenant-Governor-in-Council.

Shortly after the delivery of the agreement the company submitted plans for a coffer dam to unwater the river bed at the site of their intake and forebay. The construction of that work has proved of great interest to the public generally, as it demonstrates the facility with which the waters even of the Niagara River may be trained to flow in any desired direction, and some very interesting characteristics of the strata forming the bed of the stream above the Cascades have been revealed. The construction of this coffer dam has also afforded a valuable opportunity for the study of the currents of the river and the effect upon the surface levels of the water at points lower down the stream. The text of the agreement will be found in the appendix to this report.

Shortly after the granting of these additional privileges to the Ontario Power Company, application was made on behalf of Messrs. William Mackenzie, H. M. Pellatt and Frederic Nicholls for a site in the Park on which to develop electrical and pneumatic power on a large scale.

The location proposed for the works was "Tempest Point" midway between the works of the Canadian Niagara Power Company and the Ontario Power Company.

Before entering into negotiations with these gentlemen, the Chairman of the Commission prepared for the consideration of the Board a memorandum, which will be found in the Appendix to the Report, clearly setting out the questions involved, and which in his opinion would require to be settled before proceeding with the negotiations. This memorandum was submitted to the Government, and it was decided that a hearing should be given to the two companies holding franchises to develop power in the

Park in order to ascertain what objections they might have to the granting of further rights for this purpose. The interested parties were cited and the hearing given by the Government on 19th December last, when it became apparent that a great divergence of opinion existed between the hydraulic engineers of the Canadian Niagara Power Company, the International Railway Company and the engineers of the applicants.

In order to determine precisely the nature of these opinions, the several parties were invited to reduce to writing the arguments used at that meeting. Upon the reception of the written briefs the Government considered it judicious to furnish each of the parties with copies of the reports and arguments advanced by the others for such criticism and rejoinder as might be considered necessary. When all these reports and memoranda were received, the Commissioners, with the approval of the Government, engaged two eminent hydraulic experts to examine into all the questions at issue and to report fully upon the arguments set out in the respective briefs.

The engineers selected were Mr. Isham Randolph, C.E. (Chief Engineer of the Sanitary District of Chicago, a work in the construction of which over \$35,000,000 has been expended), and Mr. Robert C. Douglas, Hydraulic and Bridge Engineer of the Department of Railways and Canals, Ottawa. These gentlemen visited Niagara Falls and made as thorough an examination into the physical conditions existing at the present time as was possible, and also examined the works which have been constructed up to this date for the companies to whom franchises have been given.

Upon a full consideration of the reports of these experts the Commissioners came to the conclusion that the flow of the water and the level of the river at the intakes of the Canadian Niagara Power Company and the International Railway Company would not be materially affected by the proposed works of the applicants, as these were outlined in the plans submitted, and the Government authorized the Commissioners to conclude an agreement with Messrs. Mackenzie, Pellatt and Nicholls on the same general principles as obtained in the other agreements made, and this has been concluded and confirmed by Order-in-Council since the close of the year.

The text of the agreement entered into together with the arguments and briefs of the Solicitors, and the opinion of the hydraulic experts called in by the Commissioners, will all be found in the appendix to this report.

Shortly after the completion of the agreement entered into with the Mackenzie, Pellatt and Nicholls Syndicate, the Honourable, the Premier, requested the Board to furnish the Government with a report from a hydraulic engineer of high standing upon the locations above the Falls, and also in the Rapids of the Lower Niagara, where, in addition to the rights already granted, electrical power upon a large scale could conveniently be developed.

The Premier also desired the Commissioners to obtain an authoritative report upon the cost of transmitting electrical energy to cities and towns in Ontario within a reasonable distance of Niagara Falls, showing the probable cost of constructing the lines, the estimated loss in transmission, and the

probable cost of maintenance. After due consideration and inquiry, the Commissioners decided to engage Mr. Isham Randolph, C. E., of Chicago, whose eminence as a hydraulic engineer has been already referred to in this report, and who, in order to advise the Board in respect to important engineering questions relating to power development at Niagara Falls, had carefully studied the hydraulic conditions of the river within the Park.

In order to make himself thoroughly familiar with the broader questions now submitted for his consideration, Mr. Randolph again visited Niagara Falls, and made an extended examination into the physical characteristics of the river, both north and south of the present Park limits.

Mr. Randolph's report, which will be found in the appendix, demonstrates very clearly that the available sites for water-power development on the Canadian side of the river have not been exhausted by the rights and privileges already granted by the Commissioners, but that there are several points where power may be developed upon as large a scale as the plants now under license, and at a cost not materially in excess of those plants.

One of the locations referred to in his report is quite close to the Falls, and north of the intakes of the several companies licensed, but the powerhouse is designed to be subterranean, and nothing but a small building, to enclose an elevator, would appear on the Park surface. The other locations are all south of the Park limits, and would be upon the general lines adopted by Messrs. Mackenzie, Pellatt and Nicholls for their development.

In addition to these major projects, Mr. Randolph confirms the opinion given in the Twelfth Annual Report of the Commissioners, that there are several locations along the course of the river below the Falls where water-powers may advantageously be developed, although these will necessarily be upon a less extensive scale than at the Falls proper.

Mr. Randolph's report, therefore, sets at rest the newspaper opinion that the granting of the concessions already made has exhausted the field for power development at Niagara Falls, and that municipalities and other consumers of electric power will, for all time, be at the mercy of a possible combination of the licensed companies.

The Commissioners, however, are of the opinion that further rights should not be granted until it is shown that a combination having for its object an undue increase in the cost of power is either possible or probable.

The plans of the three companies now exercising their franchises contemplate such a large output of electrical power that, as has been already shown, there is no likelihood of anything like the demand being for many years equal to the supply, and consequently the tendency will be to compete for the business offering.

As any power development at Niagara Falls necessarily involves a very great initial outlay, with consequent high interest charges per H. P. until a large amount of power is sold, the Commissioners recommend that the companies now developing under their several agreements should be given an opportunity to complete their works before other privileges on a large

scale are granted, unless it can be shown to be in the public interest to grant such additional privileges.

Respecting the selection of an electrical engineer of large experience to report upon the construction and operation of lines for the transmission of electrical energy from Niagara Falls to cities and towns in Ontario, within a radius of 100 or 150 miles from the Falls, the Commissioners decided, after careful investigation, to secure the services of Mr. L. L. Nunn, of Telluride, Colorado, to furnish them with a report upon this important subject. Mr. Nunn is the General Manager of the San Miguel Consolidated Telluride Company and Telluride Power Transmission Company; General Manager Logan Power Company, Logan, Utah; General Manager the Power Company, Logan, Utah; General Manager, the Power Company, Norris, Montana; and he is credited with being the first man to successfully demonstrate the practicability of long-distance high-tension transmission.

Mr. Nunn's report, which will be found in the Appendix to this Report, affords a very interesting statement of the conditions affecting this vastly important subject, and will be found of great value at the present time.

The various field works which have been carried on during the year are referred to at length in the accompanying report of the Superintendent of the Park.

The following statement will show the receipts and disbursements for the year :

Receipts.

The Ontario Power Company. Rental.....	\$30,000 00
The Canadian Niagara Power Company. Rental	15,000 00
The Niagara Falls Park and River Railway Company. Rental..	10,000 00
The Fort Erie Ferry Railway (Rental for 3 months)	250 00
Zybach & Company.....	8,200 00
Wharf privileges	422 00
Tolls.....	1,167 20
Sales of old materials and sundries.....	219 96
	<u>\$65,259 16</u>

Expenditure.

Paid Imperial Bank overdraft for 1901.....	\$2,704 39
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Capital Account.

Paid for permanent improvement, including cost of materials.....	\$2,055 07
Paid wages of mechanics and laborers	2,616 46
Paid for land purchases	917 18
	<u>\$ 5,588 71</u>

Maintenance Account.

Paid salaries and wages, including wages of teams, laborers, etc	\$16,283 22
Paid cost of materials	3,130 79
Paid office expenses	289 65
Paid Commissioners' expenses	879 72
Paid miscellaneous	483 55
	<u>\$21,066 93</u>
	<u>\$26,655 64</u>
Paid interest on Bonds and Bank Charges.....	24,188 28
Balance at Imperial Bank.....	11,710 85
	<u>\$65,259 16</u>

All which is respectfully submitted.

J. W. LANGMUIR, Chairman.
 GEORGE H. WILKES.
 JAMES BAMPFIELD.
 A. W. CAMPBELL.
 ROBERT JAFFRAY.

APPENDIX "A."

Report of the Superintendent of the Park, being for the year ending December 31st, 1902.

To the Commissioners for the Queen Victoria Niagara Falls Park :

Gentlemen.—The past year has been an eventful one in the history of the Park. In the report for 1901 the early operations of the Canadian Niagara Power Company were referred to as marking a new era in connection with Niagara Falls, but 1902 has witnessed the beginning of operations by the Ontario Power Company, whose works are designed upon even a larger scale than those of the Canadian Niagara Power Company. In addition to these two gigantic concerns a franchise has recently been granted to a syndicate of Toronto capitalists who purpose taking immediate steps to rival if not excel the other companies in the magnitude and completeness of its work, so that for all future time the history of the Park seems to be inseparably connected with the utilization of the water power within its borders for the creation of electrical energy on a scale hitherto undreamed of.

POWER DEVELOPMENT WORKS.

The Canadian Niagara Power Company.

During the year the Canadian Niagara Power Company have vigorously carried on their several works for the development of power. The great tunnel designed to carry away the exhaust water from the water wheels to the lower river, and which was but well begun at the beginning of the year, has been driven through from the shaft both ways to the portal below the Falls on the north, and to the wheel pit on the south, a total length of 750 yards. The contractor for the tunnel work succeeded in driving his southerly heading up to the line of the wheel pit before the latter work had been excavated down to the corresponding level. In order to expedite the work it was therefore decided to extend the tunnel in below the wheel pit excavation, and this work is now under way, the cutting being made of somewhat greater dimensions in order to form the lower part of the wheel pit. A great deal of extra work is required at the bottom of the wheel pit in addition to the simple sinking of the excavation, and it is expected that all this work will be completed by the time the wheel pit is sunk down to the level of the crown of the tunnel. The wheel pit is a great chasm, 266 feet long by 21 feet wide, cut in the rock with masonry arches, girders and other appliances for supporting the penstocks and wheels as well as the enormous electrical machines which are to generate the electric power designed by the company for commercial purposes.

As it was deemed essential that the walls of the wheel-pit should not be shaken by the effects of the explosives used, channelling was resorted to, which, although a slower process than drilling and blasting, was considered preferable. A narrow and continuous channel in the rock following the outline of the excavation required is first cut downwards and a little outwards by channelling machines running along each side of the excavation. These travel on rails and make a two-inch clean cut separating the rock walls from the mass it is desired to remove to below the level of the bench or step determined on, which in this case is six feet in depth. Holes

are then drilled from cut to cut across the 21 feet of intervening rock and the mass is shattered by dynamite and afterwards removed from the excavation. This work has made very good progress, and the sinking of the northern half of the wheel-pit has been carried down an average depth of nearly one hundred feet.

Late in the season the company decided to go on and excavate the remaining half of the wheel-pit to the full extent required for the installation of the 100,000 horse-power for which the plant is designed, and to complete the works required to make the intake and forebay of the full dimensions contemplated by the agreement instead of water connections for only one-half of the total to commence with. This decision on the part of the company is clearly of great advantage to the Park, as it insures a much more speedy and permanent restoration of the surface of the grounds contiguous to the works, which would of necessity be torn up and destroyed by any succeeding expansion. Some difficulty may, however, be experienced in finding space in the park for the large additional quantities of materials to be removed, and a considerable proportion of the rock excavated may have to be taken out of the Park, as provided in the agreement. Up to the present the material excavated has been used for various purposes, viz., to fill up the low ground west of Cedar Island, to extend the portion of the shore line shallowed by the recession of the Falls out to deep water, and to cover the exposed shale at the base of the Falls to prevent its rapid wearing away. A large quantity has also been taken off to make a filling at the crossing of the electric railway over the Whirlpool Ravine, and several thousand cubic yards have been broken to form concrete for the lining of the tunnel.

BRIDGE AT INTAKE.

By midsummer the excavations at the site of the Canadian Niagara Power Company's intake had been carried down to solid rock, and the construction of the bridge to carry the Electric Railway and the main Park driveway was begun. This bridge was first designed to be of ornamental steel trusses, supported by stone abutments with a centre pier. Acting, however, upon the suggestion of the writer, the company have substituted a concrete arch bridge reinforced by steel ribs and faced with cut stone masonry. The parapet walls are to be of rock-faced masonry, and the bridge, which will consist of five spans of fifty feet each in the clear and have a total width of about fifty feet, will when finished be a very handsome feature of the Park.

INTAKE FOR ELECTRIC RAILWAY AND TOWN WATER SUPPLY.

The filling out from the shore to deep water by the Canadian Niagara Power Company necessitated a new intake for supplying the flumes of the Electric Railway and the town waterworks. In each of these cases the supply of water has of late become quite inadequate, owing in part to the rapid current carrying stones and gravel to the entrances of the flumes, which were very contracted in area, and in part to the lowering of the margins of the river by the receding of the contour of the Horse Shoe Fall. In preparing plans for

new intakes it was deemed best by the respective parties to have one large opening from the river, instead of two small ones as before and to slow up the velocity of the water passing through to the existing flumes in order to relieve the difficulty experienced from ice. The plans approved by the Commissioners provide for five openings of 21 feet each between piers, these openings to be protected by heavy steel racks secured to the Portland cement concrete masonry piers and containing walls. The main Park driveway will be carried over this intake by a steel deck bridge with a span of about eighty feet. The Electric Railway Company are to provide the bridge: all the other work, including the deepening of the area enclosed by the intake walls, is at the expense of the Canadian Niagara Power Company. The contractors for this work have made very slow progress, and it will not be completed until the spring.

THE ONTARIO POWER COMPANY.

Under the terms of the agreement made with this Company on 11th April, 1900, work was commenced in the Park in April last by making an initial cutting along the centre line of its proposed open canal from the gravel pit northwards to near the Electric Railway Power House. Work was also begun outside the Park and several test holes along the line of the waterway from the Welland River were put down to the required level.

NEW AGREEMENT.

Before much progress had been made on the works within the Park the company found it desirable to change its plans, and made an application for an intake and supply from the Niagara River above the Dufferin Islands. This privilege to be supplementary to the Welland River works, but development from the Dufferin Islands works to be first carried out. After negotiations an agreement was made under date of 28th June granting the desired privileges. By the terms of this agreement the right to construct an open canal through the Park was cancelled and a stipulation made that all the water required by the company from either the Welland or Niagara Rivers should be conveyed under the surface of the Park in conduits or pipes, and that no part of the Park surface should be occupied by a canal or forebay.

EXCAVATIONS AT SITE OF POWER HOUSE.

Upon the execution of this new agreement, work upon the open canal was suspended, and the Company concentrated its efforts upon clearing away the loose rock forming the talus from the site of the Power House in the lower river gorge. This difficult work proved of great interest as the rocky face of the chasm was uncovered to the level of the water in the lower river, and the outermost line of solid rock indicated where the cataract had hewn its way when some centuries younger than at the present time. The excavations for the first section of the building were completed before the close of the year, and a beginning was made upon the excavations on the upper Park level for the conduits or pipes near the Table Rock House. As this portion of the Park

is usually thronged by visitors in mid-summer, it is very desirable that as much of the work as possible requiring to be done at this point should be completed before July.

COFFER DAM.

Subsequent to the conclusion of the new agreement authorizing the company to take water from the Niagara River, application was made for approval to plans for a coffer dam to shut off the waters of the river and lay bare the river bed at the site chosen for the intake and forebay, extending from the Dufferin Islands up-stream to the southern boundary of the Park. This work was begun in August and completed by November, and it has also been of very great interest to the public generally owing to the variety in the conformation of the strata forming the bed of the stream and which owing to the swiftness of the current had been swept clean for ages. The coffer dam was commenced at the point where the easterly limit of the Park intersects the edge of the river, and running out into the stream about twenty feet turns at a right angle and runs in a direct line with the intake of the Canadian Niagara Power Company for a distance of over two hundred yards, when it curves outward and terminates near the line of the first cascade a total distance of about 250 yards. The construction of this coffer dam shut off all the water flowing in and around the Dufferin Islands, and thousands of visitors have been attracted by the strange spectacle. The company have not yet begun the permanent works incidental to the intake or forebay, but the engineers of the company expect to have these works so far completed that the waters of the river will be restored to their usual channels by mid-summer.

FORT ERIE RESERVE.

The Government of the Dominion having granted a lease to the Commissioners of the reserve of thirteen and a half acres about the ruins of Fort Erie, on condition that the property be cared for as part of the Park system, the Commissioners took possession and decided to fence off the grounds, which have been an open pasture field for many years; turned cedar posts for an ornamental wire garden fence have been set out along the front, and on the south unturned posts of cedar for a simple field fence have been placed in position. Owing to delay in obtaining the desired separating rails the fencing is not yet completed. In the spring a beginning will be made towards putting this historic ground into proper condition.

GENERAL MAINTENANCE.

The spring and summer of 1902 were characterized by an unusual amount of precipitation, heavy snow falls in the earlier months and frequent rains throughout the summer. This climatic condition was most favorable to the Park, as in many places the soil is but a few inches in depth, and in dry weather both grass and shrubs suffer in consequence. Throughout the whole of last season, however, the verdure was remarkably fresh and the trees and shrubs were never seen to such advantage. The very heavy cartage of materials required in the new power works, owing to the excessive moisture, cut up the Park driveways and made it difficult to maintain them in good condition.

A considerable shipment of new herbaceous shrubs was added to our collection. These were put in the nursery to mature before setting out in the Park.

QUEENSTON HEIGHTS PARK.

The heavy repairs to the shaft and pedestal of Brock's Monument, which were referred to in last year's report, were carried out in the early summer, and this noble monument is now in good repair. It was, however, found impossible to take down the dwarf wall enclosing the monument, and this remains to be taken in hand.

The densely wooded background, which surrounded the earthwork redoubts, has been cleaned up, and the sunlight allowed to penetrate. Much of this undergrowth was of evergreens, and the crowding had forced the growth to the tops, with the result that any heavy snow fall lodged in the tops and bent and broke them in all directions, while the lower limbs for want of light and room to develop had perished. In a few years it is hoped that this historic ground may be restored to a Park-like appearance and every part of it made accessible to visitors.

NIAGARA GLEN.

The pathways opening up this widely diversified portion of the Park were maintained throughout the season, and new ones built in order to provide access to other points of interest. This unique glen is yearly becoming better known, and visitors in increasing numbers are availing themselves of the facilities which have been provided since the property was acquired by the Commissioners.

CHAIN RESERVE.

The Chain Reserve along the shore of the Niagara River between Slater's Point and Fort Erie continues to suffer from the eroding action of the river. The company which obtained a franchise to construct an Electric Railway along this reserve, and as compensation in part undertook to provide protecting works, has not as yet done anything in this connection. The roadway having at several points become dangerously narrow, additional lands have been secured and the driveway set back in such a manner as to afford abundant room for present requirements. There are, however, several additional points where greater width is needed, and these will require attention in 1903.

The whole respectfully submitted.

JAMES WILSON,
Superintendent.

AGREEMENT OF 28TH JUNE, 1902, BETWEEN THE COMMISSIONERS AND THE ONTARIO POWER COMPANY.

This Agreement, made this 28th day of June, 1902, between the Commissioners of the Queen Victoria Niagara Falls Park, acting herein on their own behalf and with the approval of the Government of the Province of Ontario, and hereinafter called the "Commissioners," of the first part, and The Ontario Power Company of Niagara Falls, incorporated by the Parliament of Canada, and hereinafter called the "Company" of the second part.

Whereas the company, on the 29th day of November, 1901, did obtain the sanction of the Minister of Railways and Canals to the plans and surveys of works proposed to be built by the company, of a Canal and Hydraulic Tunnel, from a certain point in the Welland River to the boundary line of the Queen Victoria Niagara Falls Park, and also, on the 20th day of February, 1902, did obtain the sanction of the said Minister of Railways and Canals to the plans and surveys of works proposed to be built by the company, of a Canal and Hydraulic Tunnel, from the said boundary line of the said Park and through the same to a point of discharge on the west bank of the Niagara River below the gorge, whereby the waters of the said Welland River can be led through the Queen Victoria Niagara Falls Park for the purposes of supplying power for use in manufacturing or any other business or purpose by means of the discharge of such water in the Niagara River, in accordance with the powers given by the Act of Canada, 1887, chapter 120, and its amendments as then enacted by the Parliament of Canada, and which said plans and surveys are filed and are of record in the Department of Railways and Canals of Canada at Ottawa.

And whereas the Lieutenant-Governor of Ontario, on the 23rd day of April, 1902, by Order-in-Council, and the Commissioners by the several agreements of 15th August, 1901, hereinafter recited, subject to conditions, provisions and stipulations, did consent that the works of which the plans and surveys so sanctioned by the Minister of Railways and Canals, as above recited, be constructed within the limits of the Queen Victoria Niagara Falls Park, and also that the powers given by the Act of Canada, 1887, chapter 120, and its amendments or any of them, to the company, as therein enacted up to the date of the aforesaid sanction by the Minister of Railways and Canals, may be exercised within the limits of the said Park, in accordance with three separate agreements heretofore entered into between the parties to this agreement, and severally bearing date as follows: First, on 11th April, 1900; second, a supplementary agreement on 15th August, 1901, and third, an Ancillary Agreement on the said 15th August, 1901, whereby the conditions, provisions and stipulations entered into between the parties with the consent and approval of the Lieutenant-Governor-in-Council as aforesaid are duly witnessed and agreed upon, as well by force of the powers vested in the Commissioners under the Act of Ontario, 1899, chapter 11, and Section 36, as by any other powers vested in the Commissioners and exercisable by or with such approval as aforesaid.

And whereas the company, on or before the 11th day of April in this present year (1902), pursuant to paragraph 2 of the said supplementary

agreement, and in observance of the terms of paragraph 31 of the agreement of 11th day of April, 1900, did begin to construct the works as laid down upon the map or plan annexed to the supplementary agreement of 15th August, 1901, entitled "Amended Map of the Ontario Power Company's Works in the Queen Victoria Niagara Falls Park" and lettered "B."

And whereas the parties to these presents have agreed that the company may take an additional supply of water to be obtained by an intake from the Niagara River under the powers contained in the before in part recited Act of Ontario, 1899, chapter 11, and Section 36, at a certain defined point, for the purpose of generating electric or other power, as in the Act of Canada, 1887, and its amendments specified, by means of the works located and defined in the aforesaid supplementary agreement.

And the parties have also agreed, as by these presents defined, on provisions whereby the supply of water for the purposes of generating electric or other power as aforesaid, whether such supply be obtained from the Welland River as already agreed, and provided by the agreements previously in part recited, or from the Niagara River as by these presents provided, shall be led through the Park by means of conduits or pipes as hereafter specified. And have also agreed for one rental being payable in manner and at the periods hereinafter specified by paragraphs 10 and 11 of these presents, for the enjoyment of all the rights and privileges by this or the previous agreements granted and conferred upon the company. And have also agreed to surrender, as by the execution of these presents it is testified are surrendered the rights of the location and construction of works relating to the "first development," as described and provided by the aforesaid agreement of 11th April, 1900, notwithstanding any matter relating thereto, contained in the supplementary agreement of 15th August, 1901, and for convenience the expression in these presents of Niagara River Intake shall mean the right granted to obtain water by these presents and the expression of Welland River Intake shall mean the rights acquired to take water as described in and by the agreements previously in part recited.

Now, Therefore, This Agreement Witnesseth, as follows, that is to say:

1. For the purpose of generating electricity and pneumatic power, or any other power within the Acts of Incorporation of the company, to be transmitted and capable of being transmitted to places beyond the Park by means of the works described in paragraph 2 of the hereinbefore in part recited supplementary agreement of 15th August, 1901, indicated on the map or plan thereto annexed, entitled, "Amended map of the Ontario Power Company's works in the Queen Victoria Niagara Falls Park," and lettered "B."

The Commissioners hereby grant to the company, subject to the consent and approval of the proper authority and save as hereinafter limited, a license irrevocable to construct upon or in the natural channel or bed of the Niagar River an intake and forebay by means of which water may be taken from the Niagara River and conducted through conduits or pipes or tunnels through the Park to or near the the point marked "L" in the map or plan hereto annexed marked "C", and from such point be continued in lines parallel with and adjacent to the conduits or pipes which may be required to lead the waters of the Welland River intake to the power house,

situate in the gorge below the Falls, in accordance with the supplementary agreement of 15th August, 1901, hereinbefore in part recited, and as located by map or plan "B" annexed to said supplementary agreement, and by means of conduits or pipes, as hereinafter more particularly specified, in lieu of the open channel and forebay as by the said map or plan "B" appears and is laid down. The works to be done in relation and to carry out the rights granted as the Niagara River Intake to be as shown in pink on the map or plan marked "C", entitled "Revised plan of works of the Ontario Power Company's works in the Queen Victoria Niagara Falls Park," and hereto annexed and subject to provisions hereinafter contained, and to all other provisions of law to be observed in exercising the said franchise or the works required for its development. Provided also that these presents are not to be construed as expressing or implying any covenants by the Commissioners for title or quiet possession.

2. The said map or plan marked "C" hereto annexed is identified by the seals and signatures of the parties hereto.

3. The several works which the Company are by these presents authorized to perform and do may be more particularly described as follows, reference being made throughout to the above described map or plan marked "C", which is attached to and forms part of this agreement ;

(1) From a point at or near (A) to a point at or near (B) to construct a permanent rack and ice fender.

(2) From a point at or near (B) to a point at or near (C) to construct a concrete wall of sufficient height to impound the water required at an elevation approximately equal to river level at point of intake.

(3) From or near (C) to or near (D) to construct an overflow dam or waste weir of capacity sufficient to draw from the forebay any ice which may pass through the rack into the headrace.

(4) From or near (D) to or near (E) to construct a headblock with gatehouse and gates to control water supply to conduits.

(5) From or near (E) to or near (F) to construct a concrete wall of sufficient height to protect the Dufferin Islands from overflow.

(6) From or near (F) to or near (G) to construct an overflow Jam or sluiceway and to regulate the flow of water round Dufferin Islands.

(7) From or near (K) to or near (D) to construct a rack and screen to prevent ice or other objectionable matter entering forebay.

(8) To excavate the bed of the raceway and forebay in order to slow the speed of the water and afford sufficient hydraulic head at headgates.

(9) To construct temporary cofferdams in order that any or all of these works may be properly constructed.

(10) From the gate house (D-E) to construct one or more conduits or pipes through the Park to the point at or near (L) on said map or plan, these conduits or pipes to form a syphon under the lower channel of the Niagara River at the Dufferin Islands.

(11) To construct conduits or pipes from or near the point (I) on said map or plan "C" or where the works of the company to carry the waters of the Welland River are designed to enter the Park to or near the point (II) on plan or so far as the penstock chambers (under the agreements of April 11th, 1900, and August 15th, 1901.)

(12) To construct cascades and overflow dams in the existing channels of the Dufferin Islands to preserve the surface levels of the several streams under a restricted flow of water.

4. The works hereinafter specified and embraced in the following subsections (a) to (j) inclusive, and authorized by the Commissioners to be done and executed by the company by these presents and the manner in which the same may, from time to time, be proposed to be performed or varied shall, before being commenced, be submitted by the company to the Commissioners accompanied by suitable plans, profiles, specifications and elevations as the case may require, and the scenic and general features thereof shall be approved by the Commissioners in writing. This approval shall in no wise relieve the Company from responsibility for the stability and effectiveness of its works, but it is intended to secure, as far as possible, a degree of harmony in outline and treatment compatible with the location and with the works in a public park. The works to which such approval are required, and shall not be proceeded with without such approval, are the following :

(a) The location of the temporary cofferdam to shut out the waters of the river from the headrace and forebay during construction of the works.

(b) The outline and method of treatment proposed for the walls of the headrace and forebay.

(c) The raising of the northerly shore of the Dufferin Islands.

(d) The overflow dams, weirs, cascades, etc., to regulate the flow of water in the headrace and forebay, and in and around the Dufferin Islands.

(e) The depositing of waste materials from the excavations of the company.

(f) The design and location of the bridge required to carry the Park driveways at the Dufferin Islands.

(g) The conduits or pipes to carry the supply through the Park, including the method of concealing or covering over the same, and the method of syphoning under the lower channel at the Dufferin Islands.

(h) The works and structures for regulating the flow of water at the penstock chambers.

(j) The power house and the means of access thereto, including the filling out into the lower river in front thereof.

5. The company shall remove all good surface soil which may be found at any point where its works are to be constructed and deposit the same in heaps at convenient points as the Commissioners may direct—this good surface soil shall be used as a top dressing for all areas which may be disturbed by the operations of the company, or for covering over any waste

material taken from the excavations of the Company in the Park. Should the quantity of good soil so obtained be insufficient in the opinion of the Commissioners to afford a proper covering for such new or disturbed areas, the company shall obtain from without the Park sufficient good soil for this purpose, but the quantity of good surface soil which the company may be called upon to bring into the Park and use as a covering or top dressing shall not exceed 10,000 cubic yards.

6. Material other than the good top soil above referred to which may be excavated from the works of the company in the Park shall be used for :

(a) Raising the northerly shore of the Dufferin Islands.

(b) Forming new land or islands at such points near the Dufferin Islands as the Commissioners may determine.

(c) Filling out into the river below the Dufferin Islands to lines and levels to be given by the Commissioners.

(d) Filling up the low ground along the line of the conduits to the finished surface level of the Park—such finished surface level to be defined by the Commissioners.

Before depositing any material other than heavy stone rip-rap in rapid water the Company shall first construct a substantial and efficient crib work, facing to the ordinary level of the river, in order to protect the filling from being eroded by the action of the current. The heights, lines, slopes and levels of all filling to be defined by the Commissioners.

7. For the purposes of construction and to remove or receive supplies of materials and machinery, the company may build, subject to the approval of the Commissioners, tramways, and such other appliances and structures as may be necessary for the prosecution of the work, but these appliances are to incommode to the least possible extent the ordinary travel in the Park, and shall be removed as soon as the works for which they are required are completed.

8. The company shall provide and construct one driveway bridge in place of the north Suspension bridge connecting the Dufferin Islands, such bridge to be of concrete steel construction of appropriate design and faced with rock-faced limestone. The bridge to be not less than twenty (20) feet in width of roadway and with a six foot pathway on one side. Should it be necessary to interfere with the present Suspension Bridge before the completion of the new concrete steel structure, temporary wooden bridges are to be provided to carry the traffic.

9. The license hereby granted shall take effect and operate from the day at which these presents shall have force and effect. Under paragraph twenty hereof and for the sake of uniformity in termination of periods with the provisions of the above in part recited agreements previously made by and between the parties hereto, shall terminate on the first day of April, 1950, unless terminated by operation of law or any provisions in this agreement contained.

10. At the time of the signing and delivery of these presents the company will pay to the Commisisoners the sum of \$30,000, which shall be accepted and taken as rent in advance up to 30th September, 1903.

11. On and after the first day of October, 1903, the company having duly observed and performed all the agreements and conditions by them agreed to be done and performed, the company shall pay a clear yearly rental of \$30,000, payable half-yearly, on the first days of April and October in each year, and in addition thereto, payment at the rate of the sum of \$1.00 per annum for each electrical horse-power generated and used and sold or disposed of over 20,000 electrical horse-power up to 30,000 electrical horse-power in the year, and the further payment of the sum of 75 cents for each electrical horse-power generated and used and sold or disposed of over 30,000 electrical horse-power up to 40,000 electrical horse-power in the year, and the further payment of the sum of 50 cents for each electrical horse-power generated and used and sold or disposed of over 40,000 electrical horse-power in the year, that is to say, by way of example, that on generation and use and sale or disposal of 40,000 electrical horse-power in any year, the gross rental shall be \$47,500 for that year, payable half-yearly, and so on, in case of further development at the sum of 50 cents for each electrical horse-power as above provided, and that such rates shall apply to power supplied or used either in Canada or the United States. Such additional rental as shall be payable for such generation and sale or other disposition as aforesaid to the Commissioners shall be payable half-yearly at the rate above specified on the first days of April and October in each year for all the power sold in the said several half-yearly periods from the day of sale, and within ten days after the said first days of April and October in each year on which such additional rentals shall be payable respectively the Treasurer or, if no Treasurer, the head officer of the company shall deliver to the Commissioners a verified statement of the electrical horse-power generated and used and sold or disposed of during the preceding half-year, and the books of the company shall be open to inspection and examination by the Commissioners or their agent for the purpose of verifying or testing the correctness of such statement, and if any question or dispute arises in respect to such return or if any statement delivered at any time by the company to the Commissioners of the quantity or amount of the electrical horse-power generated and used and sold or disposed of or of the amount payable for such additional rentals, the High Court of Justice of Ontario shall have jurisdiction to hear and determine the same and to enforce the giving of the information required.

Provided always that if any part of the said rent, whether payable under this paragraph or in respect of the renewal term or terms in paragraph 15, shall be in arrear for three months, whether legally demanded or not, the Commissioners, or if not then an existing corporation the Government of the Province may re-enter on the premises or any part thereof in the name of the whole, and thereupon this agreement shall determine, and the remainder of the term then current shall terminate as well as any renewal or renewals thereof which under this agreement may be claimed.

12. And whereas the company has actually deposited to the credit of the Commissioners in the Canadian Bank of Commerce the sum of \$50,000, with the assent of the Commissioners it is hereby agreed that when the company shall have actually expended the sum of \$250,000 on works upon the grounds within the Park, either on the works known as the Niagara River

intake or known as the Welland River intake and the Commissioners are satisfied of the amount of such expenditure then that the Commissioners will pay the said sum of \$50,000 to the company.

13. This agreement shall be taken to complement the previous above in part recited agreements made between the parties hereto, and all the terms and provisions thereof shall so far as applicable apply to the works authorized by these presents and to the execution and carrying out thereof.

14. And for greater certainty, but not so as to restrict the generality of the foregoing, it is hereby declared and agreed that if at the end of the said period of license of fifty years as created by the agreement of 11th April, 1900, and the period of license created by these presents shall have terminated under the operation of paragraph 11 of these presents, renewal of term or re-adjustment of rentals shall be made in accordance with the provisions of paragraph 27 of the 11th April, 1900.

15. In lieu of paragraph 31 of the agreement of 11th April, 1900, so much of its provisions as are as follows shall apply not only in respect of the works authorized by these, but in respect of the works authorized by the supplementary agreement of 15th August, 1901, which have been in part begun as hereinbefore recited, the company undertake to begin the works authorized by these presents, (or by any of the agreements previously entered into between the parties and in part recited), within two years from the date of this agreement, and to have proceeded so far with the said works on or before 1st April, 1906, that they will have completed within the Park water connections (that is to say: headrace, forebay, conduits or pipes, penstocks and tailrace), for the development of 40,000 horse power, and have actually ready for use, supply and transmission 20,000 developed electrical or pneumatic horse-power by said last mentioned day, and if not then completed the Lieutenant-Governor-in-Council may declare this agreement, the liberties, licenses, powers and authorities so granted and every one of them to be forfeited and void, and thenceforth after such declaration the same shall cease and determine and be utterly void and of no effect whatever.

16. And not to restrict the generality of the foregoing it is hereby declared that the following paragraphs of the agreement of 11th April, 1900, shall apply and be taken to be inserted herein: 8, 12, except the words "in its first development" in fifth line of said paragraph, 19, 20, 23, 28, 29, 30, 32, 33, 34, 35, 36, 37, also paragraphs 1, 2, 6, 7 and 8 of the supplementary agreement of 15th August, 1901.

17. And that the following paragraphs of the agreement of 11th April, 1900, be deemed to be inapplicable, namely, 10, 13, 15, 17, 18, 22, 24, also paragraphs 3, 4 and 5 of the supplementary agreement of 15th August, 1901.

18. It is further agreed that if from any cause the supply of water at the point of intake as by these presents defined be diminished the Company shall have no claim or right of action against the Commissioners, but may deepen such point of intake to such extent as to restore the supply of water to the volume or quantity necessary for the purposes of the company.

Nor give to the company any right of action against other licensees or grantees of the Commisisoners in respect of any diminution not substantially interfering with the supply necessary for the company, nor so long as such necessary supply can be obtained by means of deepening at said point of intake.

19. And the said parties hereto mutually and respectively covenant, promise and agree with each other to carry into effect, observe, perform and fulfill all the provisions and stipulations in these presents contained and to be carried into effect, observed performed and fulfilled by the said parties respectively.

20. This agreement shall have no force or effect until approved by the Lieutenant Governor-in-Council.

In Witness Whereof the corporate seal of the Commissioners has been hereunto affixed by their Chairman, who has also signed these presents in certification of due execution hereof by the Commissioners, and the corporate seal of the company has been hereunto affixed by the President, who has also signed these presents in certification of due execution hereof by the company, and on the day and year aforesaid.

(Signed) THE ONTARIO POWER COMPANY OF NIAGARA FALLS.

By J. J. ALBRIGHT, President.

ROBERT. C. BOARD, Secretary. (Seal)

Witness : JAMES WILSON.

(Signed) THE COMMISSIONERS OF QUEEN VICTORIA NIAGARA
FALLS PARK.

By J. W. LANGMUIR, Chairman. (Seal)

AGREEMENT 29th DAY OF JANUARY, 1903, BETWEEN THE COMMISSIONERS AND MESSRS. MACKENZIE, PELLATT, AND NICHOLLS.

This Agreement made this 29 day of January, A.D. 1903.

Between The Commissioners of the Queen Victoria Niagara Falls Park, acting herein on their own behalf and with the approval of the Government of the Province of Ontario, hereinafter called "The Commissioners," of the first part, and William Mackenzie, of the City of Toronto, Capitalist, Henry Mill Pellatt, of the same place, Capitalist, and Frederic Nicholls, of the same place, Capitalist, hereinafter called "The Syndicate," of the second part.

Whereas for convenience and to prevent ambiguity it is agreed and understood by and between the said parties hereto and is hereby declared as follows, that is to say:

(a) The expression "The Park" whenever it occurs herein shall be understood to mean the Park proper, namely The Queen Victoria Niagara Falls Park south of its original boundary in front of the property formerly known as the Clifton House and running easterly to the Niagara River.

(b) The expression "The Commissioners" whenever it occurs herein shall be understood to mean not only the Commissioners of the Queen Victoria Niagara Falls Park—as representing the Government of the Province of Ontario in the premises—named as parties hereto of the first part, but also their successors and assigns and those who for the time being may be Commissioners of the Queen Victoria Niagara Falls Park or other representatives of the Government in Ontario.

(c) The expression "The Syndicate" whenever it occurs herein shall be understood to mean not only the individuals above named as parties hereto of the second part, but also their and each of their heirs, executors, administrators and assigns.

And whereas the Syndicate have applied to the Commissioners for the right to take water from the Niagara River at a certain point or points in the Park in order that the Syndicate may thereby generate and develop electricity and pneumatic power for transmission beyond the Park.

And Whereas by the Act of the Legislature, 62 Victoria, Chapter 11, it is enacted as follows:—

"The said Commissioners with the approval of the Lieutenant Governor-in-Council may enter into an agreement or agreements with any person or persons, company or companies to take water from the Niagara River or from the Niagara or Welland Rivers at certain points within or without the said Park for the purpose of enabling such person or persons, company or companies to generate within or without the Park electricity, or pneumatic, hydraulic or other power conducting or discharging said water through and across the said Park or otherwise in such manner, for such rentals and upon such terms and conditions as may be embodied in the agreement or agreements as may appear to the Lieutenant Governor-in-Council to be in the public interest."

And Whereas the Syndicate desire to secure the right to construct their works in the Park and the Commissioners have agreed to permit such construction upon the terms and conditions hereinafter expressed and contained or intended so to be and in pursuance of the Statutory powers in the preceding paragraph set forth.

Now Therefore This Agreement Witnesseth as follows that is to say :

1. For the purpose of generating electricity and pneumatic power or any other power to be transmitted and capable of being transmitted to places beyond the Park the Commissioners hereby grant to the Syndicate, subject to the consent and approval of the proper authority and save as hereinafter limited, a license irrevocable to take from the water of the Niagara River within the Park a sufficient quantity of water to develop 125,000 electrical or pneumatic or other horse-power for commercial use. Provided also that these presents are not to be construed as expressing or implying and covenants by the Commissioners for title or quiet possession.

2. For the purposes aforesaid the Commissioners further grant to the Syndicate the right to construct and build and do and perform and operate the works, as hereinafter described and located in pink lines upon the map or plan marked "N" hereto annexed and entitled "Plan Attached to Agreement Dated January 29th, 1903, made by the Commissioners of the Queen Victoria Niagara Falls Park with William Mackenzie, Henry Mill Pellatt and Frederic Nicholls for Power Privileges within the Park" and which plan is identified by the seals and signatures of the parties hereto.

3. The several works which the Syndicate are by these presents authorized to perform and do may be more particularly described as follows :

Reference being made throughout to the above-mentioned map or plan marked "N".

(a) From a point at or near A. to a point at or near B, to construct a gathering over fall masonry dam, the crest of the said dam to be level with the surface of the ordinary water level of the river at the point A.

(b) From a point at or near B, to or near the points C, D, E and F successively to construct a masonry dam and overflow weir the crest of which from B to D to be approximately two feet and from D to F approximately three feet lower than the general level of the water in the forebay.

(c) At or near the point C, to construct a substantial masonry pier to direct the passage of ice from the intake to the river below the works.

(d) From or near the point H, to or near the point G, and from or near H, to or near K, to construct masonry revetment walls.

(e) From or near the point A, to or near the point R, and from or near the point H, to or near the point C, and from or near the point D, to or near J, to construct permanent masonry sheer ice booms to prevent floating ice which may enter the intake from passing into the forebay.

(f) To construct a power house with gate house, rack, screen, penstocks, wheelpit, etc., etc., within the area marked P, K, L, M. The power

house to be of size and capacity appropriate for the machinery and appliances for the generation of 125,000 electrical horse-power.

(g) To deepen the bed of the river within the area enclosed for the intake and forebay and extending to such a distance eastwards and up stream from the point A. as may be found necessary to conduct to the intake sufficient water at lowest stages of the river for the generation of 125,000 electrical horse-power in the power house of the company and a sufficient quantity of water in addition thereto to keep the weirs from B to E full to the level of the crest of the gathering over-fall masonry dam AB.

(h) To construct a masonry lined tail-race tunnel of capacity sufficient for the discharge of the water required in the works. The tunnel to extend from the wheel pit to a point of discharge below the Horse Shoe Fall located between the points O and N on the plan.

(i) To erect a transformer house at some point east of the power house site of the dimensions necessary for the stepping up of the electric power given off by the electrical machinery in the power house to the voltage required on the transmission lines.

(j) To carry the electricity generated to points beyond the Park by means of overhead wires or cables or by means of underground conduits.

(k) To construct temporary coffer dams in the bed of the river where required in order to facilitate and permit of the construction of any of the permanent works referred to in sub-sections (a) to (g) inclusive.

4. The syndicate agree to observe and perform the stipulations contained in the agreement between the Commissioners and Sutherland Macklin so far as it relates to the supply of water from the Niagara River to the Mansion, grounds and premises known as "Clark Hill," and to the stipulations in the subsequent agreement relating to the water supply made between the Commissioners and James R. Smith, the present proprietor and his heirs and assigns.

5. The rights and privileges described in sub-sections (a) to (k) of paragraph 3 of this agreement are granted subject to the rights in the bed of the river heretofore granted to the Ontario Power Company of Niagara Falls for its power development, which said rights granted as aforesaid to the Ontario Power Company are indicated in purple lines on the map or plan marked "N" attached hereto and described as "Intake Works of the Ontario Power Company of Niagara Falls," and none of the works to be performed under this agreement either those intended to be of a temporary character, such as coffer dams or other methods of diverting the water of the river in order to facilitate construction, or those designed to be of a permanent nature, shall in any wise interfere with or incommode the Ontario Power Company in the proper and efficient construction or operation of its works as these are defined on the said map, and the syndicate shall make all such provision for the carrying off of the natural drainage water or waters which may require to be pumped by the Ontario Power Company from its excavations and works as shall place that company in as favorable a position for the execution of its works of construction as if this agreement had not been entered into.

6. The works hereinafter specified and embraced in the following subsections (a) to (f) inclusive, and authorized by the Commissioners to be done and executed by the syndicate by these presents and the manner in which the same may from time to time be proposed to be performed or varied shall before being commenced be submitted by the syndicate to the Commissioners, accompanied by suitable plans, profiles, specifications and elevations as the case may require, and the scenic and general features thereof shall be approved by the Commissioners in writing. This approval shall in no wise relieve the syndicate from responsibility for the stability and effectiveness of its works, but it is intended to secure as far as possible a degree of harmony in outline and treatment compatible with the location and with the works in a public park. The works to which such approval are required and shall not be proceeded with without such approval are the following :

(a) The location of the temporary coffer dam required to shut out the waters of the river from the space to be occupied by the works of the syndicate.

(b) The design and location of the overflow masonry dams and weirs, sheer ice booms, revetment walls and piers for impounding and regulating the flow of water to the power house.

(c) The design and location of the power house and wheelpit, including the works and structures for regulating the flow of water at the penstock inlets.

(d) The lines and levels for the filling of the grounds about the site of the power house and out into the river to the north thereof and the method of protecting the same from erosion.

(e) The tunnel for carrying away the waste water from the wheel pit, the means of access to the mouth of the tunnel below the Falls, the method to be used in disposing of the excavated rock and the supply of timber and material for the lining of the tunnel.

(f) The design and location of the transformer house and the method of conducting the electricity to points without the Park.

7. Where the high tension transmission lines are carried over the park surface to points beyond the limit of the Park, non-conducting guard wires or other means of protection shall be placed beneath the transmission lines in such manner that in case of accident to any of the wires carrying electricity all danger to persons or vehicles passing may be prevented.

8. The Commissioners will define on the ground the area of the Park surface, which may be occupied for the temporary storage of materials to be used in the construction of the works in the Park, and also for the erection of such buildings or appliances as the Commissioners may consider necessary for the uses of the syndicate or of its contractors during construction. The area to be so occupied will of necessity be limited and the period during which the Park territory may be used for this purpose shall not exceed four years from the date of agreement for the initial installation of machinery to generate 25,000 horse power, nor more than eighteen months for any subsequent partial development up to the completion of the full installation of 125,000 electrical horse power.

9. The Commissioners may require all good surface soil which may be found at any point where works are to be constructed to be removed and deposited in heaps at convenient points. This good surface shall be used as a top dressing for all areas which may be disturbed by the operations specified or for covering over any waste material taken from the excavations in the Park. Should the quantity of good soil so obtained be insufficient in the opinion of the Commissioners to afford a proper covering for such new or disturbed areas, the syndicate shall obtain from without the Park sufficient good soil for this purpose, but the quantity of good surface soil which the Commissioners may require to be brought into the Park and used as a covering or top-dressing shall not exceed 10,000 cubic yards.

10. For the purpose of construction and to remove or receive supplies of materials and machinery, the syndicate may build, subject to the approval of the Commissioners, tramways, roads and such other appliances and structures as may be necessary for the prosecution of the work, but these appliances are to incommode to the least possible extent the ordinary travel in the Park, and shall be removed as soon as the works for which they are required are completed.

11. The syndicate shall have the right to use as power in the construction of any of the foregoing works either steam, electricity, compressed air or water.

12. Any excess of waste or refuse material taken from the excavations of the forebay, power house, wheel pit and tunnel which the Commissioners do not desire to use as filling within the Park shall be taken away by the Syndicate and deposited outside the Park limits.

13. The syndicate undertake to complete all the filling up, grading, levelling, sodding or covering with good surface soil and other works affecting the surface of the Park and to have removed all tramways, buildings and other constructions, material or appliances used in carrying out their operations in the Park within one year from the time fixed for the completion of any fractional instalment under this agreement.

14. The license hereby granted is for the term of fifty years commencing with the first of February, 1903. The syndicate paying therefor a clear yearly rental at \$15,000, payable half-yearly on the first days of August and February in each year, and in addition thereto payment at the rate of the sum of one dollar per annum for each electrical horse power generated and used and sold or disposed of over ten thousand electrical horse power up to twenty thousand electrical horse power, and the further payment of the sum of 75 cents for each electrical horse power generated and used and sold or disposed of over twenty thousand electrical horse power up to thirty thousand electrical horse power and the further payment of the sum of fifty cents for each electrical horse power generated and used and sold or disposed of over thirty thousand electrical horse power; that is to say, by way of example, that on generation and use and sale or disposal of thirty thousand electrical horse power the gross rental shall be \$32,500 per annum, payable half-yearly, and so on in case of further development, as above provided, and that such rates shall apply to power supplied or used either in Canada or the United States. Such additional rentals as shall be pay-

able for such generation and sale, or other disposition as aforesaid, to the Commissioners shall be payable half-yearly at the rate above specified on the first days of August and February in each year for all the power sold in the said several half-yearly periods from the day of sale; and within ten days after the said first days of August and February in each year, on which such additional rentals shall be payable respectively the Treasurer, or if no Treasurer, the Head Officer of the Syndicate shall deliver to the Commissioners a verified statement of the electrical horse power generated and used and sold or disposed of during the preceding half year, and the books of the syndicate shall be open to inspection and examination by the Commissioners or their agent, for the purpose of verifying or testing the correctness of such statement: and if any question or dispute arises in respect to such return or if any statement delivered at any time by the syndicate to the Commissioners of the quantity or amount of the electrical horse power generated and used and sold or disposed of, or of the amount payable for such additional rentals, the High Court of Justice of Ontario shall have jurisdiction to hear and determine the same and to enforce the giving of the information required. The syndicate has paid contemporaneously with the signing of this agreement the sum of \$30,000, being the first two years' rental in advance, being up to 1st February, 1905.

Provided always that if any part of the said rent, whether payable under this paragraph or in respect of the renewal term or terms in the following paragraph, shall be in arrear for three months whether legally demanded or not, the Commissioners, or if not, then an existing corporation, the Government of the Province of Ontario, may re-enter on the premises or any part thereof in the name of the whole, and thereupon this agreement shall determine and the remainder of the term then current shall terminate as well as any renewal or renewals thereof which under this agreement may be claimed.

15. If at the end of the said period of fifty years the syndicate desire to renew for a further period of twenty years and shall give notice in writing to the Commissioners at least twelve months before the expiration of the fifty years' period, they shall be entitled to and shall receive a further lease of such rights for the period of twenty years more at the same rental as above provided, unless the Lieutenant-Governor-in-Council shall desire a readjustment of said rent as below provided, and similarly the syndicate shall be entitled at their option to two further renewals of twenty years each at same rental, subject to the same qualifications, the object and intention of this stipulation being to confer upon the syndicate the right to an original term of fifty years at the rentals hereinbefore specified, and to three further terms of periods of twenty years each at said rentals, making one hundred and ten years in all, and the syndicate shall then give up or at the expiration of the first term of fifty years, or any subsequent term of twenty years, if unrenewed in accordance with this agreement the works, premises, rights and privileges by this agreement created without any claim for compensation with liberty to the syndicate to remove their machinery.

In case the syndicate desire to terminate the lease, they may do so during the first period of fifty years upon three months' notice in writing to the Commissioners, or in case the Commissioners are not then an exist-

ing corporation, the Government of the Province of Ontario, payment of rent up to the time of the termination of such notice being made upon the giving of such notice. At the end of said period of fifty years the same rentals as are hereby reserved shall continue to be paid by the said syndicate unless the Lieutenant-Governor-in-Council shall desire a readjustment of said rent, in which case the rentals for a further period of twenty years shall be readjusted by agreement, and in the absence or failure of agreement by the parties hereto, then the rentals for such further term shall be ascertained by three arbitrators or a majority of them, one of whom shall be named and appointed by the Commissioners, another by the syndicate, and the third by the Chief Justice or senior presiding Judge of the Provincial Court of Ultimate Appellate Jurisdiction for Ontario. The proceedings of and before such arbitrators shall be subject to the provisions of the law relating to "References by consent out of Court," contained in the Revised Statutes of Ontario, 1897, chapter 62, respecting arbitrations and references; and either party to such arbitration may appeal in accordance with the provisions of the said Revised Statutes. The Lieutenant-Governor-in-Council may in the like manner for the two further periods of twenty years each require a readjustment of said rentals. In which case the same shall be determined as aforesaid and at the expiration of such two periods of twenty years each the term so limited by these presents shall determine and end in accordance with all provisions above contained whereby the syndicate shall then give up the works, premises, rights and privileges by this agreement granted or created without any claim for compensation, but with liberty to the syndicate to remove their machinery. And it is hereby further agreed that at any time not less than three years before the period at which such third renewal of twenty year shall terminate the Lieutenant-Governor-in-Council, and notice thereof to the syndicate given, may require the syndicate to continue its operations for a further period of twenty years, to commence from the termination of such third renewal, at the same rental as shall have been paid during the said third renewal period of twenty years or at a readjustment of said last-mentioned rentals for such further period of twenty years by agreement, and in the absence or failure of agreement by the parties hereto, then the rentals for such further term of twenty years shall be ascertained by arbitration in manner and form and according to the provisions of arbitration hereinbefore contained, and in the event of such option being so exercised the terms and provisions of these presents shall extend and bind the parties hereto until the said period of twenty years shall have elapsed and expired, but the exercise of such option requiring such further renewal by the Lieutenant-Governor-in-Council shall not change, alter or affect the above provisions in respect of the termination of the liberties, licenses, powers and authorities and so declared applicable at the termination of the said last mentioned or fourth renewal.

16. The Commissioners will not themselves engage in making use of the water to generate electric, pneumatic or other power except for the purposes of the Park, provided that in case the said Commissioners shall have granted or at any time may have granted to any other person or corporation licenses to use the waters of the said Niagara or Welland Rivers, and by reason of failure of such person or corporation to carry on the works so licensed the said Commissioners find it necessary to forfeit said license

and take over said works, this clause shall not prohibit said Commissioners from operating such works for the generation and transmission, sale or lease of electricity or power.

17. And the company shall indemnify the Commissioners from all claims or demands by any person or persons whomsoever, whether arising by reason of the exercise by the syndicate of the powers, rights or authorities or any of them conferred by this agreement, or by reason of anything done by the syndicate in the exercise thereof affecting any property, rights or privileges heretofore by the Commissioners granted to or conferred upon any person or persons whomsoever or enjoyed, used and exercised by any such person or persons under the Commissioners; it being the intention of this agreement that should the syndicate in the exercise of the aforesaid powers, rights and authorities so affect any such property, rights or privileges granted by or enjoyed under the Commissioners, the syndicate shall fully indemnify the Commissioners in respect thereof.

And in the event of any claims or demands aforesaid being preferred before or in any tribunal, whether in a court of law or by proceedings of arbitration against the Commissioners or for the Commissioners or in their name, the syndicate undertake and agree to intervene on behalf of the Commissioners and defend the same or take such action in the premises at the cost and charges of the syndicate; the Commissioners thereby conferring upon the syndicate all such rights and powers to act in their name and in their behalf in the premises or to confer such other and further rights and powers as may be required by the syndicate and necessary.

18. For the transmission of electricity or pneumatic or other power to points beyond the Park in Canada or the United States, the syndicate shall have the right to convey the same by overhead high tension wires or by cables or other appliances in conduits, beneath the surface of the Park at such depth and in such locations as the Commissioners may from time to time determine, including the right to cross the so-called Chain Reserve so far as the same is within the jurisdiction of the Commissioners at any point or points approved of by the Commissioners between Fort Erie and Niagara-on-the-Lake, but subject to any rights which the Commissioners may have created or licensed or which may be created, without prejudice, however, to the exercise by the syndicate of any of its rights and powers under these presents, or which may be acquired in respect of transmission of power as by this paragraph prescribed.

19. The syndicate undertake to begin the works hereby authorized within two years from the date of this agreement, and to have proceeded so far with the said works on or before first January, 1907, that they will have completed within the Park, water connections (that is to say, head race, forebay, penstocks and tail race) for the development of twenty-five thousand horse power and have actually ready for use, supply and transmission ten thousand developed electrical or pneumatic horse power by said last-mentioned day, and if not then completed the Lieutenant-Governor-in-Council may declare this agreement, the liberties, licenses, powers and authorities so granted and every of them to be forfeited and void, and thenceforth after such declaration the same shall cease and determine and be utterly void and of no effect whatever.

20. So long as this agreement is in force the Commissioners undertake and agree that the amount of rentals which may be fixed and charged for the right to use the waters of the Niagara or Welland Rivers within the Park for the purpose of generating electricity by any other company or person shall not be at less rentals than is provided and reserved by these presents, and further, that any such company shall be subject to the like restrictions, as in paragraph 21 of this agreement. Provided, however, that notwithstanding anything in this paragraph contained the rentals so to be fixed and charged against any other company or person may be reduced below the rentals provided and reserved by these presents so far only as such reduction may fairly and reasonably be allowed in respect of the increased cost of the construction of the tail race or tunnel within the Park, by reason of its greater length or other ground of expense in its or their construction, whether required for supply or waste through the Park to the point of discharge into the Niagara River in excess of the distance between the power house of the Canadian Niagara Power Company and the point of discharge into the Niagara River, such reduction not to be of an amount sufficient to give any undue advantage as against the syndicate except by reason of such increased cost of tail-race or tunnel or both, as the case may be.

21. The syndicate whenever required shall from the electricity or pneumatic power generated under this agreement, supply the same in Canada to the extent of any quantity not less than one-half the quantity generated at prices not to exceed the prices charged to cities, towns and consumers in the United States at similar distances from the Falls of Niagara for equal amounts of power and for similar uses, and shall, whenever required by the Lieutenant-Governor-in-Council, make a return of prices charged for such electricity or power, verified under oath by any Chief Officer of the syndicate, and if any question in dispute arises involving the non-supply or prices of electricity or power for consumption in Canada, the High Court of Justice of Ontario shall have jurisdiction to hear and determine the same and enforce the facilities to be given or the prices to be charged.

22. All power developed within the limits of the Park under this agreement shall be in a form capable of transmission and use outside the Park, and shall not be used within the Park except such uses as may be convenient or necessary within the buildings of the syndicate for the purposes of its power development and except such cases as may be hereafter agreed upon for railway, pumping, elevator, or other purposes within the Park. The syndicate may agree with the Niagara Falls Park and River Railway Company for the supply of electricity, pneumatic or other power to work the said railway, and with the town of Niagara Falls, Ontario, and the town of Niagara Falls South, Ontario, for the supply of power for their pumping station or stations within the Park and may also supply electricity for any other persons within the Park.

23. If the syndicate should at any time or times after the completion of its plant and power house or the first day of January, 1907, whichever shall first happen, continuously neglect for the space of one year effectually to generate electricity or pneumatic power as hereby agreed by the syndi-

cate, unless hindered by unavoidable accident, the Lieutenant-Governor-in-Council may then and from thenceforth declare this agreement, the liberties, licenses, powers and authorities thereby granted and every of them to be forfeited and thenceforth the same shall cease and determine and be utterly void and of no effect whatever.

24. The rents hereby agreed to be paid are hereby declared to be the first and preferential charge upon the said works, and the syndicate shall not have the power to create any lien, charge or incumbrance upon the said works or any of them by bond, debenture, mortgage or otherwise, which would interfere with or prevent the Commissioners from procuring payment of the rent hereby reserved or any part thereof; and no simple contract creditor or other creditor of the syndicate shall have any claim against the said works or any part thereof in priority of the claim of the Commissioners for rent.

25. The said syndicate shall not amalgamate with any other corporation or company heretofore or hereafter incorporated by or under the laws of the Dominion of Canada or by or under authority of the Province of Ontario, or which shall be hereafter licensed by the said Commissioners to take and use the waters of the Niagara or Welland Rivers or both for the purpose of generation and transmission of electricity without the consent of the Lieutenant-Governor-in-Council to such amalgamation, nor shall they enter into an arrangement or agreement for that purpose with any such company which may directly or indirectly have that effect or which may or shall have the effect of keeping up the price or prices of said power nor shall they enter into an agreement with any such company for pooling the receipts of the said syndicate or of any part thereof with those of any other company nor which shall provide for or have the effect of establishing a common charge or schedule of charges for the use of said power or any part thereof.

26. It is further agreed that if from any cause the supply of water at the point of intake as by these presents defined be diminished the syndicate shall have no claim or right of action against the Commissioners, but may deepen such point of intake to such extent as to restore the supply of water to the volume or quantity necessary for the purposes of the syndicate and that the granting or licensing of rights to the syndicate by these presents shall not give the syndicate any right of action against the Commissioners, nor give to the syndicate any right of action against other licensees or grantees of the Commissioners in respect of any diminution not substantially interfering with the supply necessary for the syndicate, nor so long as such necessary supply can be obtained by means of deepening at said point of intake.

27. The syndicate agrees with the Commissioners that within two years from the date of this agreement they will sell, assign, convey and transfer to a company or corporation formed or to be formed under proper authority, having power to construct and operate the works hereinbefore described all the rights and franchises by this agreement given and conferred to and upon the said syndicate, including the benefit of any work that shall have been done and any moneys that shall have been expended in connection with the said works prior to the organization of the said com-

pany or corporation, subject to all the provisions and conditions in this agreement contained, and by the syndicate agreed to be observed and performed, and otherwise upon such terms and conditions as shall be agreed upon between the said corporation and the syndicate.

And upon the due organization and formation of the company or corporation now existing or to be formed as above provided, and when this agreement and the rights and franchises thereby conferred, including works done and money expended as aforesaid, shall have been duly transferred to such company or corporation and it shall have assumed the same, the syndicate shall thereby be relieved from personal responsibility to the Commissioners for the performance of this agreement.

Nothing in this agreement contained shall affect any pending suit or litigation, or any contract, covenant or agreement made between the syndicate and any other corporation or individual, at the time of or prior to the said transfer.

Provided always, that any claim or right of suit or action existing against the syndicate may be urged and prosecuted against the said company or corporation as fully and effectually as it might be urged and prosecuted against the syndicate primarily bound or obliged or indebted in the premises, and the said company or corporation may be substituted for the syndicate in any pending suit or action.

28. And the said parties hereto mutually and respectively covenant, promise and agree with each other to carry into effect, observe, perform and fulfill all the provisions and stipulations in these presents contained and to be carried into effect, observed, performed and fulfilled by the said parties respectively.

29. This agreement shall have no force or effect until approved by the Lieutenant-Governor-in-Council.

In Witness Whereof the Corporate Seal of the Commissioners hath been hereto affixed by their Chairman, who has also signed these presents in certification of due execution hereof by the Commissioners, and the members of the syndicate have also hereunto set their hands and seals on the day and year aforesaid.

Witness:

(Sgd.) JAMES WILSON,
as to signature of J. W.
Langmuir.

THE COMMISSIONERS OF THE
QUEEN VICTORIA NIAGARA
FALLS PARK. (Seal.)

(Sgd.) J. W. LANGMUIR, Chairman.

(Sgd.) W. MACKENZIE,

Witness:

HUBERT H. MACRAE,
to the signatures of William Mac-
kenzie, by his Attorney A. W.
Mackenzie, Henry Mill Pellatt and
Frederic Nicholls.

Atty. A. W. MACKENZIE.
(Seal.)

(Sgd.) HENRY M. PELLATT.
(Seal.)

(Sgd.) FREDERIC NICHOLLS.
(Seal.)

QUEEN VICTORIA NIAGARA FALLS PARK.

Memo. Prepared by J. W. Langmuir, Chairman, re Development of Electrical Power at Niagara Falls.

Presented for the Consideration of the Government, Nov. 25th, 1902.

Messrs. William Mackenzie, Henry M. Pellatt and Frederic Nicholls, of Toronto, have made application to the Commissioners of the Queen Victoria Niagara Falls Park for a franchise to take water from the Niagara River within the Park limits, for the purpose of developing electrical power, and the applicants ask for sufficient water to generate 100,000 horse power. Two franchises have already been granted for taking water on a large scale within the Park, one to the Canadian Niagara Power Company, whose works designed for an ultimate capacity of about 100,000 electrical horse power, are in course of construction, and the other to the Ontario Power Company, which has made considerable progress in its preliminary works.

In addition to these a franchise has also been given to the Ontario Power Company for bringing the Welland River waters to the Park and developing power at the Falls on a large scale, but active operations upon this work are now in abeyance pending the construction of the Niagara River works of the same company. Rights have also been granted to the Niagara Falls Park & River Railway Company to use sufficient water to generate power for the operation of its system, and to the town of Niagara Falls for water for municipal purposes and in addition to generate 100 electrical horse power for lighting the town.

Before granting any additional franchises within the Park, it becomes necessary to consider every condition, both present and prospective, relating to the use of the waters of Niagara River for commercial purposes within the Park at Niagara Falls. The conditions to be inquired into and the problems to be dealt with in this connection may be summarized as follows:

(1st) An enquiry into the estimated volume of water that at present flows down the Niagara River before any waters are diverted for the purpose of generating power.

(2nd) The estimated volume of water now withdrawn on both sides of the river for power purposes and the approximate amount that will ultimately be diverted through the full operation of franchises and rights now under construction on both sides of the river.

(3rd) The effect that such withdrawals of water for the generation of electrical power and other purposes will ultimately have on the Falls of Niagara viewed from a physical and scenic standpoint.

(4th) A consideration of the international features of the subject that may arise between the State of New York and Canada through the diversion of a large volume of water from passing over the Falls.

(5th) Whether the granting of the application asked for at the location designated will to any appreciable extent interfere with or jeopardize the rights and privileges granted to the Canadian Niagara Power Company by a change or interruption in the flow of water or through other physical transformation.

(6th) The economic or financial results that the granting of a franchise to Messrs. Mackenzie, Pellatt and Nicholls, representing as they do the largest users of power in the City of Toronto, will have on the two companies which have already obtained rights to use the waters of Niagara within the Park for the purpose of generating electrical power with a view to marketing the same in Toronto and all points within transmissible distance, and in the furtherance of which these companies have to spend many millions of dollars in capital outlay as well as the payment of large annual rentals to the Government for the rights obtained.

(7th) Whether by the carrying out of all of these great works of commercial utility the original design of the founders of Queen Victoria Niagara Falls Park will be marred or the natural scenery unduly defaced.

Considering these matters in the order in which they are referred to, the Park Superintendent has made a very carefully prepared and interesting statement respecting the conditions and questions embodied in the two first paragraphs relating to the volume of water flowing above the Falls and the present and proposed diversion of a portion of the same on both sides of the river. His statement is as follows :

“The flow of the river has usually been assumed to be not less than 250,000 cubic feet per second, or under the difference of level found between the head of the rapids and the base of the Falls, the theoretical equivalent of over six millions of horse-power, the U.S. Engineers finding it in 1868 to be from 273,329 to 280,757 cubic feet, and Sir Casimir Gzowski from observations made at the site of the International bridge in 1870, —1,—2,—3 found a mean flow of 246,000 cubic feet. Now, however, from very careful surveys made by the U.S. Army Engineers extending over a number of years and recently published, the mean flow from the average levels of the water of Lake Erie for the last forty years is stated to be at Buffalo only 222,400 cubic feet per second.

“Doubtless the Erie and Welland canals now take more water than formerly, while the Chicago drainage canal alone abstracts about 6,000 feet per second from the supply, but it would appear that other causes must be found for the marked diminution of the volume. By making a slight addition for the streams entering the Niagara below Buffalo, the result may therefore be assumed at 223,000 cubic feet per second, which under the total head found in the Falls and in the rapids above the Falls would be equal to about 5,500,000 horse-power theoretical.

“From this total I estimate that to-day there is being taken from the upper river and returned below the Falls, on both sides of the river, about 9,000 cubic feet per second, or say four per cent. of the total.

“The two large companies taking water on the American side are now busily engaged in enlarging their works. Should they each extend to the limits prescribed—in the one case by statute and in the other by the measure of its waterway—the result will be as follows :

“The Niagara Falls Power Company. . . .	17,200 cubic feet
“The Niagara Falls Hydraulic Power & Manufacturing Company	7,700

“Or a total on the American side of. . . . 24,900 cubic feet

“Upon the Canadian side of the river, the Canadian Niagara Power Com-
 “pany’s plans for their completed power house of 100,000 horse-power will
 “require..... 8,600 cubic feet
 “approximately, and the Ontario Power Company from
 “its Niagara River and Welland River franchises will
 “in all probability require—say..... 16,000
 “Add to this the requirements for the town supply and the
 “Electric Railway..... 400

“and we have a total on our side of 25,000 cubic feet

“Adding these quantities together makes a grand total of about 50,000
 “cubic feet, or twenty-two per cent. of the total flow. Of course this very
 “large amount of water will not be required immediately, nor will the maxi-
 “mum quantity be constantly abstracted from the river, but it is interesting
 “to note that the relative quantities proposed to be abstracted from each
 “side is nearly the same, and the output of electricity, viz., 300,000 horse-
 “power is also equal, or 600,000 horse-power altogether.

“But this may not be the sum total of the demands for the water.
 “Between the years 1886 and 1894 six additional companies obtained charters
 “from the New York State Legislature to take water from the Niagara
 “River, and none of these are limited as to the amount. So far none of them
 “have been carried out, although one was begun some years ago but failed
 “of completion for want of capital.”

From the foregoing figures furnished by Mr. Wilson it will be gathered
 that the estimated flow of water above the Falls with Lake Erie at its mean
 or average level of 572.86 feet above tide level is equal to 223,000 cubic feet
 per second, and that the present and future withdrawals of water from the
 river in order to meet the requirements of the companies now exercising
 their franchises and charters granted both in the State of New York and
 Canada would require about 50,000 cubic feet. Leaving, when all the works
 are completed, 173,000 cubic feet or about seventy-eight per cent. of the
 present flow to pass over the Falls.

As to the effect such withdrawals of water will have on the Falls of
 Niagara as viewed from a scenic and physical standpoint it is shown from
 Mr. Wilson’s statement and figures that when the franchises and charters
 which are being exercised up to this time for the development of power, both
 in the State of New York and in Canada, are in operation to the full extent
 of their respective capacities that the withdrawal of water from passing
 over the Falls will be about equal on both sides of the river. The changes
 and transformations that will take place and at what points more than at
 others the withdrawal of this large volume of water will have on the Falls
 it is most difficult to imagine, let alone to determine with any degree of
 accuracy.

Owing to the great volume of water now drawn into the extreme point
 of recession of the Horseshoe Falls on the Canadian side as well as the

great depth of the water at that point and also to the filling in that is going on of the shallow portions of the shore line on the Canadian side near the Falls, it is quite possible that the volume of water flowing over the present contour of the Horseshoe Falls except at Terrapin Point will not be injuriously affected to a visible extent.

Respecting the likelihood of International questions arising from the diversion of such large quantities of water for commercial purposes; having regard to the strong currents of the river and the concave shore line within the Park forcing the main volume of the stream to the Canadian shore, it is not likely that questions or differences of a serious character respecting such diversions, and the physical or scenic changes resulting thereupon will present themselves for settlement.

Coming now to the consideration of the application of Messrs. Mackenzie, Pellatt and Nicholls for a franchise to develop 100,000 horse-power at Point Tempest, I am of the opinion that the application can only be entertained on condition that the tailrace will be carried under the river to be discharged below the Falls. To allow another discharge tunnel in the Park, even if it can be safely placed under the tubes of the Ontario Power Company, would, I fear, lead to complications either with the Ontario Power Company or the Canadian Niagara Power Company. Moreover, until the plans of the Ontario Power Company are finally settled in all respects we cannot decide as to the location of intake, forebay and power house. The most serious question, however, in connection with this application is the unknown results that might arise in granting a franchise to take water from the river at any point between the Ontario Power Company's works at Dufferin Islands and the intake of the Canadian Niagara Power Company. Should the Government favor the granting of the application of Messrs. Mackenzie, Pellatt and Nicholls for a franchise, having regard to all the circumstances now recited, it would in my opinion be desirable to have the amount of water which they would be entitled to take clearly defined.

In view of all the intricate questions involved, I am of opinion that before taking action upon the application the services of one of the most eminent Hydraulic Engineers in America should be had to report fully upon the whole subject.

Respecting the economic or financial results that the granting of the franchise applied for will have on the two companies that have already received franchises, I am of the opinion that being simply a question of policy it should be settled by the Government. If these two companies develop to their full capacity there will be sufficient electrical power produced, in all likelihood, to supply the demand in Ontario for the next quarter of a century. If however, only one-half of the power to be generated on the Canadian side—say 150,000 horse power—is offered to consumers in Ontario as the agreements provide for the demand may overtake the supply in a much less period. Perhaps the most serious view of this phase of the question is that the present applicants represent the largest consumers of power in Toronto, who under other circumstances would likely become customers of one or other of the chartered companies. The whole question, however, is one of policy and expediency, and therefore can only be decided by the Ontario Government.

In respect to the probable scenic effects upon the Park of the carrying out of these several power projects, it may be noted that all that portion of the Park which lies north of the picnic ground and where the chief works of restoration and improvement have been carried on, will be unaffected by the construction of any of these projects, and between the picnic ground and Table Rock none of the works will be of a conspicuous character, the power house of the Ontario Power Company in the Gorge being below the line of vision of the Falls from any point within the Park proper. At Table Rock point the recession of the Falls has of late years bared a large area of the river bed, and advantage has been taken of the surplus material from the works in progress to reclaim all this area, and provide a new and most attractive point from which to view the Falls and gorge. South of Table Rock, after the completion of the works now in progress, all of the unfinished portions of the Park including the low lying reach behind Cedar Island, will be graded and planted, and the area of the Park considerably increased by reclaiming the low lying foreshore of the Niagara. At the south end of Cedar Island will stand the power house of the Canadian Niagara Power Company. This building will be of an imposing character and contain the largest electric machines so far constructed, and it is believed that it will be considered a most interesting feature of the Park. Beyond this point there will be no permanent works of construction above the Park surface, excepting at the Dufferin Islands where the intake of the Ontario Power Company will be placed. The plans of the company for this portion of the work have not yet been presented but the Commissioners have taken every precaution possible to have the works of the company so constructed, as to very greatly improve and enhance this attractive feature of the Park. The granting of the additional franchise as asked for by Messrs. Mackenzie, Pellatt and Nicholls will of course involve additional changes, but the nature of these cannot be determined until their plans are submitted.

Respectfully submitted,

J. W. LANGMUIR, Chairman.

MEMORANDUM OF THE COMMISSIONERS OF THE QUEEN VICTORIA NIAGARA FALLS PARK.

Submitted to the Government on the occasion of the hearing given the Canadian Niagara Power Company, and The Ontario Power Company, in respect to the application of Messrs. Mackenzie, Pellatt & Nicholls at the Council Chambers, Dec. 19th, 1902.

Messrs. Mackenzie, Pellatt & Nicholls have made an application to the Commissioners of the Queen Victoria Niagara Falls Park for a power site within the Park together with the right to take sufficient water from the Niagara River to construct the necessary works for the generation of 100,000 electrical horse-power.

When the plans of the works were submitted by the applicants, the Commissioners carefully examined them, first from the standpoint of how the proposed works would affect the Park surface, and secondly whether they would interfere with the rights and privileges already granted to other companies to generate power within the Park. The first phase of the matter need not at present be referred to, and as to the second, certain amendments and modifications were suggested by the Commissioners and accepted by the applicants.

In order that the locations in the Park of the various power companies, including the site now asked for, may be clearly shown, the Commissioners have had prepared by the Park Superintendent a surface plan which is now submitted. This plan shows (1) The location of each site and the relationship or contiguity of the one to the other—(2) The intake from the river and forebay connected with each site—(3) The situation of the respective power houses, and—(4) The location of the discharge tunnels. The method proposed by the applicants for the generation of electrical power is the same as that of the Canadian Niagara Power Company, viz., by a wheelpit, power house and forebay; the discharge tunnel to be constructed under the bed of the river.

It will be seen from the map that the Ontario Power Company site is the most southerly location and therefore cannot be affected by the granting of the application now asked for. It therefore only remains to consider the rights and privileges that have been granted to the Canadian Niagara Power Company which is the most northerly location and the one nearest to the Falls. That location was so well and carefully selected by the Engineers of the Canadian Niagara Power Company, both in respect to depth and volume of water, natural currents and other important physical conditions that its intake of water cannot be interfered with unless the rights granted to the Ontario Power Company and those proposed to be granted to the presents applicants are in terms of their respective agreements exceeded beyond the limits provided by such agreements respectively. The plans of the Ontario Power Company and those of the present applicants as approved in accordance with the outline of their present proposals by the Commissioners are such that the natural flow into the intake of the Canadian Niagara Power Company will not be diverted or the volume of water injuriously reduced by the withdrawal of water through the operations of the other companies.

The Commissioners are strengthened in this view by the opinion of one of the most eminent hydraulic Engineers in America, Mr. J. James R. Croes, who at my request has answered the questions which I submitted to him as follows :

“Toronto, Canada, December 18th, 1902.

“J. W. Langmuir, Esq.,

“Chairman Queen Victoria Park Commissioners, Toronto.

“Dear Sir,—I have your letter of even date containing the following two questions in regard to the proposed power development by the Toronto and Niagara Falls Power Company.

“Question No. 1. Will the building of the proposed works of the Toronto and Niagara Falls Power Company tend to divert the waters of the Niagara River away from the intake of the Canadian Niagara Power Company ?

“Question No. 2. Will the subtraction of 11,200 cubic feet of water per second from the Niagara River as proposed by the Toronto and Niagara Falls Power Company affect the elevation of the water surface at the intake of the Canadian Niagara Falls Power Company, and if so to what extent ?

“I have made the examinations referred to in your letter and beg to reply as follows :

“In reply to Question No. 1, I am of the opinion that the building of the works proposed by the Toronto and Niagara Falls Power Company will not tend to divert the waters of the Niagara River away from the intake of the Canadian Niagara Power Company.

“In reply to Question No. 2, I am of the opinion that the subtraction of 11,200 cubic feet of water per second at the location and in the manner proposed will not appreciably lower the elevation of the water at the intake of the Canadian Niagara Power Company.

“Very respectfully, your obedient servant,

“(Signed) J. JAMES R. CROES, Consulting Engineer.”

The Commissioners, therefore, subject to detailed plans and specifications of the various works in accordance with the outline of the present proposal being submitted for their approval and the execution of an agreement containing all necessary provisions and terms and conditions contained in the agreements with the other power companies are prepared to recommend the application of Messrs. Mackenzie, Pellatt and Nicholls to the favorable consideration of the Government.

ARGUMENTS AND BRIEF OF THE SOLICITORS AND THE OPINIONS
OF THE HYDRAULIC ENGINEERS RESPECTING THE APPLI-
CATION OF MESSRS. MACKENZIE, PELLATT, & NICHOLLS
FOR WATER POWER RIGHTS WITHIN THE PARK.

PETITION OF COUNSEL FOR MESSRS. MACKENZIE, PELLATT &
NICHOLLS.

To the Honorable the Commissioners of the Queen Victoria Niagara Falls
Park :

Your petitioners, William Mackenzie, Henry M. Pellatt and Frederic
Nicholls, as supplementary to the application already filed for a power site in
Niagara Falls Park, beg leave to submit for your consideration, in order to
exemplify and illustrate the same, drawings 1, 2, 3, and 4.

Your petitioners pray, subject to the plans of future permanent works
being approved by your honorable body.

1. The irrevocable right to take from the waters of the Niagara River
for power purposes for the generation of hydraulic or pneumatic power, a
sufficient quantity of water to develop 125,000 (one hundred and twenty-five
thousand) net electrical horse power for commercial use ; said water to be
applied to turbines located in suitable wheelpits to be operated under a head
of not less than 140 feet.

By the use of the term "net" above, we desire to express that the water
shall be sufficient for the actual generation of 125,000 electrical horse
power after the necessary waters are supplied for excitation, and the opera-
tion of other auxiliary apparatus incident to the development of 125,000
electrical horse power.

2. For the purpose of securing the water necessary for the power men-
tioned in petition No. 1, your petitioners request the right to build upon
the river bed of the Niagara River a gathering overfall masonry dam, the
approximate general outline of which is shown on drawing No. 2 from G to
S and S to Q.

We request further the right to excavate the bed of the river above the
end of the overfall dam to such depth as may be necessary to secure a mini-
mum depth of ten feet below the bed of the river at the end of the overfall
dam and not less than six feet at any point leading thereto and the width and
alignment of such excavations to be determined by the Engineer of the
applicants. Providing always that the permanent works to be constructed
shall always be contained within the line A.B. shown on the plan.

The maximum height of this overfall dam to be not less than elevation
533 above the sea level, and that your petitioners may have the right to vary
the elevation of the parts G R, R V, V S, and S P, and the lengths of the
same, as further surveys may render necessary.

3. We ask for the right to construct from U to V and T to S and at any other points our Engineer may determine as necessary, and all within the boundary line mentioned in paragraph 2, masonry sheer ice booms, the length of the said ice booms and their dimensions and construction to be determined upon by the Engineer of your petitioners after the completion of further surveys.

4. Also for the right to build masonry retaining walls from G to W and a fender wall from T to E and from T to Z as shown on the plans the elevation of which fender wall will approximately agree to elevation 540; all other dimensions to be determined by the Engineer of the applicants upon the completion of further surveys.

5. For the right to perform such excavation above the overfall dam G S and S Q and within the same as will permit of the delivery of the necessary amount of water to the turbines, at such velocity of approach as the Engineer of the applicants may deem proper, after the completion of further surveys. It being the declared purpose of the gathering works shown on plan No. 2, both as to masonry and excavations above Q L, to divert a sufficient amount of water for the supply of the power asked for in paragraph No. 1, as well as a sufficient quantity of water to keep the spillways P S, S V, V R, and R G always full to elevation 533.

6. For the right to fill in all of that shaded portion between the letters T Z Y X J W M and F to the elevation approximately 540 and as the Commissioners may direct.

7. For the right to sink a wheelpit at some location inside of the space marked "Outside limits power house and gates" in plan No. 2, and that such wheelpit shall be of a size to be hereafter determined by the Engineers of your petitioners, and sufficient in all dimensions in his judgment for the development of 125,000 electrical horse power, specified in paragraph No. 1.

8. For the right to connect the bottom of the wheelpit mentioned in petition No. 7, with the Niagara River below the Horseshoe Falls, by the construction of a tailrace tunnel; the point of discharge of such tailrace tunnel to be at a point below the crest of the Horseshoe Falls and between the letters O and N on drawing No. 4.

For the further right in the construction of this tailrace tunnel to prosecute its construction from the exit under the Falls by the building of a construction tunnel under the brow of the Falls, which shall connect the end of the tailrace tunnel with a point of discharge for debris, to be hereafter determined, at some location between the letters O and approximately N on the map.

9. Referring to drawing No. 2, your petitioners ask for the right of use of such portions of the property inside the boundaries shown by the letters S T Z Y X J W back to S and of the lands in the river bed bounded by the letters Q S T and Z as may be required by the Engineer of the applicants for permanent works and subject to the approval of your honorable body.

10. For the right within the limits of Drawing No. 2, marked "Outside Limit Power House and Gates," to construct a suitable power house and

suitable gate house, which shall in the opinion of your Engineer be sufficient and proper for the housing and operation of the apparatus necessary for the generation of 125,000 electrical horse power.

11. The right to construct upon the river bed of the Niagara River a temporary construction coffer dam for the uncovering of the river bed, at least within the limits described in petition No. 2, the design of such construction coffer dam, and its actual location to be determined by our Engineer upon the completion of further surveys.

12. For the right to erect upon the property marked T Z Y X F back to T a transformer house of such dimensions as may be determined by the Engineer of the applicants and a suitable high tension transmission tower both to be of such dimensions as may be determined by the engineer of the applicants and subject to the approval of the Commissioners.

And also the right to carry high tension wires from the top of such transmission tower in a single span across the property of the Park Commission to some point outside the Park to be hereafter determined.

13. For the right in the construction of the foregoing works to construct such surface or overhead construction tracks and works as may be necessary for the delivery of any surplus excavated material that may be encountered, to the Niagara River below the Horse Shoe Falls, also that the right be granted permitting of the temporary construction and use of such cable-ways, derricks, engines and other apparatus as may be found necessary and expedient, for the rapid construction of the proposed works.

14. Also for the right to use the highways of the Park for the delivery of materials to and from the said construction works above referred to.

15. We further ask for the right to occupy the necessary lands in the Park and situated in the immediate vicinity of the above works for construction purposes, the buildings and constructions necessary to be erected on said property and the machinery necessary to be installed thereon, all to be removed immediately upon the completion of the works and the property to be restored, at the expense of the petitioners, to its original condition and under regulations to be made by your honorable body.

16. We also ask for the right in the construction of the foregoing works to use as power, either steam, electricity or compressed air, or water or any one or more of the above.

And your petitions will ever pray.

Dated December 17th, 1902.

(Signed) H. H. MACRAE, for the Applicants.

To the Honorable the Premier of Ontario, and the Members of the Cabinet :

MEMORANDUM OF ARGUMENT.

Submitted by Counsel for the Applicants for the Proposed Site at Niagara Falls.

It is not disputed that the Commissioners have the absolute right in their discretion to grant a license to the applicants, this authority is by Statute of the Province of Ontario, 63 Vic., Chap. 11, Sec. 36.

The position has been advanced that the Government is in a fiduciary relationship towards, and are in fact trustees for, the Canadian Niagara Power Company; this is erroneous, as will appear from what follows:

The Canadian Niagara Power Company had the exclusive right to take water within the limits of the park; they surrendered and abandoned that right for valuable consideration, and the Legislature cancelled it, and granted the Commissioners power to license other persons.

The Canadian Niagara Power Company are constructing their works under their license from the Commissioners with the knowledge that the Commissioners reserved to themselves the right to grant licenses to other persons.

Not only are they doing this, but they entered into an agreement which expressly contemplates by its terms the subsequent licensing by the Commissioners of other persons.

For proof of this see paragraph 5 of the Canadian Niagara Power Company agreement, 15th July, 1899, which provides: "That in case the said Commissioners shall have granted to any other person or corporation license to use the waters of the said Niagara River," etc., etc.

Also see paragraph 7 of the same agreement, which provides: "That the amount of rentals which may be fixed and charged for the right to use the waters of the Niagara or Welland River for the purpose of generating electricity by any other company or person shall not," etc.

And paragraph 11 provides with reference to "any right of action against other licensees or grantees of the Commissioners in respect of any diminution," etc., etc.

Special attention is called to the full reading of the above paragraph.

The Canadian Niagara Power Company therefore hold their license and are constructing their works, subject to the acknowledged right of the Commissioners to license other persons.

The legal position between the Commissioners and the Government on the one side, and the Canadian Niagara Power Company on the other side, is defined by the agreements which have been made between them: The Commissioners and the Government grant the license to take the waters pursuant to the plans, and the company agree to pay the rentals—both subject to the expressed conditions of the contract. In the contract there is no covenant or clause which restricts the Commissioners or the Government in the free exercise of their power to license.

There is no fiduciary relationship and there is no obligation cast upon the Commissioners or the Government, other than that arising directly from the provisions of the contract.

The applicants have made out their case through Mr. Cooper and Mr. Croes to the satisfaction of the Commissioners that there will be no substantial interference with the works of the Canadian Niagara Power Company, and the Commissioners have recommended the granting of the petition.

With regard to the evidence of Mr. Croes, see copy of letter to the Premier hereto annexed.

The Government after receiving the recommendation of the Board of Commissioners, granted a hearing to the Canadian Niagara Power Company for the purpose of giving to that company the opportunity of showing that physical injury would result to their works by the licensing of the applicants' proposed operations.

If the Canadian Niagara Power Company can demonstrate that the taking of water in the manner proposed by the applicants will cause physical injury of a substantial kind to their licensed works, the Government would be justified in refusing the applicants' petition, but the burden of establishing this injury rests upon that company. If they fail in convincing the Government that this injury will reasonably and naturally result, the Government need not, and ought not, to deny to these persons the license which they are privileged to ask, and which the Commissioners have the undisputed right to grant.

To suggest that the proposed works may injure the works of the Canadian Niagara Power Company is not sufficient, neither is the burden of proof cast upon the company met by the opinion of one or more engineers that such injury will result; more is required, the Canadian Niagara Power Company must show by reasons sufficient to satisfy the Government, founded on hydraulic facts and formulas, that this injury will flow from the projected works.

The Hon. the Premier remarked to Mr. Herschel on the argument before him, that he gave no reasons for his opinion that the level would be reduced four feet, it is these reasons which the Premier then sought, which must now be forthcoming, and which must be established before the Government can properly be asked to withhold the license petitioned for.

The opinion is again to be found in the written submission of Mr. Herschel, but he fails to give any reasons why the current should be diverted by a wall which in its hydraulic nature is not a diverting but a receiving wall.

The reasons why there will be no substantial interference with the level by the proposed works are to be found in the briefs of Mr. Croes and Mr. Cooper already submitted.

The responsibility of decision rests upon the Government, and it is submitted that their duty and obligation if they should consider it in the public interests to do so, is to grant the petition of the applicants unless constrained to believe upon the evidence before them, that a substantial injury

would be done to the Canadian Niagara Power Company by the proposed works.

The suggestion of an alternative site to avoid the dam is not a fair one, for neither at the point proposed by the applicants nor at any other available point above the intake of the Canadian Niagara Power Company is there sufficient depth of water to produce the necessary supply without a gathering dam, which is not included in the alternative scheme proposed by that company, and when this statement is fully understood, it includes the proposition, which is true in actual fact, that unless this site and proposed works are available, the Commissioners have now exhausted their power to license, and the existing companies have secured licenses which will forever prevent the operations of any other sufficient power development upon the Canadian side of the Niagara River.

SECTION II.

No argument for the Canadian Niagara Power Company can be founded upon paragraph 11.

It was inserted in the wisdom of the Government for its protection against any possible liability in respect of the proposed works of other licensees up the river, so that if the supply of water were diminished, still the Canadian Niagara Power Company should have no claim either against the Government or against such other licensees. But if any substantial interference were caused by subsequent licensees, which could not be remedied by deepening at the point of intake, then any claim on the part of the Canadian Niagara Power Company is not interfered with.

The section does not in any way restrict the right of the Government to grant, or of any applicant to receive a license, but it says that if the interference should turn out to be substantial, and without remedy by deepening, then if the Canadian Niagara Power Company has a claim for damages they may enforce it.

This section is relied upon by the applicants to prove :

1. That subsequent licensees were then contemplated by the Canadian Niagara Power Company.

2. That the Canadian Niagara Power Company were then content to make no claim against subsequent licensees for any diminution in the supply of water which would not cause a substantial interference or which could be remedied by deepening at the point of intake.

3. A lowering of the level of the water was clearly intended to be covered, because the words are "if from any cause the supply of water, etc., be diminished"; and lowering the level is a cause which would diminish the supply the reduction in the supply absolutely calls for a reduction in the level, and this can be taken care of by deepening. And

4. If the applicants admit a slight difference in level which can be remedied by deepening, then this difference is not such a one as will affect the granting of the license, for the section imposes the obligation upon the company to deepen for its own protection.

The above grounds are submitted by counsel for the applicants.

(Signed) C. ROBINSON.

(Signed) H. H. MACRAE.

The Hon. the Premier of Ontario :

Re the Application of William Mackenzie, H. M. Pellatt and Frederic Nicholls to the Board of Commissioners of Niagara Falls Park.

Sir : I desire to call the attention of the Hon. the Premier and the Members of the Cabinet to the following facts in connection with the report of J. James P. Croes, submitted herewith.

The petition of the applicants having been filed, Mr. J. W. Langmuir Chairman of the Board, appointed Wednesday, the 10th December, for the hearing of the same, and on that date Mr. Mackenzie, Colonel Pellatt, Mr. Nicholls and myself attended before the Commissioners—Mr. Langmuir in the chair, Mr. Jaffray and Mr. James Wilson.

Mr. Hugh L. Cooper, hydraulic engineer for the petitioners, submitted his plans and explained the details of the proposed works, and gave it as his opinion in answer to Mr. Langmuir, that the taking of the water would not materially reduce the level of the water at the intake of the Canadian Niagara Power Company.

Mr. Langmuir then addressed Mr. Cooper, saying that it might be so, but could Mr. Cooper produce before him the first hydraulic engineer in the United States to say the same thing.

The case of the petitioners was complete at this time before the Commissioners, but in view of Mr. Langmuir's expressed desire for the highest independent testimony, Mr. Cooper obtained the opinion of Mr. Croes and offered it to Mr. Langmuir on the 18th inst.

The positions held by Mr. Croes are on record now with Mr. Wilson, and are sufficient evidence of his standing.

I have the honor to be, sir,

Your obedient servant,

H. H. MACRAE.

ARGUMENT OF HUGH L. COOPER, ENGINEER FOR THE APPLICANTS

In the matter of a certain application to the Lieutenant-Governor-in-Council of the Province of Ontario by William Mackenzie, Frederic Nicholls and Henry M. Pellatt, all of the City of Toronto, in the County of York in the said Province.

Mr. Hugh L. Cooper, hydraulic engineer for the applicants above mentioned, availing himself of the permission given to him by the honorable the members of the Cabinet of the Ontario Legislature, begs to submit the following answers to the objections taken by Mr. Herschel, C.E., on behalf of the Canadian Niagara Power Company to the works of the applicants on the Niagara River.

The Honorable the Premier having expressed his desire to have before him in writing the engineering reasons from the standpoint of the applicants why the objections taken by Mr. Herschel are not entitled to prevail, the writer understands that he is expressly desired to confine his statements to the arguments advanced by Mr. Herschel at the time of the hearing before the Members of the Government.

It should not be understood, however, that a simple reply to the arguments of Mr. Herschel in themselves constitute all of the reasons why the location proposed by the applicants should be adopted. Mr. Herschel's objections all had to do with the questions: First, of a reduction of level at their intake; second, the great cost that will be entailed upon them as a result of the change in this level; third, the action of the ice.

The opening statement of Mr. Herschel was to the effect that the construction of the temporary diverting coffer dam of the Ontario Power Company had produced a great change in the level of the water at the intake of the Niagara Power Company, and he announces that this change in level was so great as one foot.

In the consideration of the subject matter of this report the writer specially desires that the report of Mr. Croes, his associate, should be first read and understood, for the reason that the entire question of the effect upon the Canadian Niagara Power Company hinges upon the kind of works proposed by the applicants.

The report of Mr. Croes plainly shows that the works proposed both by the Ontario company and the applicants' company are neither of them in any sense in the nature of diverting works, for the specific reason that both over-falls in their final position are parallel to the direction of the approaching current, and because they are parallel they cannot divert, but can only receive, and it will aid your honorable body if in a consideration of this question you will call the structures placed in the river receiving dams, which they properly are.

The temporary construction dam which Mr. Herschel says changed their level one foot, is a diverting dam in the fullest sense of the definition offered you by Mr. Croes, and it is a fact that the diverting dam built by the Ontario company and now in place, diverts from its natural course a quantity of water more than twice as great as the total of the sum of waters

involved in the power developments of the Ontario company and the applicants' company.

Mr. Herschel thinks that the reduction in level is one foot.

The writer will bring upon request to the notice of the Commission absolute proof that Mr. Herschel is in error in this statement, and that this reduction, instead of one foot, as claimed by Mr. Herschel, has not been six inches.

Now, then, if the coffer dam above referred to is diverting twice as much water from its natural flowing tendency as is required by the Ontario Company and the applicants' company, and the present reduction in level is only six inches, then the greatest reduction in level that can be suggested as possible when both of the companies above referred to are in full operation will be a reduction of level of three inches at the intake of the Canadian Niagara Power Company.

A strict analysis of the conditions existing when you come to consider that the coffer dam above referred to is a diverting dam and entirely discharges and displaces the natural flow, would suggest to a reasoning mind that this three inches would be more like one and a half inches.

The investigations have been made and based upon actual facts pertaining to the particular river under consideration and results have been found which have been dictated by undisputable mathematic hydraulic formulae.

A calculation as to what the effect would be at the intake of the Canadian Niagara Power Company by the subtraction of 11,200 cubic feet of water per second, based upon standard hydraulic engineering formulae, shows that the maximum reduction that could be expected would be three and one-half inches, and in order to be entirely safe and that no possible close decisions could be offered to your honorable body, this three and one-half inches has been increased 100 per cent. and called seven inches.

The engineers of the War Department of the United States Government in their part 8 report of the year 1900, publish an exhaustive report upon the flow in the Niagara River covering a term of years at the International Bridge and below it.

The minimum flow of the Niagara River, as per the above report, is 10,000,000 cubic feet of water per minute, and the total quantity of water which the applicants propose to use when their entire development is complete is but 7 per cent. of this vast quantity, and this ratio of 7 per cent. should always be borne in mind when this report is being considered.

The report above referred to shows that a reduction of 7 per cent. of the quantity of water in the Niagara River results in a reduction of the level of the water surface of 2 per cent., where the percentage is applied to the average depth of the water at the point at which the measurements are taken.

At the Canadian Niagara Power Company's intake the average depth of water is 96 inches, and 2 per cent. of this quantity would mean a reduc-

tion in level of approximately two inches, allowing for the quantity of water that is discharged over the American Falls.

Taking into consideration all of the foregoing there can be no questioning this statement, that the maximum possible effect that can result to the Canadian Niagara Power Company's level by the subtraction of our quantity, namely, 11,200 cubic feet per second, cannot be a greater amount than seven inches, and it should be borne in mind that this seven inches is fully 100 per cent. more than the best calculations and previous measurements show that it will be.

The question then comes as to what the effect will be of a reduction of seven inches in the level of the water at the intake of the Canadian Niagara Power Company?

In consideration of the question "of water level" in front of the Canadian Niagara Power Company's intake, it must be borne in mind that the level of the water in front of this intake, whether any works are built above the intake or are not built, is an exceedingly variable quantity, owing to the directions of the winds at the head of the river, and that under present conditions, uninfluenced by any intakes whatsoever, the variations in the level of the water are frequently as great as 2 1-2 feet in 24 hours.

This feature of the present existing conditions is important and should not be lost sight of.

It should also be further borne in mind that in all hydraulic power constructions the machinery used is always designed to take care of large variations in level, and that turbines are provided with regulating gates within themselves, while under the influence of the machinery employed automatically take care of changes in level.

The maximum range of variation in level that can be spoken of here, or has been spoken of by Mr. Herschel or by ourselves, is 3 per cent. of the total head, whereas it is a fact that fully 80 per cent. of the water powers on the American continent have their turbines built to take care of variations in level of 35 per cent., instead of 4 per cent., and no important water power can be referred to in the United States or elsewhere, where the variations in level are less than 3 per cent.

The foregoing statement is exceedingly important in the consideration of this question, and the facts stated above should be thoroughly understood and remembered.

For the information of the Commission, it may be further stated that all properly designed turbines, and including the designs of Mr. Herschel of this particular plant, provide that the maximum power shall be given off by the turbines when the turbine gate is practically seven-eighths open, and the reason that the turbines are so designed is to take care of the variations in level and their consequent influence upon speed.

No water power plant can be instanced by Mr. Herschel, or by any other person, where the value and efficiency of the plant is affected or controlled or restricted by variations in the level of 3 or 10 per cent.

In practically all of the water power plants that are now in commission the element of a flooded season as compared to a minimum period, has always to be contended with, and in a majority of cases, the range between high water and low water is often 50 and 60 per cent. instead of the 3 per cent. in the case under consideration.

The reason that flood waters do not influence the plant we are speaking of, is because the vast areas of the lakes serve as an equalizing storage reservoir.

All of the foregoing facts point to one absolute condition existing at Niagara Falls, namely, that the taking of water out of the Niagara River upon the plans that obtain in the construction of the Canadian Niagara Power Company, follow conditions that cannot be paralleled elsewhere, and these conditions are conditions of exceptional value.

Finally in the above it should be noted that all of the comparisons have been made upon the basis that the actual conditions in level have been made, because of the work of the applicants has been 3 per cent., whereas this variation will be less than one-half of 1 per cent.

The contention has been made that the reduction in the level would cause necessarily a great change in the design of the works of the Canadian Niagara Power Company, and the waste of a "large heap of cut stone."

I have seen the plans of the intake of the Canadian Niagara Power Company, as well as the plans of their ice runner, and am familiar with the general construction involved in the works of the Canadian Niagara Power Company. From such examination I am able to say that the depth of water figured at the intake of the Canadian Niagara Power Company is taken at 15 feet, they having made excavations deepening the river at the intake from eight to fifteen feet, in order that the velocity of the water through their works may be reduced to a speed easier of manipulation.

Assuming that the petition of the applicants is granted, and assuming that the Ontario Power Company and the applicants' company were both taking their maximum power, and assuming finally that the Canadian Niagara Power Company under these conditions had not made any change in their present works, then and in that event, a reduction even of 7 inches (and we claim that it is only 3 1-2 inches) in the level would cause the following result:

The turbines of the Canadian Niagara Power Company are figured to work upon a nominal head of 136 feet, then if this head should be reduced 7 inches, in order to supply the same amount of power at 135.4 feet head that was originally called for at 136 feet head, we would require an increase in the amount of water delivered to the turbines, which percentage of increase would be represented by the ratio between 7 inches and 136 feet, which is less than one-half of 1 per cent.

In order that the turbines might still deliver the full amount of power as originally designed, and when operating under a reduced head of 7 inches in order that the quantity of water might be sufficient, it would be necessary to increase the velocity of the water of the intake by 3 1-2 per cent.

The demands of these above two necessities would add up less than 4 per cent., which increase in velocity is an amount that is imperceptible to the eye, is incapable of practicable measurement or discovery with the best measuring devices now known to the engineering profession. When we realize that practically all the power plants in the United States have to contend with differences in volume and in water levels where the ranges of these differences are usually from 30 per cent. up, this proposal, even if it involved a change of 4 per cent. (which we deny) prohibits criticism.

Supposing that the Canadian Niagara Power Company take the arbitrary position that they do not choose to indulge this four per cent.—what is the remedy?

Based upon an examination of the plans of this company the remedy that will cure the proposed increase in velocity would be by deepening the intake, a condition which has been contemplated by section 11, invoked by Mr. Nesbitt.

The contention has been made that in order to provide for a change in level great changes would have to be made in the design of the present works, and the waste of a large amount of cut stone in the above works. It was stated before the members of the Government that it would entail the expenditure of a very large sum of money to make the necessary changes in the present works to allow for any change whatever in the level, but upon examination and calculation I have found and estimated that the extra expenditure, if any, which would be occasioned to the Canadian Niagara Power Company would be as follows:

For the deepening of the intake the necessary amount that would require to be excavated would be 650 cubic yards of lime rock, in the bed on the intake, which at \$1.50 per yard would make \$975.00. Then with reference to the ice run, it is a fact that the elevation of the top of this ice over-fall, which is only 40 feet long, could be lowered to suit the new conditions, by the removal of six cubic yards of masonry, which at \$15.00 per yard would be \$90, making a total with the amount mentioned above, of \$1,065.00 to correct all the evils which are predicted by Mr. Herschel, and which evils we deny can possibly ever exist.

It must be borne in mind with reference to the masonry in this ice run that none of it is now laid, and that the alteration of the level in the intake does not involve any interference with any masonry that is now in place or is hereafter contemplated to be placed.

With reference to Mr. Herschel's second suggestion, that we should have our building across the tracks within the main body of the park, we reply that such a plan would involve the building of the same gathering dam upon the river bed as is provided for in the present plans, for the reason that in order to enable the applicants to successfully handle approaching ice, and to successfully provide for permissible velocities in the necessary volume of water for the operation of our plant, it will be necessary for us to construct a gathering over-fall dam, the elevation of the top of which is approximately elevation 533, and the length of which is determined by the two points, where this level line of elevation 533.00 intercepts the bed

of the river, and where it intercepts the present bank of the Queen Victoria Park. The above works would be necessary in any design, and by placing our power house behind this work we obviate the necessity of burdening the space in the body of the park with power house structures and locate them in the position where they would cause the least possible interference with the rights and privileges of every person interested.

It had been suggested that instead of building a gathering dam that the bed of the river should be excavated and deepened. In reply to this we state, what must be apparent to every person, that in order to successfully handle the ice that may be forced upon us, we must have slow velocity and a uniform level from the surface of which to divert the ice, and that these conditions cannot possibly be obtained except by the construction of the works proposed.

The building of works of the kind proposed was not necessary at the intake of the Canadian Niagara Power Company because there the surface of the water is practically level as compared with the surface of the water at our intake, and the water at their intake has the necessary depth, none of which conditions exist naturally at our site petitioned for.

With reference to the claim of Mr. Herschel that the works as proposed would operate to change the quantities of ice going by the intake of the Canadian Niagara Power Company, we reply as follows :

The direction of the current in the Niagara River carrying ice towards the Canadian Niagara Power Company's intake is formed, and its course is fully established by natural slopes in the river bed and by contour of the shore long before the waters of the Niagara River reach any of the works proposed by the applicants.

Therefore, inasmuch as the works of the applicants are wholly receptive, instead of diverting, the quantity of ice that will come to the plant of the applicants will be no different in any sense than would be the case were the plant never constructed. Therefore it must be admitted that the discharge of ice by the proposed plant of the applicants can be no greater under the proposed conditions.

A casual glance at the plan map would make all of the foregoing immediately apparent, and when we come to consider that the direction of the currents in the Niagara River above the intake of the Canadian Niagara Power Company is all toward the shore line just above the intake of the Canadian Niagara Power Company, the question of a change of the action of the ice in front of Mr. Herschel's intake by the works proposed by the applicants is entirely out of reason.

In conclusion the following facts cannot be denied by hydraulic mathematics or reason :

First : That the subtraction of 11,200 cubic feet of water per second at the site of the applicants will not appreciably reduce the level, or have any perceptible effect upon the installation of the Canadian Niagara Power Company, and will not entail upon them the necessity of changing in any particular whatever any part of their plans.

Second : For the reasons above given that there can be no legitimate reason advanced for the transfer of the power house site that they propose to a place further within the park and on the opposite side of the street railway tracks.

Third : Under the plans proposed, because of natural conditions that now exist, and which cannot be interfered with by any of the works proposed, there will be no change in the action of the ice at the intake of the Canadian Niagara Power Company.

Respectfully submitted,

(Signed) HUGH L. COOPER,
Consulting Engineer, 29 Boardway, New York.

New York, December 23rd, 1902.

OPINION OF J. JAMES R. CROES, CONSULTING ENGINEER.

To the Honorable the Premier of the Province of Ontario and Members of the Cabinet :

Gentlemen.—Having been requested by the Honorable Premier to submit my reasons for the opinions expressed in my letter to John W. Langmuir, Esq., Chairman of the Queen Victoria Park Commission, dated December 18th, 1902. I have the honor to say :

“First. The proposed works of the Toronto and Niagara Falls Water Power Company will not tend to divert the waters of the Niagara River away off the intake of the Canadian Niagara Power Company.”

Walls built in the channel of a swiftly flowing stream may be of three kinds ; diversion walls, or training walls, or obstructing walls.

A diversion wall may be defined as one built diagonally to the course of the stream at such an angle that the current striking it will be deflected from its course at an angle about equal to that at which it impinges against the wall. After passing the wall its course will not be parallel to the wall.

A training wall may be defined as one nearly parallel to the course of the current, and at such an angle that the water impinging against it will follow the course of the wall and not be deflected, but will continue on the same course as the wall after leaving it.

An obstructing wall is one built nearly transversely to the course of the current, so that the current is checked and broken up and divided each way from the point of impact and in a rapid current is heaped up against the wall at that point.

In a very swift current, the angular difference between an obstruction wall and a diversion wall at one extreme; and a diversion wall and a training wall at the other extreme, may be very slight.

In the case now under consideration, there is at this time a diversion wall at the east boundary of the Queen Victoria Park, extending downstream 800 feet in the form of a coffer dam built by the Ontario Power Company.

The current at that point sets in naturally towards the receding river bank. It is deflected by the dyke away from the shore and towards the apex of the Horse Shoe Fall, 3,200 feet down the stream. The extreme end of the dyke is bent to the east for 100 feet, making it practically a training wall in the direction of the deflected current.

The natural result is seen in the diversion of water from the elbow around Dufferin Island, where the bottom is laid bare and the lowering of the water level along the west shore of the river all the way down to the Canadian Niagara Power Company's intake opposite the apex of the Horse Shoe Fall.

This dyke is a temporary structure and when it is removed the current will resume its normal course, and the elevation all along the shore will be restored.

At the farther end of the dyke the current, the course of which has naturally been deflected somewhat to the left, as is evidenced by the conformation of the shore line, will encounter the training wall of the Ontario

Power Company, 700 feet long, built on the axis of the original current and terminated by the obstruction wall of the waste weir and gate house. The water flowing in the channel to the left of this wall will pass, some of it through the elbow around Dufferin Island, some will be carried off through the conduit of the Ontario Power Company and the rest will flow over the waste weirs and into the natural channel below Dufferin Island. That passing to the right of the training wall will follow its natural course, which the contour of the adjacent shore shows to be in a direction towards the intake of the Canadian Niagara Power Company.

It must be borne in mind right here that the direction of the current which shapes the shore of this, or any other, river is parallel to the general shore line. Bays and indentations cause fragmentary aberrations, but the general contour of the shore shows the true course of the current, which in this case is from the point designated as "Tempest Point" and down to the power house of the Electric Railway Company; a very regular curve of about 2,700 feet radius.

A shore distance from the shore opposite "Tempest Point" observation shows the course of the current to be directly towards the intake of the Canadian Niagara Power Company. To preserve this direction and accentuate it and lessen if possible the deflection which is apparent in the current 400 or 500 feet from the shore to the right, and in the direction of the Horse Shoe Fall, it is proposed by the Toronto Niagara Falls Power Company to build in the bed of the river about 400 feet from the shore a training wall some 650 feet long on the axis of the current, the upper end of the wall being entirely submerged and the top of the wall level, while the bed of the river falls several feet in the length of the wall. The last 200 feet of this wall will be built up to above the surface of the water. The water flowing to the left of this wall will partly be diverted into the company's whelpit and partly will flow over an obstructing wall or waste weir at the down-stream end of the training wall. The water flowing to the right will be given a direction which will lead it directly towards the intake of the Canadian Niagara Power Company, 1,200 feet distant.

Inasmuch as the walls proposed to be constructed are all west of a straight line drawn from the east line of the Victoria Park to the intake of the Canadian Niagara Power Company and are so aligned as to attract the current shoreward rather than towards the centre of the river, I am of the opinion that these works will not tend to divert the waters of the river away from the intake of the Canadian Niagara Power Company.

Second. "The elevation of the surface of the water at the intake of the Canadian Niagara Power Company will not be appreciably lowered by the subtraction from the river of 11,200 cubic feet per second at a point 1,200 feet distant."

By the term "not appreciably" is meant that the difference of elevation of the water at the intake under the conditions of subtraction or non-subtraction of the specified amount of water could not be detected by the ordinary observer, and could only be determined by a long and carefully conducted series of observations. The conditions existing may be thus stated: taking a straight line from the southerly shore of the river at the east limit of Queen Victoria Park to the Canadian Niagara Power Company's intake, a distance of about 3,700 feet, there is to the northeast of that line a body of

water 1,200 feet wide flowing towards the intake, and its surface ordinarily falling in that distance about forty feet. On one side of this stream there would be a body of comparatively still water between it and the river bank, the fall and velocity being checked by training walls and obstruction walls. On the other side there would be a mass of swiftly flowing and turbulent water moving in the same general direction. Ripples and rapids and swirls, caused by irregularities in the river bottom, disturb the surface of these swiftly moving waters and cause surface cross-currents and fluctuations of level, but the general mass of the stream we are considering moves on towards the intake. On arriving at the intake the west side of this stream encounters the river bank through which the intake is constructed, while the east side of it reaches a precipitous gorge, the brink of which curves in across the stream and then down in its general direction for about 1,000 feet, meeting there the west shore, which has curved around to that point; down this gorge the whole mass of water is precipitated, forming the Horse Shoe Fall.

At about 1,400 feet up stream from the line drawn from the intake to the crest of the Horse Shoe, the Toronto & Niagara Falls Power Company propose to take from the west side of this stream a volume of water amounting to 11,200 cubic feet per second. At this point the water in the centre of the channel is several feet higher than it is along the shore. The abstraction of 11,200 cubic feet per second will tend to lower the water level close to the shore and the training wall erected on the west edge of the stream. The lowering of the water at this point will tend to produce a cross current in the stream setting towards the west shore, so as to equalize the level of the water. The direction of the line of shortest descent in the surface of the stream will be changed so that the surface current will flow in a more northwesterly direction than before to fill up the slight depression in the surface caused by the removal of the above named amount of water on the west side of the stream. This action will continue along down the stream until the level of the water surface near the shore is restored to its original condition. The distance within which this action may take place is fully a quarter of a mile, and at the point of intake of the Canadian Niagara Power Company, where the energy of this whole mass of water in the stream has been exerted in producing such a condition that the water which comes down on one side of a triangle is checked by another side of the triangle and precipitated over a cascade on the third side of the triangle. The cross section of the area of the stream on the up stream side of this triangle is adjusted by the action of the natural forces, so that all the water that comes down must be precipitated over the fall.

The exact shape of the upper surface of this cross section varies with the amount of water flowing in the stream, it fluctuates every day and every hour, and it is impossible that such a slight variation as would occur from the abstraction of a very small proportion of the volume of water flowing down this stream at a point more than a quarter of a mile away can make such a difference in the surface elevation of the water from crest of fall to bank as to be appreciable by the senses.

All of which is respectfully submitted.

(Signed) J. JAMES R. CROES,

New York, Dec. 22, 1902.

Consulting Engineer.

REJOINDER OF HUGH L. COOPER TO ARGUMENTS OF CANADIAN NIAGARA POWER COMPANY'S ENGINEERS.

To the Premier of Ontario and the Members of the Cabinet :

On behalf of the applicants William Mackenzie, Henry M. Pellatt and Frederic Nicholls, I beg to present the following answer to the memorandum of objections embodied in the letter of Clemens Herschel and Cecil B. Smith, under date of December 29th, all having to do with the grant of a power site to the applicants at or near Tempest Point.

The first assertion that the Niagara River above and below Tempest Point is a "series of rapids, ridges, channels, flat shoals, covered by a small depth of water," is admitted. An examination of the site on the ground absolutely demonstrates that the piling up effect at the intake of the Canadian Niagara Power Company and due to above admitted conditions, is caused by water almost wholly entirely outside of the line A. B. shown on our map.

The configuration of the banks of the Niagara River at Tempest Point is such that the water striking its bank, whether works are built there or not, do not add to the tendency of the river to pile up in front of the intake of the Canadian Niagara Power Company because this shore is not parallel to the shore below. The fact that there is this great natural tendency of the waters of the Niagara River to pile up six feet higher than a level line in front of the intake in question, is one of the strongest arguments why the subtraction of 7 per cent. of the waters will be inappreciable. If the water were level opposite the intake of the Canadian Niagara Power Company, the subtraction of 11,200 cubic feet per second at the proposed intake must affect the level to a greater extent than where, as the fact is in the present case, the torrent behind is crowding the water against the bank and in natural opposition to any reduction of level whatsoever. The works proposed by the applicants do not in any sense tend to divert water from the intake of the Canadian Niagara Power Company; on the contrary, the drawing out of 11,200 cubic feet per second at Tempest Point will create a tendency of the river to flow toward the river bank above the intake of the Canadian Niagara Power Company, and this tendency will extend beyond the limits of the line A. B. and towards the centre of the stream, and be of value to the contestants in this case, as explained by Mr. Croes. In view of the above, and bearing always in mind that the proposed works do not divert water, the claim that a subtraction of 7 per cent. of the water of the river is going to result in the remaining 93 per cent seeking a new path toward the centre of the Horse Shoe Falls cannot prevail.

Action of Ontario Power Company Coffe Dam.

Messrs. Herschel and Smith overlook the fact that this coffer dam of the Ontario Power Company is a diverting dam in the fullest meaning of the words, and that it diverts from its natural tendency more than twice the amount of water than is involved in the ultimate necessities of both the Ontario Power Company and the applicants' company, and they overlook the fact that the diverting towards the centre of the river of 50,000 cubic feet of water per second is a vastly different condition than the subtraction of 25,000 cubic feet per second through works that are receiving and not diverting.

It follows therefore that the admission by Messrs. Herschel and Smith that if the present effect of the coffer dam of the Ontario Company is only a reduction of "2-3 of a foot" or 8 inches at their intake, this admission must also carry with it the further admission that when natural conditions are restored, and the Ontario company and the applicants' company should be both in full commission, that the maximum effect at the intake of the Canadian Niagara Power Company could not be more than one-half of eight inches, or four inches. In view of the foregoing it is not understood how Messrs. Herschel and Smith can sign so impossible a statement that "at the intake of the Canadian Niagara Power Company the water level will be permanently lowered by several feet."

General Denial.

We deny absolutely that any of the works proposed by the applicants either of a permanent or temporary construction kind, can ever have any appreciable effect upon the contestants' company, and our reasons therefor are set forth above, and in our original brief, and the statement that the Canadian Niagara Power Compny will be by any of our works prevented or hindered from the completing of their plant for two years or any other period, is not correct.

We deny for reasons previously set forth that the Canadian Niagara Power Company is in any sense called upon by engineering necessities to protect itself from any conditions whatsoever, that may result by the granting of the petition of the applicants.

We deny that we can build works "by placing their power house back against the bluff." The reason we can't go "against the bluff" is because: First, we could not get by the pipes of the Ontario Power Company, neither under them, over them, nor behind them. Second, because this plan, even if the Ontario Power Company were out of the way would involve a needless expense of from \$450,000 to \$550,000, and the plant when so built would not be as useful as the one proposed by the applicants.

Arguments on Water Level.

The contention that "To lower the natural level of the Niagara River one inch would inflict serious damage," means that if it is a fact, then the works in question have been most seriously mis-designed.

The river level varies from day to day from 6 inches to 36 inches, influenced by the wind at the head of the river. This level may further vary in the future by subtraction of further waters for a deep water way canal, by the granting of further water power rights on the American side, by the taking out of more water at Chicago for drainage or navigation purposes—all or any of which probabilities will have in their consummation a much greater influence than one inch, and the sum of them might be 18 inches, and if this plant has been designed up to so close a point that one inch is a factor on one side and the wind and the possibilities above mentioned on the other, then we submit that the designers of this plant have been guilty of oversights for which the Commissioners of the Victoria Park cannot be held responsible.

It must be remembered that the probabilities above referred to have always existed, and before the filing of the application of the applicants. It is here contended that in no way is it a possibility for the Victoria Park Commissioners to guarantee any particular level of the water at the intake of the Canadian Niagara Power Company because of the volume of the influence outside of the jurisdiction of the Park Commissioners.

Wing Dam.

We deny the necessity of the proposed wing dam at the intake of the Canadian Niagara Power Company, and referred to in the legal submission section D. for reasons plainly evident in the first brief filed by the writer.

If, however, the contestants under the dominion of the same kind of advice that designs a plant on a margin of 1 inch where the total head involved is 1,632 inches, desire to build a wing dam at the lower end of their intake, such wing dam can be built without "hurt" to the affiliated company, the International River Railway Company, but the suggestion that the expense of this useless undertaking should be ever brought to the attention of the applicants should not prevail.

Ice.

We deny that the works we propose add to the ice quantities that are to be contended with by the contestants. First, because the area to be occupied by the proposed plant is so situated that even with the works not built the tendency of the river at that point is to pile up the ice on and toward the receiving bank at Tempest Point, and all such ice must pass close to the intake of the Canadian Niagara Power Company. The plan shows that, and an examination of the site shows the same thing; therefore, we do not increase the ice that would otherwise come, because the ice so thrown against Tempest Point would have to travel on toward the intake in question. Second, our first discharging weir or chute for ice, discharges away from the bank, not towards the bank, and the action of our works will be to relieve the contestants of ice instead of to oppress them.

Section 11.

Messrs. Herschel and Smith assert that in their respective experiences they have never known of changes in level not being objected to. This is no argument, because conditions parallel to those here existing, do not exist elsewhere even in an approximate degree. Section 11 says, if the supply of water is by any means reduced, the Canadian Niagara Power Company may deepen. This statement compels the admission that a reduction in level is contemplated and provided for, as otherwise you could not reduce the quantity without artificially choking up the intake with added works therein, a condition impossible in these premises.

We are shown exhibit "A" and as to this my brief already filed dealing with Mr. Herschel's second suggestion that the applicants should build across the tracks, shows conclusively why any instalment which does not include a gathering dam must be valueless, and no experienced hydraulic engineer could properly approve of the plan marked exhibit "A" and signed

by Mr. Smith. Furthermore, even if there were no hydraulic objections to this plan "A" it could not be made available because the properly approved plans of the Ontario Power Company show their steel conduits passing through the centre of forebay and power house of the works shown on exhibit "A."

No reason is offered by the Canadian Niagara Power Company for the original preparation and filing of this plan.

Conclusion.

We submit the foregoing brief reply feeling assured that the first briefs filed by Mr. Croes and the writer themselves constitute a general answer to the brief in question. We are gratified in the knowledge that the various engineering problems which are the points at issue in this case, will receive at your hands a full and impartial judgment, and we beg to assure you of our belief that the most critical examination of the facts in this case will result in the granting of the petition we have filed.

All of which is respectfully submitted.

(Signed) HUGH L. COOPER.

LETTER OF COUNSEL FOR CANADIAN NIAGARA POWER COMPANY.

Toronto, December 29th, 1902.

Hon. G. W. Ross, Parliament Buildings, Toronto:

Application of the Toronto and Niagara Power Company.

Dear Sir,—Herewith we beg to send you (a) memorandum of objections by the engineers and (b) memorandum presented upon behalf of the Canadian Niagara Power Company, as a supplement to that of its engineers.

On the 27th inst. we wrote to Mr. Macrae, solicitor of the applicants, the letter of which we enclose a copy, and to-day we received a letter from Mr. Macrae refusing to comply with our request.

As we have not been given an opportunity to read the report of the engineers of the applicants or the argument presented upon behalf of the applicants, we are obviously at a disadvantage in replying thereto, and we therefore beg to say that, if anything contained in the papers submitted upon behalf of the applicants is not replied to in our memorandum we shall be happy to deal with such point upon being advised by you that you desire a reply thereto.

Certainly, we must not be held to concur in any statement in the applicants' papers which we have been refused an opportunity to consider.

Respectfully yours,

(Signed) WALTER NESBITT

A. MONRO GRIER

Enclosed.

of counsel for the Canadian Niagara Power Company.
27th December, 1902.

(Copy.)

H. H. Macrae, Esq., Barrister, etc., Toronto, Ont.:

My Dear Mr. Macrae.—I have communicated with Mr. Nesbitt and he informs me that the Premier has intimated to him that the engineering argument upon behalf of the applicants should be put in, so that our engineers may be able to frame their rejoinder, and in like manner that such rejoinder should be put in so that it may be answered by your engineers.

In order that a course in keeping with the above may be followed, perhaps you will kindly let me have the memorandum or argument by Mr. Croes and Mr. Cooper in order that I may be in a position to send to you the rejoinder of Mr. Herschel and Mr. Smith. If you so desire I can ask the railway company to send you, at the same time, the argument of their engineers.

Wishing you the compliments of the season,

Yours faithfully,

"MONRO GRIER," Secretary.

Niagara Falls, Ont., Dec. 29th, 1902.

OPINION OF CANADIAN NIAGARA POWER COMPANY'S
ENGINEERS.

The Canadian Niagara Power Company, Niagara Falls, Ont.:

Gentlemen,—We beg to present the following memorandum of objections to the plans of the Toronto and Niagara Power Company, as shown on a tracing presented by the Commissioners of the Queen Victoria Niagara Falls Park, December 19th, 1902, at a hearing by the Government of Ontario, held at the Parliament Buildings in Toronto on that day.

The Niagara River at Tempest Point, in the Park as well as both up stream and down stream therefrom, is a series of rapids, low water falls, ridges, channels, flat shoals covered by a small depth of water, and ledges of rock, making a stretch of river totally unlike an ordinary length of river in its formation as a channel for water, and subject to effects from disturbances placed in it totally unlike those that by the same causes would be produced in the ordinary river.

The configuration of the river is such that the water near the shore where the applicants' power house is proposed is some eight or nine feet lower than the water in the river 700 or 800 feet distant therefrom, and at right angles to the shore line. This inequality in the level of the water caused by the existence of rock ledges in the river creates a unique rush of water towards the Canadian shore at the intake of the Canadian Niagara Power Company, the result being that the water at that point is some 5 or 6 feet higher than it is in the centre of the river above the Horse Shoe Falls. Should a still-water basin be constructed in the river at the point shown on the plans filed, the level of which would be as high as or higher than that of the water in the centre of the river, the result would be that the main flow of the river would direct itself towards the centre of the Horse Shoe Falls, lowering the water in front of the Canadian Niagara Power Company's intake by several feet—exactly how much it is impossible to calculate—but in our opinion it would be at least 3 or 4 feet. Experience has amply shown these effects may be looked for.

At Tempest Point the water level is now, since the cribs were put in the river, 1,800 feet up stream from Tempest Point, about 2 feet lower than it was during the same stages of the river before the said cribs were put in by the Ontario Power Company.

At the intake of the Canadian Niagara Power Company, 1,400 feet down stream from Tempest Point, this same lowering of the water by the said cribs, which are over half a mile up stream from the intake, has amounted to about two-thirds of a foot.

Under the circumstances the proposed permanent structures of the applicants' in our opinion will cause the water level of the river at the intake of the Canadian Niagara Power Company to be permanently lowered by several feet, and any coffer dam to be built by the applicants will lower the river water levels still more at the intake of the Canadian Niagara Power Company and thus totally prevent the operation of the company's works while the coffer dam stands. That is, for a period of very likely two years.

The Canadian Niagara Power Company cannot now protect itself against effects from either the temporary or permanent works proposed. The works of the Canadian Niagara Power Company are built or contracted for to fit the natural water levels of the Niagara River; artificial interferences with these water levels could not have been foretold either in extent or in form. Their extent could not have been anticipated or prophesied or estimated, nor could the works to be built have been fitted to the water levels of futurity, and this cannot be done even to-day.

The most that could now be done would be for the Government or the applicants to build wing dams out into the river from a point down stream from the intake of the Canadian Niagara Power Company, and thus restore the river water level to its natural state.

The applicants can build works of the same class as those building by the Canadian Niagara Power Company without changing the natural levels in the Niagara River, by placing their power house back against the bluff opposite Tempest Point prallel to the river shore and about the same distance from the river shore as is the power house of the Canadian Niagara Power Company.

The sensitiveness of hydraulic works to a change of water levels is no new thing. The present case is wholly of this sort, and is not one of a slight diminution of head to act on the wheels or of a slight diminution of the total volume of water passing down the river. It is, to state it again, a case where owing to the configuration of the river bed even distant structures produce unusually great changes in water levels along the shore, and thus inflict great damage to works already planned and built.

To lower the natural level of the Niagara River one inch would inflict serious damage on the operation of the works of the Canadian Niagara Power Company, and the lowering of such level by a foot or more would so affect the operation of that company's works that the wing dam above referred to would become an absolute necessity.

During the terms of our respective experiences in water power construction we have never known a case where an attempt to change the natural water levels of a stream in any such manner as here has been suggested has been allowed against the protest of others having rights in the premises.

A harmful effect of the applicants' works will be the taking of ice from the river, which otherwise would pass on down stream and outside of the intake of the Canadian Niagara Power Company and the throwing of it again into the river along the shore, and in the line of the Canadian Niagara Power Company's intake, but if the applicants' works are built inland as suggested above the applicants can run their ice into their channel as is now done in other plants.

Section 11 of an agreement between the Commissioners and the Canadian Niagara Power Company has been alluded to. This section treats of remedies against a diminution of the supply of water at the point of intake and not with lowering of the water level of the river. The remedy open to the Canadian Niagara Power Company under this section is a "deepening at said point of intake," a course that would not remedy the

artificially produced water levels in the river in the slightest though possibly affect in helping to restore the volume of water. The remedy contemplated by the section, therefore, is of no avail against the injury which the works of the applicants as at present proposed would inflict.

Respectfully submitted.

(Signed) CLEMENS HERSCHEL,
Consulting Hydraulic Engineer.

(Signed) CECIL B. SMITH,
Resident Engineer.

RE APPLICATION OF THE TORONTO & NIAGARA POWER CO.

Memorandum presented upon behalf of the Canadian Niagara Power Co.

A.

1. This matter comes before the Government as an entirely open matter. The Commissioners always maintain that, as a body, they do not pass upon expert engineering questions. Now that the Commissioners have learned that the gentlemen, whose judgment they relied upon, represents the applicants—one of the parties to the present controversy—they will retire as of course from the position that the point at issue is concluded so far as they are concerned. It is not the practice of our tribunals to base a judgment upon the ex parte statements of one side in a contestation. The matter is therefore an open one.

2. The Canadian Niagara Power Company is not seeking to prevent the Toronto and Niagara Power Company from getting the right to develop power or, in other words, to prevent competition, but it is seeking to protect itself from physical damage.

B.

1. The Canadian Niagara Power Company obtained its charter in 1892. It has paid in rentals, up to date, the sum of \$215,000. It has obeyed consistently the Commissioners' directions as to its works, whether in respect of location or otherwise, and is in its present position of vulnerability with reference to physical hurt by reason of such obedience.

2. In law, the Commissioners are in a fiduciary position towards the Canadian Niagara Power Company, and in law and in equity that company looks to them and also to the Government to see that it is protected.

Apart from the provisions of section 11 of the agreement of 15th July, 1899 (which section will be dealt with below), the Commissioners are in duty bound to see that they do not impair the value of their grant to the Canadian Niagara Power Company. The like duty rests upon the Government.

3. Therefore if to grant the present request would hurt physically the development of the Canadian Niagara Power Company the request must be refused.

4. If it be said that it is impossible to demonstrate that the proposed development would or would not hurt physically the development of the Canadian Niagara Power Company, the duty of the Commissioners and the Government is clear. Reputable experts for the Canadian Niagara Power Company assert so strongly that hurt would follow that a reasonable doubt must be held to exist and any reasonable doubt must be resolved in favor of the Canadian Niagara Power Company.

This is not the case of a controversy between two parties as to the construction of rights already granted, but it is an application upon the part of one seeking for privileges which (upon the assumption of there being a doubt) may or may not do injury to another, who has received certain rights, for which he has duly paid. It is not a case where the question

can be tested physically, because if the view of the party who has paid for and has received the rights is correct, the granting of the privileges asked for by the one who has no rights, up to the present, would irremediably damage the party who has paid for and has already received rights in the premises.

5. The proposition contained in the next preceding paragraph would be sound, even if alternative methods were not open to the applicants, but in view of the fact that at least one alternative method of development is open to the applicants, the plea of the Canadian Niagara Power Company must be listened to by any tribunal, which desires to deal justly between the parties. The Canadian Niagara Power Company not only points to an alternative method of development, but hands to the Government and the Commissioners a plan (exhibit "A" to this memorandum), which has been in existence in the exact condition in which it is at present, ever since the month of July, 1902. If the Canadian Niagara Power Company were to start to develop to-day near the proposed site of the works of the applicants, the method of development to be followed would be that indicated in the attached plan, which was made without reference to any possible application by the Toronto and Niagara Power Company and at a time when it was confidently thought that the applicants, instead of developing power themselves, would take power from the Canadian Niagara Power Company. No better evidence of the good faith of the Canadian Niagara Power Company, in the suggestion of an alternative method, could, by any possibility, be obtained.

6. To sum up, it is abundantly clear, that the present application should not be granted, but that the Toronto and Niagara Power Company should be asked to develop along lines which would not hurt physically the development of the Canadian Niagara Power Company, which is already in an advanced stage, and upon which large sums have been spent and still larger sums contracted to be spent, in reliance upon the good faith of the Government of Ontario and the Commissioners of the Queen Victoria Niagara Falls Park.

C.

Reference has been had to section 11 of the agreement of 15th July, 1899, which reads as follows :

"11. It is further agreed that if from any cause the supply of water at the point of intake as by these presents defined be diminished, the company shall have no claim or right of action against the Commissioners, but may deepen such point of intake to such extent as to restore the supply of water to the volume or quantity necessary for the purpose of the company, and that the granting or licensing of rights to the company by these presents or the agreement of the seventh day of April, 1892, as hereby extended, shall not give the company any right of action against the Commissioners, nor give to the company any right of action against other licensees or grantees of the Commissioners in respect of any diminution not substantially interfering with the supply necessary for the company, nor so long as such necessary supply can be obtained by means of deepening at said points of intake."

1. As pointed out more fully below this section does not relate at all to such a hurt as is complained of by the Canadian Niagara Power Company, namely, a lowering of the water level, but assuming for the moment that it does relate to such a hurt the following consideration is pointed out:

If the section is not wide enough to protect the Canadian Niagara Power Company, in case its intake is in fact interfered with, then the Government and the Commissioners in the carrying out of the trust reposed in them in respect of the Canadian Niagara Power Company as a purchaser of rights from them, are bound to see that no rights are granted which are calculated to interfere with the supply necessary for the Canadian Niagara Power Company since (upon the hypothesis of this present paragraph) the Canadian Niagara Power Company would have no recourse, in the event of hurt being suffered. In other words, the more it is insisted upon that the Canadian Niagara Power Company is not given any remedy for damage inadvertently caused to it, the more emphatically does it become the duty of the Government and Commissioners to protect the Canadian Niagara Power Company in advance by refusing to grant privileges which might hurt its development.

2. The above section 11 does not relate to a lowering of the water level, which is the hurt complained of by the Engineer of the Canadian Niagara Power Company. The hurt contemplated by the section is merely a diminution in the volume or quantity of the supply. This is not objectionable if the water is not taken by obstructions placed in the river which substantially lower the water level. The language of the section when dealing with the hurt itself makes this point clear. It is made still clearer when we turn to the remedy suggested: "deepening at said point of intake". That remedy might be effectual to restore the volume of water but has nothing to do with the restoration of the water level. The water level changed to the detriment of the Canadian Niagara Power Company would remain so changed, and the harm done to the Canadian Niagara Power Company would remain unredressed.

Referring to that portion of the Engineers' memorandum which deals with the question of remedy it is obvious that if the applicants are permitted by the Government to erect the proposed works in spite of the protest of the Canadian Niagara Power Company the construction of a wing dam at a point down stream from the intake of the Canadian Niagara Power Company must form a portion of the works to be constructed by the applicants and that the Canadian Niagara Power Company must be indemnified by the applicants against any claim for damages suffered by the International Railway Company or others by reason of the construction of such wing dam.

(Signed) WALLACE NESBITT,

A. MORNO GRIER.

Of Counsel for Canadian Niagara Power Company.

29th December, 1902.

Niagara Falls, Ont., January 5th, 1903.

The Honorable Geo. W. Ross. Parliament Buildings, Toronto.

Dear Sir,—We have now the honor to present to you a memorandum containing the observations of our Engineers by way of reply to the briefs of the Engineers of the applicants.

In submitting this memorandum, permit us to point out that the briefs presented upon behalf of the applicants, so far from lessening our fears for the safety and well-being of our works have served to increase them.

We beg to emphasize the fact that, in the deplorable event of the request of the applicants being granted, there will arise the necessity to endeavor to protect our development, and we shall desire to lay before you the safeguards which in addition to those adverted to by our Engineers, would be necessary in such effort to protect our works.

It has been stated that the Government purpose invoking the aid of independent experts. If such a statement is correct, we wish to say that our Engineers are entirely at the service of the Government and their experts, to furnish plans or information or to aid in any other way which may be desired.

We have the honor to be,

Your obedient servants,

CANADIAN NIAGARA POWER COMPANY.

(Signed) W. H. BEATTY,

(Signed) W. B. RANKINE,
Vice-President.

REJOINDER OF ENGINEERS OF CANADIAN NIAGARA POWER
COMPANY TO ARGUMENTS OF ENGINEERS FOR
THE APPLICANTS.

Niagara Falls, Ont., January 3rd, 1903.

Canadian Niagara Power Company, Niagara Falls, Ontario :

Gentlemen,—Since sending to you our report of December 29th, 1902, containing our objections to the plans of The Toronto & Niagara Power Company, we have been allowed an opportunity to read the briefs of Messrs. J. James R. Croes and Hugh L. Cooper, Consulting Engineers of the applicants, and we beg to submit respectfully, for transmission to the Premier, the following observations by way of reply :

1. We call attention to the fact that the illustrations and arguments in the briefs of Messrs. Croes and Cooper are based upon theories in regard to the Niagara River which, however applicable to streams of ordinary character, do not apply to this river at the points under consideration. At these points, this river is not an ordinary stream-flow channel, one permitting the free interchange of water and a full and complete re-adjustment of water levels throughout its length and breadth. For this reason their illustrations and arguments should be disregarded.

(a) Personal observation and actual experiment show the error of the statements that the water now flows directly towards the intake of the Canadian Niagara Power Company and that it will be drawn in that direction by the proposed wing dam of the applicants. One of the statements of Mr. Croes in this regard is correct—"That the direction of the current which shapes the shore of this...river is parallel to the general shore line," and that the deflection which is apparent.....is in the direction of the Horseshoe Fall." During the construction of the Ontario Power Company's cofferdam, a section of crib, which broke away and floated downstream, was carried over the Horseshoe Fall near the centre, without approaching the intake of the Canadian Niagara Power Company. This result demonstrates the incorrectness of the statement in Mr. Croes' report that "observation shows the course of the current to be directly towards the intake of the Canadian Niagara Power Company," and justifies his other statement that the current is in the direction of the centre of the Horseshoe Fall.

(b) A calculation which must be disregarded is that of Mr. Cooper when he speaks of "what the effect would be at the intake of the Canadian Niagara Power Company by the subtraction of 11,200 cubic feet of water per second based upon standard hydraulic engineering formulae." It is evident that a "standard hydraulic" formula cannot be applied properly to a length of river so unlike a "standard hydraulic" river as the rapids and series of cataracts here under examination. For instance, assume a ridge of rock parallel to the shore and distant 250 feet from it and an average depth of water between it and the shore of five feet—a not inapt or unfair description of the existing conditions—and we have the subtraction of 11,200 cubic feet per second exhausting the whole flow of the river between the ridge and the shore.

(c) The computation following the statement that the Engineers of the War Department of the United States have reported the minimum discharge of the Niagara River to be in the vicinity of 167,000 cubic feet per second, leads to another erroneous conclusion; the rules formulated by the

United States' Engineers having been based upon observations made at the deep water portion of the river under the International Bridge near Buffalo, and not at points where the discharge of the river is in the form of turbulent rapids.

(d) Another erroneous conclusion is the one based upon the assumption that "at the Canadian Niagara Power Company's intake the average depth of water is 96 inches," because the river between Goat Island and the Canada shore is composed of a number of channels and shoals and rapids, and the average of their aggregate cross-section has no such bearing or weight as has been given to it in the briefs and, even if accurately guessed at, is of no use whatsoever in the present examination.

2. In the arguments of Messrs. Croes and Cooper, it is suggested that the effect of the proposed works will be to lessen rather than to increase whatever deflection of the current towards the centre of the river may exist at the present time. Obviously, the proposed construction, by means of the piling up of the water inside the intake, will create a marked deflection towards the centre of the river. The absolute disregard by Messrs. Croes and Cooper of any consideration of this piling up of the water destroys the validity of their conclusion on this point. A notable instance of this disregard is to be found in Mr. Croes' statement that the "abstraction of 11,200 cubic feet per second will tend to lower the water level close to the shore." This entirely ignores the fact that the wing dam to be constructed is designed to raise the level of the water some twelve feet at the downstream end, so that there will be no lowering by any such abstraction of water as is referred to.

3. Messrs. Croes and Cooper have omitted apparently any consideration of the injurious effect upon intakes of water downstream from the proposed works of their company by reason of the temporary cofferdams to be constructed by the applicants for the purpose of building their permanent works.

4. Messrs. Croes and Cooper assert that the intake of the Canadian Niagara Power Company is a good intake in itself and better than the intakes of other power developments elsewhere in respect of the limited range of head water levels. It is true that these works have been built with proper provision for the normal range of variation on this river, but not with a view to the allowance above the intake of structures in the river which produce still water pond effects and totally disturb and derange the natural conditions. The comparison should be with all regulated power plants where, by means of head gates, the water levels in the canal are so controlled that in the operation of the plant the head water level is not allowed to vary over one inch.

5. The evil resulting from the diversion of water by the proposed obstructions of the applicants is an evil which is calculated to increase rather than to diminish as time goes on. This calculation is based upon the fact that the breaking away of the Falls at or about their centre is tending constantly to deepen the channel thereabouts, the deepening of which increases the difficulty of bringing water back to the shore line when once it has been diverted into the centre channel.

We confirm, therefore, the views expressed in our report to you of 29th December, and advise you, in the interests of your investment and the operation of your plant, to resist to the utmost the granting of the right to construct the applicants' works as at present designed.

If, in spite of the very grave and serious objections which have been pointed out, the request of the applicants should be granted, we feel it our duty to impress upon you the absolute necessity of insisting upon the construction for your company of the wing dam indicated in our former report, for the purpose of lessening, so far as may be, the damage which is certain to be done to your water levels and to your whole plant and property by the construction of the projected works of the applicants.

Respectfully submitted,

(Signed) CLEMENS HERSCHEL,
Consulting Hydraulic Engineer,
M. Inst. C.E. M. Sm. Soc. C.E.

(Signed) CECIL B. SMITH,
Resident Engineer,
Ma E. M. Can. Soc. C.E.

ARGUMENTS AND OPINIONS SUBMITTED BY THE INTERNATIONAL
RAILWAY CO.

Toronto, January 5th, 1903.

Hon. G. W. Ross, Parliament Buildings, Toronto.

Dear Sir.—I have the honor to submit the report of Mr. John Kennedy and Mr. P. A. Peterson, of Montreal, who have been retained by the International Railway to give their opinion as to whether the proposed works of the Toronto & Niagara Power Company will lower the level of the river at the point where the railway company takes water.

In submitting this report I call attention to the following statement contained in the memorandum of the Engineers of the Canadian Niagara Power Company dated 29th December, 1902 :

“To lower the natural level of the Niagara River one inch would inflict serious damage on the operation of the works of the Canadian Niagara Power Company, and the lowering of such level by a foot or more would so affect the operation of that company’s works that the wing dam above referred to would become an absolute necessity.”

Any lowering of the water level at the intake of the Canadian Niagara Power Company will affect injuriously to an intensified degree the intake of the railway company as users of the water at a point downstream from the intake of the Canadian Niagara Power Company, and everyone can appreciate how serious a matter the lowering of the water level at the intake of the railway company to the extent of six inches would be, when it is borne in mind that the “head” of that company is only, say, one-third of that of the Canadian Niagara Power Company.

The International Railway Company adopts, *mutatis mutandis*, the observations and conclusions contained in the several memoranda presented up to this date upon behalf of the Canadian Niagara Power Company.

Should the Government override the objections which are raised and allow the application, this company desires to have then the opportunity to point out the protection which in its judgment would be absolutely necessary to mitigate, if possible, the harm done to it.

Yours faithfully,

(Signed) THOS. GIBBS BLACKSTOCK,
Of Counsel for The International Railway Co.

Montreal, Que., January 2nd, 1903.

To The International Railway Company, Niagara Falls, Ont.:

Messrs.—We are desired by you to give an opinion as to whether or not the works proposed to be built by the Toronto and Niagara Falls Power Company for taking water from the Canadian side of the Niagara River a short distance above the Niagara Falls, will lower the level of the river at the points where the International Railway Company now takes water from the river for developing power, and where the Canadian Niagara Power Company is now making a headrace to take water for developing power at its adjoining works under construction.

We understand from plans and information furnished us by your representatives :—

1. The Toronto and Niagara Power Company (hereinafter called the Toronto Company) proposes to draw water from the Niagara River at Tempest Point about 2,400 feet above the brink of the Falls, to the extent of about 11,200 cubic feet per second.

2. That the Toronto Company proposes to take the water from the river by means of a wing dam which will be built out from shore just below Tempest Point, a distance of about 400 feet, and thence upstream in the direction of the outer end of the Ontario Power Company's new cofferdam, a distance of about 650 feet, where it will terminate at a distance of about 600 feet from the adjacent shore line. It is proposed that the upper half of the wing dam would be of such height as to hold the water in the space enclosed by it at about 13 feet above its present natural level, and that the lower half of the dam is to be about two feet lower so as to allow an overflow of water and sufficient to carry away the floating ice which may enter at the upper end of the dam.

3. At the lower end of the space enclosed by the wing dam and about the present shore line, the Toronto Company proposes to place its power house, and to supply it with water caught by the wing dam.

4. The lower end of the Toronto Company's proposed wing dam will be about 1,250 feet distant from the centre of the headrace being constructed by the Canadian Niagara Power Company (hereinafter called the Niagara Company) and about 2,300 feet from the headrace of the International Railway Company (hereafter called the Railway Company.)

We have examined the shore line and strength and direction of the currents of the rapids in the vicinity of the works in question, and the effects of the Ontario Power Company's temporary dam already built about 2,200 feet above Tempest Point, and after carefully considering the whole question we are of opinion that the effect of the proposed wing dam of the Toronto Company would be to lower the surface of the river about a foot at the intake being constructed by the Niagara Company, and about half as much at the existing intake of the Railway Company.

Yours respectfully,

(Signed) JOHN KENNEDY, M. Inst. C.E.

(Signed) P. A. PETERSON, M. Inst. C.E.

REPLY OF HUGH L. COOPER TO RAILWAY COMPANY'S ENGINEERS

J. W. Langmuir, Esq., Chairman of the Commissioners,
Queen Victoria Niagara Falls Park.

Dear Sir,—I have read the report of Messrs. Kennedy and Peterson on behalf of the International Railway and dated January 2nd, 1903, and enclosed to you by Mr. T. G. Blackstock, counsel for that company.

This report contains no new engineering feature and the statement therein regarding the level being changed "about a foot" has been answered in previous briefs. I beg to remind the Commissioners that although it is proved in my brief that this reduction in level cannot be greater than three and a half inches we based our arguments on a supposed reduction of seven inches and demonstrated that such a difference was inappreciable in results. The above seven inches and the "about one foot" of Messrs. Kennedy and Peterson contain no differences that can be used as a basis of an argument. This report says the reduction of level in front of the International Railway Company's intake will be about six inches. We deny that this will be six inches and assert that while it may be as much as two inches, that any reduction such as contemplated by the building of the applicants' works should have been anticipated in the designing of the Railway Company's works. This principle and the reasons therefor are both fully set down in former briefs and need not be here repeated.

Respectfully submitted,

(Signed) HUGH L. COOPER.

Toronto, January 7th. 1903.

LETTER OF PARK SUPERINTENDENT SUBMITTING ARGUMENTS
FOR CONSIDERATION OF EXPERT ENGINEERS.

Niagara Falls, January 7th, 1903.

Isham Randolph, Esq., C.E., Chief Engineer, Sanitary District of Chicago,
Chicago, Ill.

Dear Sir,—I am directed by the Chairman of Commisisoners for the Queen Victoria Niagara Falls Park to submit to you the following opinions and memoranda in respect to an application made by Messrs. Mackenzie, Pellatt and Nicholls, of Toronto, for a water power privilege on the Niagara River near Tempest Point within the Park, viz.

(1) (a) Application of Messrs. Mackenzie, Pellatt and Nicholls, together with plans submitted by them.

(b) The written statement made by Messrs. Robinson and Macrae and their Hydraulic Engineers, Messrs. Cooper and Croes.

(c) The rejoinder of Mr. Hugh L. Cooper to the written statement of the Solicitors and Engineers of the Canadian Niagara Power Company.

(2) (a) The written statements of the Solicitors and Engineers of the Canadian Niagara Power Company and the plan accompanying the same.

(b) Their rejoinder to the written statements of the Solicitors and Engineers of the applicants.

(3) (a) The written statements of the Officials and Hydraulic Engineers (Messrs. Kennedy and Peterson) of the International Railway Company.

(b) The rejoinder of Mr. Hugh L. Cooper thereto.

And to request that you will examine into the several questions involved, and furnish the Chairman with your views in respect to the engineering features which are referred to at the earliest moment consistent with a proper investigation.

The principal questions at issue are :

(a) Will the works projected by the applicants, Messrs. Mackenzie, Pellatt and Nicholls, tend to divert the waters of the river from the intakes of the Canadian Niagara Power Company and the International Railway Company ?

(b) To what extent, if any, will the withdrawal of the amount of water proposed, viz., 11,200 cubic feet per second, lower the water surface at the intakes of these two companies ?

You will also be good enough to furnish the Chairman with any observations you may deem essential to the consideration of the subject by the Commissioners and the Government.

I am, sir, yours very truly,

(Signed) JAMES WILSON, Superintendent.

Note. A duplicate of this letter was sent to Robt. C. Douglas, C.E., Hydraulic Engineer, Department of Railway and Canals, Ottawa. J.W.

REPORT OF ISHAM RANDOLPH, C.E.

Chicago, January 12, 1903.

Hon. J. W. Langmuir, Chairman Queen Victoria Park Commission,
Toronto, Canada :

Dear Sir,—In compliance with the request contained in yours of Dec. 30, 1902, I left Chicago on Monday evening the 5th inst. for Niagara, where I arrived at the office of your Commission on the morning of the 6th. Mr. Wilson at once proceeded to place in my hands such data as he had, and to procure, for the joint use of Mr. Robert Douglas and myself, as far as lay in his power, such additional data as we deemed essential to a proper understanding of the grave questions submitted to us. He was able to secure the services of the engineers employed by the Ontario Power Co., and the Canadian Niagara Power Company, respectively, to note and determine instrumentally the courses taken by certain barrels, nine in number, which he caused to be cast off, three from the end of the Ontario Power Company's cofferdam and six above the rapids. These barrel floats we watched with particular interest, as they afforded the only approximate idea, from actual observation, of the courses of the currents through the rapids. These observations and data derived from published reports of the flow measurements of the Niagara River made by the United States engineers, which gave corresponding stages of Lake Erie. The report of the New York Niagara Park Commissioners for the year 1894; information derived from the engineers of the American Niagara Falls Power Company, The Canadian Niagara Falls Power Company; and the Ontario Power Company, coupled with visual observations taken from every available point of vantage overlooking the reach of the river involved in the controversy now pending, relative to the plans of the Toronto & Niagara Falls Power Company cover all of the knowledge that I have been able to avail myself of in reaching the conclusions at which I have arrived. It seems entirely proper for me to state here that I have never before been called upon to reach conclusions on such grave engineering questions upon so meagre a basis of fact. To start out with the question the volume of flow in the Niagara River seems conclusively settled by the work of the engineers of the United States Engineer Corps, for that reach of the river between the International Bridge and the mouth of the Chippewa River; the increment from which river being unknown, is not considered in what is hereafter said about volumes of flow. We find in the report of the Secretary of War for 1900, on page 5360, that the lowest lake level was 570.25 on November 23, 1899, and the corresponding discharge was 165,340 cubic feet per second. That the highest lake level was 573.12, on June 29, 1900, with a corresponding discharge of 231,350 cubic feet per second, and on page 5,361, the mean lake level is given as 572.86, and the discharge as 222,400 cubic feet per second. From the eleventh Annual Report (1894) of the Commissioners of the New York Niagara Park Reservation, I learned that the capacity of the American Niagara Falls Power Company's tunnel is 516,000 cubic feet per minute (8600 cubic feet per second), that the Niagara Falls Hydraulic Company's open channel then had a flowage capacity of 231,000 cubic feet per minute (3,850 cubic feet per second), and that it was being enlarged to accommodate a flow of 462,000 cubic feet per minute (7,700 cubic feet per second). This report claims for the American channel, east of Goat Island, 20 to 25 per cent. of the total discharge of the river. As against this last claim, Mr. Wilson gives as his judgment, that the channel in question carries but 10 per cent. of the total flow. I incline

to Mr. Wilson's belief, but for use in this discussion shall use 15 per cent. as the quota for the American Channel. It also seems proper to use the minimum volume of discharge for our computations. This minimum volume being 165,340 cubic feet, we shall have, after making deduction for the American Channel, 24,800 cubic feet, for the American Niagara Falls Power Company, 8,600 cubic feet; for the Niagara Falls Hydraulic Company, 7,700 cubic feet; aggregating 41,100 cubic feet, available for the Canadian Channel 124,240 cubic feet per second. The element of conjecture in these results cannot be eliminated, however. I have read carefully the application of the Toronto & Niagara Falls Power Company, the protests of the Canadian Niagara Falls Power Company, with arguments advanced in support thereof; the arguments in rebuttal presented by Messrs. Cooper and Croes, and also the protest of the International Railway Company, with the assertions submitted in support thereof by Messrs. Kennedy and Peterson.

From all of the admissions of the protesting company, backed by my interpretation of the contract existing between themselves and your Honorable Commission, I assume that there is, and can be, no objection to the abstraction of the volume of flow asked for by the Toronto Power Company, namely, 11,200 cubic feet per second; and hence that the only basis for protest by the Canadian Niagara Company, must be sought in the form of works proposed by the Toronto Company. The outline of these works is well shown upon the map submitted by that company, and their scope and method is clearly described in the written discussion by Mr. Hugh L. Cooper, their engineer. Hence the question to which I must address myself is a very grave one of the effect of these works, as designed, upon the efficiency of the Canadian Power Company's works as now designed and in process of construction.

In taking up the arguments of Mr. Hugh L. Cooper, we find that he is both resourceful and aggressive, and has a forceful way of presenting his case. I cannot, however, acquiesce in his view that the hydraulic elements of this stretch of the Niagara River can be computed by any known hydraulic formula. This is manifest when we are faced with the following facts :

- Distance.....—Z, is determinable.
- The quantity of water.....—Q, is conjectural.
- The slope.....—S, is chaotic.
- The velocity.....—V, is inconstant.

The area of cross section—*a*, is unknown, and unknowable, and without knowing that the hydraulic radius—*r*, cannot be determined.

Coefficient of roughness—*n*, is composite, and hence *C*, coefficient of mean velocity, cannot be computed.

Mr. Croes presents certain axiomatic statements covering various forms of dams and a comprehensive description of the lay of that reach of rapids coming within the scope of the three several power plants, proposed, and in process of construction.

Observations on Flow.

To state that in flowing streams the natural direction of current, unobstructed, is along straight lines, is a fact only to be qualified by the further statement that the flow is on the line of least resistance, is only asserting a truism known to all who have occasion to observe the habits of streams. It is further true that where a stream departs from a straight line, the water is higher on the concave bank than it is on the inner, or con-

vex, bank; this difference is scarcely to be detected where velocities are low, but under high velocities the piling up on the concave shore becomes a marked effect. Between the south end of Queen Victoria Park and the chasm which makes the cataract, the shore curves to the right (or east) through, probably, 80 degrees of central angle, and the onrush of the current, with inconstant velocities varying between 8 and 17 feet per second, piles the water up on the concave shore to a considerable height. The effect of this has been to erode the deepest channel on the westerly side of the centre of the stream. So markedly is this true, that to wade out from the easterly shore at Terrapin Point, just above the Falls, for a distance of several hundred feet, does not seem to me to be a venture fraught with much peril; whereas on the opposite shore, even to fall off the bank would mean almost sure destruction for the unfortunate who did so. The building of the cofferdam by the Ontario Power Company, as shown upon the maps on file with your Honorable Commission, has served to shut off all of the water which formerly flowed around Dufferin Islands and to lay bare all of the area lying between it and the shore and a line drawn from the downstream end of the cofferdam to a point about 400 feet southerly from the south end of the Suspension Bridge crossing the north channel around Dufferin Island. Notwithstanding this radical diversion of an immense volume of flow from its normal course, the pitch toward the west shore is so tremendous that the water against the crib on Tempest Point (as indicated by water mark on the timbers of the crib), is scarcely two feet lower now than it was before the diversion took place and the readings on guage No. 4, which is about 950 feet northerly from Tempest Point, and 450 feet south of the southerly end of the Canadian Niagara Falls Power Company's crib, taken before the building of the cofferdam, and regularly since, show an average reduction of level for corresponding stages of water, as determined by the readings on guage No. 1 at Chippewa, based on monthly means, of about 65-100 of 1 foot. Hence, it seems reasonable to believe that the change of level at the intake of the Canadian Niagara Falls Company, 500 feet lower downstream, will be nearly what it was before the building of the cofferdam by the Ontario Company. Strangely enough, there is no positive information to support or rebut this assumption.

The charted courses of the several barrels cast off at varying distances from the shore on January 6th, for the purpose of gaining information as to trend of currents, has a strong bearing on the questions at issue, as they afford the largest amount of knowledge upon this subject which is now available. Prior to the building of the Ontario Company's cofferdam, that company caused five (5) barrels to be cast off from a trestle which it had constructed near the Southern limits of the Park domain. The courses taken by these barrels are shown upon the chart, and it is a significant fact that the three barrels cast off from the end of the cofferdam on the 6th inst. were driven shoreward until they nearly reached the path of the previous barrels, which path they thereafter followed substantially. The barrels cast off in the upper river (numbered consecutively from the first one cast off from the cofferdam), showed the following results:

No.	Crossed line of upper reef.	Passed Canadian Niagara Falls cofferdam.
4.	270 feet from north end of cofferdam.	215 feet from its face.
5.	540 feet from north end of cofferdam.	325 feet from its face.
6.	350 feet from north end of cofferdam.	40 feet from its face.
7.	380 feet from north end of cofferdam.	175 feet from its face.
8.	1200 feet from north end of cofferdam.	1400 feet from its face.

The ninth barrel was carried into the American shore above the rapids. Crude as these experiments for determining the direction of currents were, they are yet the most positive indications bearing upon the subject of which I have been able to gain any information, and they serve to confirm the impressions made by purely visual observation of the currents.

The purpose of the Ontario Company, as it has been explained to me and as is indicated by the plans of their proposed work, in your possession, is to divert from the channel of the river toward the intake of their conduits a water volume of more than twice the capacity of their said conduits and to waste the surplus over a spillway or submerged wier lying between the wing dam and their intake. Assuming the works of the Toronto Power Company to be built as shown upon the plans accompanying their petition to your Honorable Commission, the overfall from the works of the Ontario Company would closely approximate to the 11,200 cubic feet per second asked for by the Toronto Company. The additional volume entrained by the partially submerged training wall, provided for in the plan of the petitioners, would be superfluous water, could the waste from the Ontario Power catchment basin be made available without the construction of works to hold the water, approaching the intake of the petitioner, up to the proposed level of 533. These works, however, are necessary for the reasons set forth by Mr. Hugh L. Cooper, engineer of the petitioner. The entrained and impounded water being greatly in excess of the needs of the petitioner, provision is made for the return of the surplus to the river channel over ample waste weirs. The entraining wall being well within the limiting line, prescribed by you, drawn from the intersection of the south boundary of the Park to the southeast angle of the cofferdam of the Canadian Niagara Falls Power Co., it is manifest that no water east of its line of direction will be diverted from its course toward the intake of the objecting company. It is further manifest that the tendency of the water flowing along the easterly side of the entraining wall, will have a tendency to sweep shoreward around the northwesterly end of this wall where it joins onto the overfall dam extending out from the petitioner's power house to meet it, and that this tendency will give a shoreward impulse to the water escaping over the crest of the overfall dam.

ICE.

I do not believe that the ice problem is one which need cause the objectors any serious apprehension. From conversations had with gentlemen, whose personal observations entitled them to speak with knowledge on the subject, I learned that the ice run on the Canadian side of Goat Island is inconsiderable, as the prevailing winds drive the ice to the American shore. Should there come an exception to this habit of the ice on the river, the effects could not be worse than those which would obtain if the works of the objectors were the only works between the south end of Queen Victoria Park and the Cataract.

Channel Contraction.

In considering the question of water levels, the effect of channel contraction must not be lost sight of. The work of the objecting company has tended to narrow the channel by encroachment thereupon, by filling out from the old river margin to the new shore line established by your honorable Commission. What the effect of this construction must be, I cannot state upon any basis of actual knowledge, but that will be an appreciable element in the readjustment of levels, is beyond cavil, and it may even

correct any small depression in levels feared as a result of the execution of the plans of the petitioner.

I wish to express my appreciation of the courtesies extended to me and the aid afforded by the officers and engineers of the Canadian Niagara Power Company and the Ontario Power Company. These gentlemen permitted me to examine their plans and gave me oral information which has been of great value to me in reaching the conclusions at which I have arrived. The plans of the Canadian Niagara Power Company show their intake grade as 501.5; width of intake, 250 feet, clear of obstructions; depth of water through intake, 15 feet maximum; 13 feet minimum, corresponding to elevations, 516.5 and 514.5 respectively. Elevation of bottom of tunnel, at north end of wheelpits, 353.00, height of tunnel 25 feet, hence elevation of intakes will be 378. By deductions from these elevations it is evident that the head of 136 feet used in these discussions is predicated upon the minimum water surface (514.5), with a margin of half a foot for good measure. With this exhibit to sustain me, I am able to felicitate the men who are putting up the money for this development, upon the fact that their engineers have designed their works upon a reasonable margin of variations, and not upon the theoretical exactitude for which they argue so strenuously in their protest against the Toronto Power Company's proposed development. In this connection it is instructive to note that the intake of the American Niagara Falls Power Company, designed to supply the same volume of flow as its Canadian counterpart, is 250 feet wide, clear of obstructions; was designed for a depth of 12 feet, and has a normal variation in depth of three (3) feet and an abnormal variation several feet in excess of that, and yet that plan is effectively workable under all conditions.

Map of July 16th, 1902.

The Canadian Niagara Power Company has submitted a map with the official certification of its resident engineer to the effect that the plan shown thereon "was completed on or before July 16th, 1902," and that the same "is now exactly as it was at that time." The location of the plant which they are now building is shown in black, and in red ink is shown a duplication of same at Tempest Point occupying the river front at the site selected by the present applicants, but extending back into the Park grounds. This plan and statement I accept as proof positive that the protesting company does not regard the taking of a volume of water sufficient to operate such works as a damage to the plant which they are already constructing. After giving my best thoughts to all of the matters and things which have come before me, bearing upon the grave questions at issue, I now sum up my conclusions :

Conclusions.

First. That the plan and form of construction proposed by the petitioners will not lower the level of water in front of the intake of the Canadian Niagara Power Company, to a greater extent than that which has resulted from the construction of the coffer dam of the Ontario Power Company, which lowering, if any, is not now ascertainable, as the only reliable observations bearing upon the effect of said coffer dam were taken 500 feet south of the intake of the objectors.

Second. That a lowering of a few inches is not a matter which deserves serious consideration in a water supply subject to fluctuations of at

least two feet; which fluctuation has been recognized and provided for in the plans of the objecting company.

Third. That what has been said with regard to the works of the Canadian Niagara River Company objectors, applies with even greater force to the conditions obtaining at the intake of the International Railway Company objectors; for the experts, whom they employed to present their cause, assert that the lessening of head at their intake will be just one-half of the loss of head of the intake of the Canadian Niagara Power Company (their assertion being that said lowering in the two cases would be one foot and six inches respectively), which assertion is unsupported by any sustaining data.

As an appendix to this report, I submit the letter of reference addressed to me by James Wilson, Esq., Superintendent of the Queen Victoria Park Commission.

Holding myself subject to further interrogation by you, I have the honor to be,

Yours very truly,

(Signed) ISHAM RANDOLPH,

Advisory Engineer.

REPORT OF ROBERT C. DOUGLAS, C.E.

Ottawa, Canada, January 20th, 1903.

J. W. Langmuir, Esq., Chairman Queen Victoria Niagara Falls Park Commissioners, Toronto, Ontario :

Sir,—In answer to your communication of the 30th December, 1902, stating that the Commissioners of the Queen Victoria Niagara Falls Park desired certain opinions upon several questions in connection with water power privileges, also referring me to Mr. Wilson, the Superintendent of the Park, for particulars and information, I have the honor to report as follows :

By letter of January 7th, 1903, reference was made by Mr. Wilson, (in summary); an application of the Toronto Niagara Power Company for a concession of water-power privileges. The reports of Hydraulic Engineers in support thereof with statements of Solicitors.

The reports and statements of Engineers and Solicitors of the Canadian Niagara Power Company in opposition to the application of the Toronto and Niagara Power Company.

The report and statements of Engineers and Solicitors of the International Railway Company, who adopt the observations and conclusions presented by the Canadian Niagara Power Company. The principal questions referred to were :

To what extent, if any, will the withdrawal of 11,200 feet per second lower the water levels at the intakes of the latter companies ?

Will the proposed works of the Toronto and Niagara Power Company tend to divert the water of the river from the intakes of these companies ?

Any observations that might be deemed essential to the consideration of the subject by the Commissioners.

I have made an examination of the Niagara River and its marked features, and carefully considered the various statements and reports referred; it appears unnecessary to repeat the description of works and measurements fully set forth in the numerous reports and the official plans before the Commissioners.

Taking into consideration the magnitude and importance of the various interests established, and proposed to be established, the technical data with regard to the river available is meagre. Mr. Wilson, for the information of Mr. Randolph and myself, made nine float experiments, under not favorable conditions, but with instrumental observations, which, with some similar data furnished by the Ontario Power Company, was the only material available, other than by mere visual inspection.

To answer the query, to what extent, if any, will the abstraction of 11,200 cubic feet per second from the river, lower its surface, is difficult when discussing a river of unexampled features, with its magnitude of volume of flow, broken by heavy surging water, with various velocities and courses of flow, and subject to frequent fluctuations of level and consequent variable volume of water discharged.

The question cannot be answered upon the original normal regimen of the river, disturbed as it is, but on a new regimen, which will be created by the erection, in the bed of the river, of the structures of the Ontario Power

Company, and of the proposed works, the effects of these works upon the river being unknown, together with the limited technical data available, renders an answer to the question a matter of conjecture.

As to what extent the withdrawal from the river of the volume of water mentioned will lower the water level of the river at the intakes, it may be said the water level, theoretically, will be lowered: the number of inches below any datum plane of the river, I cannot estimate.

The Queen Victoria Niagara Falls Park Commissioners have leased to the Canadian Niagara Power Company and the Ontario Power Company some 21,000 cubic feet per second, and have recommended a further lease; what quantity is it judicious to lease without injury to the Canadian Power Company?

The minimum discharge of the river is stated to be 160,000 to 170,000 cubic feet per second. The discharge at mean level of Lake Erie 222,400 cubic feet per second; if a basis of a minimum flowage of 165,000 cubic feet per second be taken, from that amount deduct the quantity which may be diverted for power upon the New York Niagara Falls developments, say 25,000 cubic feet per second. The approximate flowage upon the United States side of the boundary line could not be obtained.

The quantity of water, available, by an economic construction of works, to divert for the purpose of power upon the Canadian shore, could, approximately, be determined by an hydraulic survey; about one-third of the previous balance will be assumed, or say 45,000 cubic feet per second; the leasing of this additional 11,200 cubic feet per second, or in all, 32,200 cubic feet per second, would not, in my opinion, be an injury to the present lessees through loss of head to any appreciable extent.

In connection with this question, and the larger question, the effect of the construction of the proposed works by the Toronto Niagara Power Company. The statement will be taken up of the Canadian Niagara Power Company, endorsed by the International Railway Company, of the prospective injury of a loss of head of one inch, and of the serious loss to a water plant of one foot or more.

The following water-power companies for the purpose, as expressed in the lease, allow a variation of one foot.—

“To prevent disputes as to power of each privilege in the variation of the height of water from changes of season or other causes.”—

The Lowell, Lawrence, Holoke, Amoskeag (Manchester) Water power Companies and the Minneapolis Mill Company.

Upon the canals, under the control of the Department of Railways and Canals, Canada, the general terms and conditions for leasing water-power, 1890, provide for a variation of head of six inches in calculating power between the level or reaches of a canal, these levels are maintained, except during lockages, constant. Between a standard level of a canal when the tail water discharges into a river, lake or water course, one foot variation is provided for.

In the power developments of the Canadian Niagara Power Company and the Allied Company upon the New York side, I am informed, a variation of levels or head of water of two and three feet respectively is provided for.

Mr. Randolph, the Engineer of the Chicago Drainage Canal, has informed me he intends to provide for a variation of three feet in head upon the prospective water-power development upon that canal.

In consequence of the variations of water levels of Lake Erie and consequently of the Niagara River, the variation of head produced by the withdrawal of the quantity of water in question, and the allowance for such variations just quoted, become a minor consideration.

To the important query, to what extent the proposed works, of the Toronto Niagara Power Company, will tend to divert the waters of the river from the intakes of the Canadian Niagara Power Company and the International Railway Company, it may be remarked,—

The Engineers of the Canadian Niagara Power Company maintain the proposed works will permanently lower the water at its intake, several feet, exactly how much it is impossible to calculate, but in their opinion it would be at least three feet or four feet.

The Engineers of the International Railway Company state the proposed works will lower the surface of the river one foot at the intake of the Canadian Niagara Power Company, and about one-half as much at the present intake of the Railway Company.

In connection with the above, the Solicitors of the Railway Company, adopt *mutatis mutandis* the observations and conclusions contained in the reports and memoranda presented on behalf of the Canadian Niagara Power Company. What head do the Solicitors assume in the interest of their clients?

The Engineers of the Toronto Niagara Power Company state the loss of head will be, at the intake of the Canadian Niagara Power Company, three and a half inches, but that their arguments were based upon a loss of head of seven inches; they deny the loss at the intake of the railway company, will be six inches, but it may be as much as two inches.

In offering an opinion upon this probable loss of head, through the construction of the proposed works, it may be remarked, the information available to us, other than the personal inspection, upon which the reports of the various engineers is based, is the plan of direction and velocity of the fast floats whose course was observed by us.

The plan of the proposed works of the Toronto Niagara Power Company outlines an impounding dam within the line of the principal filaments of current near it; the dam is practically parallel to the axis of the current and it may be termed as suggested in the reports of the engineers of the above company, a training wall. Training walls and training banks are terms commonly used in the improvements of rivers and are generally constructed in the direction of flowage for cutting off sinuosities or other causes.

The engineers of the Canadian Niagara Power Company maintain that the stillwater basin (it may be called a mill pond), proposed to be constructed higher or as high as the surface level of the centre of the river, would direct the main volume of flow of the river to the centre of the Horse Shoe Falls. This opinion applies in a lesser degree to the still water basin proposed to be constructed by the Ontario Power Company.

With the facts available to form an opinion upon, I cannot apprehend the grounds for this opinion, other than would apply to the impounding

dams; these basins might be termed training banks in the direction of the training wall or dam.

It is not feasible to calculate or estimate, in my opinion only the loss of head through the diversion of water from the intakes of the Canadian Niagara Power Company and the International Railway Company by the proposed works, except by a doubtful approximation.

The construction of the coffer dam of the Ontario Power Company and the consequent alteration in the regimen of the river supply a practical indication of the probable action of the river when the proposed works of the Toronto Niagara Power Company are constructed. The dam diverted, from its direction of flow, a large volume of water; 4,000 or 5,000 cubic feet per second of that volume, are stated to have been discharged around Dufferin Island.

The entire flowage diverted is mentioned by the engineers of the Toronto Niagara Power Company as some 50,000 cubic feet per second. Whatever quantity this flowage may be, it was diverted from its normal course in the line of Dufferin Island and the banks of the Park into the river on a line with an extension of the line of the proposed wing dam of the Toronto Niagara Power Company.

The engineers of the Ontario Power Company have made daily observations of the water levels at various stations, both previous and subsequent to the construction of the coffer dam. I compared, from the records, similar daily readings at the gauge at Chippewa and at a gauge on a point some 450 feet above the coffer dam of the Canadian Niagara Power Company, these readings embracing a period previous and subsequent to the construction of the coffer dam; there was a difference of nearly eight and a half inches, a lowering of the surface of the river to that extent, or a loss of head of eight and a half inches at this gauge, caused by the construction of the coffer dam.

The level of the surface of the river below its former level at Tempest Point, some 950 feet above the gauge, is stated to be two feet. Between Tempest Point and the lower gauge by the depression of the river below its former level a known number of inches, at each station in a given distance, there may be estimated the present hydraulic gradient between those two points in an approximate manner.

If the depression of the river at the lower gauge be termed a loss of head of eight and a half inches, the loss of head at the intakes below will be decreased in proportion to their distance from the lower gauge.

I am unaware of any method by which can be determined the loss of head in inches at the intakes in question, resulting from the construction of the proposed works. There will be established another hydraulic gradient by the removal of the present coffer dam; by the construction of the impounding dam of the Toronto Niagara Power Company; by the abstraction from the river of 22,200 cubic feet per second for power; by the overflow of the weir of the Toronto Niagara Power Company into a course tributary to the lower intakes; with these elements of uncertainty and dealing with a river of the description of the Niagara River, the only opinion I can give would be that the present loss of head at the lower gauge is a fair index of the future loss of head, and that the proposed works will not tend

to divert the waters of the river from the intakes to the extent of a calculable damage.

I may remark with regard to the subsidiary question, but one of importance, is the need for the construction of a wing dam below the intake of the Canadian Niagara Power Company, to maintain the level of the river at the intakes, if diverted by structures, permanent or temporary, into channels other than into the still water basins.

The engineers of the one company characterize a wing dam a useless undertaking, for which there is no necessity.

The engineers of the lower companies consider its construction necessary to maintain the head at the intakes through the apprehended diversion of water towards the centre of the river.

The Niagara River in its magnitude, its great velocity, its diverse currents of rough water, and its varying fluctuations of level, is a river to which ordinary practical engineering experience or theory cannot be applied.

Structures, erected in the beds of rivers for various objects, by able engineers of experience, have resulted in exciting energies or current and flowage unforeseen, and actions not predicated.

With the little information before me I am not prepared to call a wing dam "a useless undertaking," although it might not be an absolute necessity, its benefits might be such to the two intakes as to justify the cost of erection, which would be little in comparison with the large proposed development of power.

I might suggest that the Commissioners establish a datum plane of the river, at the intakes of the companies complaining, determine the loss of head below this plane, to which they will be subject by their agreements, set water level gauges at the intakes with reference to the plane, the daily readings of which, before, during and subsequent, to the construction of works, will determine the necessity of a dam from the action of the proposed structures temporary or otherwise.

I have to acknowledge the courtesy of Mr. Wilson, the Superintendent of the Park, also that of the officers and engineers of the Canadian Niagara Power and the Ontario Power Companies, who were always ready to afford any information relative to the inquiry.

I have the honor to be, sir,

Your obedient servant,

(Signed) ROBERT C. DOUGLAS, C.E.

Toronto, January 19th, 1903.

CONCLUDING REPORT OF PARK COMMISSIONERS TO THE GOVERNMENT.

Hon. G. W. Ross, Premier, etc., etc., Parliament Buildings, Toronto :

Dear Sir,—In compliance with the request you made on the 19th December last, at the hearing given by the Government to the various companies and parties interested in the development of electrical power at Niagara Falls that they should reduce to writing the arguments used at that meeting, I now beg to report that the applicants for a franchise (Messrs. Mackenzie, Pellatt and Nicholls), the Canadian Niagara Power Company and the International Railway Company have furnished the Commission in writing with their respective arguments before the Council with such amplifications as they deemed essential to the presentation of their case.

Upon the reception of these written briefs, the Commissioners considered it judicious to furnish each of the parties with copies of the reports and arguments advanced by the others for such criticism or rejoinder as each might consider necessary. When the Commissioners received all the reports and memoranda and acting upon your instructions, two eminent hydraulic experts were engaged to examine into all the questions at issue and to report fully upon the arguments set out in the respective briefs.

The engineers selected were Mr. Isham Randolph, C.E. (chief engineer of the sanitary district of Chicago, a work in the construction of which over \$35,000,000 has been expended), and Mr. Robert C. Douglas, hydraulic and bridge engineer of the Department of Railways and Canals, Ottawa. These gentlemen visited Niagara Falls and made as thorough an examination into the physical conditions existing at the present time as was possible, and also examined the works which have been constructed up to this date for the various power companies to whom franchises have been given. I have now received the report of Mr. Randolph, but regret to say that in respect of Mr. Douglas' report, that gentleman finds on his return to Ottawa that his official superiors will not sanction his making a report upon matters outside of his departmental work; the Commissioners therefore have to depend upon the report of Mr. Randolph.

Upon a full consideration of Mr. Randolph's report the Commissioners are of opinion that the statements made by the applicants that the flow of water and the level of the river at the intake of the Canadian Niagara Power Company will not be materially affected by the proposed works of the applicants as they are outlined in the plans attached to the applications, are substantially correct.

In view, therefore, of the report of Mr. Randolph, the Commissioners, upon a full review of the subject, see no reason why the application of Messrs. Mackenzie, Pellatt and Nicholls should not be granted, subject to the conditions recited in the memorandum submitted by the Commissioners at the hearing of the case before the Council on the 19th December last.

I beg to transmit herewith the various documents and reports in connection with the matter.

I am, yours truly,

(Signed) J. W. LANGMUIR, Chairman.

REPORTS UPON AVAILABLE SITES REMAINING
FOR POWER PLANTS

AND

COST OF TRANSMITTING ELECTRIC ENERGY TO
CITIES AND TOWNS IN ONTARIO

Toronto, 28th February, 1903.

My Dear Sir,—I am desirous of having a report from some hydraulic engineer of high standing upon the remaining sites at Niagara Falls where electric power could be generated on a large scale. I understand from you that in granting water-power privileges to the Canadian Niagara Company, the Ontario Company and to Messrs. Mackenzie, Pellatt and Nicholls, the Commissioners had not exhausted the field, and I should like to have this confirmed by an engineer whose opinion could be accepted as final.

I should also like to have an authoritative report upon the cost of transmitting electrical energy from Niagara Falls to cities and towns within a radius of 100 or 150 miles, showing the cost of construction of the lines for various amounts of power, and the approximate loss in transmission, say at each unit of 50 miles, and also the probable cost of maintaining such lines.

Will you be good enough to take steps to secure these reports as soon as possible?

Yours truly,

J. W. LANGMUIR, ESQ.,

(Sgd.) G. W. ROSS.

Chairman Queen Victoria Niagara Falls Park, Toronto.

REPORT OF ISHAM RANDOLPH, C. E., UPON THE FURTHER DE-
VELOPMENT OF THE NIAGARA RIVER FOR POWER PURPOSES.

Chicago, April 4th, 1903.

J. W. Langmuir, Esq., Chairman Queen Victoria Park, Niagara, Ontario:

DEAR SIR,—Pursuant to your request, I have made a study of the hydraulic conditions as the same affect power development along the Niagara River, between the mouth of the Chippewa River and Queenston, and I now have the honor of reporting to you the conclusions at which I have arrived as the result of my investigations. To give me fuller familiarity with the several localities which I am about to discuss, I supplemented former visits to the Falls by spending March 27th and 28th there. The question with which I have to deal may be formulated thus: Have the available sites for water power development on the Canadian side of the river been exhausted by the acquisition and occupation of the four several sites within the domain of Queen Victoria Park for which charters have been issued

by the Government of Ontario? I answer most emphatically, no; and in support of my position I submit the following array of sustaining facts. First, I will take up that reach of the river which begins at the mouth of the Chippewa River and ends at the steel arched highway bridge below the Falls. To illustrate the situations which come first in order of discussion, I submit a map drawn on a scale of four hundred feet to one inch, marked Exhibit "A." On this map the respective locations of the Ontario Power Company, the Toronto & Niagara Power Co., the Canadian Niagara Power Co., and the Niagara Falls Park & River Railway Co.—the first mentioned three being now in process of construction—are shown and named, and the available but unappropriated sites are numbered 1, 2, 3 and 4. G. K. Gilbert, Geologist U. S. G. S., states in a report dated May, 1901. "It (the Niagara River) affords enormous water power, of which five million horse power is readily available." Between the mouth of Chippewa River, where the mean elevation is taken as 561 above sea level, and the pool at the foot of the Falls, elevation taken as 342.4, with the volume of flow given by the United States engineers as 222,400 feet per second, we arrive by computation at a total gross horse-power of 5,542,814. The river front between the mouth of Chippewa River and the south boundary of the Park domain affords sites for locating power plants which have marked advantages over those located within the bounds of the Park property, the only disadvantage being in the longer tail water tunnels. The advantages are cheaper preliminary construction, due to the comparatively still water in which the work must be done; less extensive, and hence less costly, wing-dams, and lastly, greater available head. I show upon Exhibit "A" (map) three suggested power plants occupying a river frontage of 2,700 feet in length; the northerly plant (No. 3) being 600 feet south of the Park limits. These locations are numbered from the south 1, 2 and 3 respectively, the tunnels, leading from them, to discharge in rear of the cataract, as is planned for the Toronto & Niagara development. The elevation of the bottom of the tunnel at the discharge end is in each case assumed as 338.3, and the ascending grade in the tunnel is taken as 7 feet per 1,000 feet (which is the grade used in the Canadian Niagara Power Company's tunnel, the dimensions of which, 18x25 feet, are also adopted). The length of this tunnel will be approximately 6,220 feet. The elevation of the intrados will therefore be 406.84. The available head will be 151 feet nearly, and the water required to develop 100,000 net horse-power, assuming an efficiency of 75 per cent., will be 7,776 cu. ft. per sec. The tunnel leading from location No. 2 will be 5,450 feet long, the available head 156 feet, nearly, and the water required to produce 100,000 net horse-power (75 per cent. efficiency) 7,507 cu. ft. per sec. The tunnel leading from location No. 3 will be 4,300 feet long, the available head 164 feet, nearly, and the water required to produce 100,000 net horse-power (75 per cent. efficiency) 7,140 cu. ft. per sec. Any one of these three sites when developed would have a decided advantage over the American Niagara Falls power development on account of its freedom from ice gorges. The experiences of the past spring have served to emphasize the advantage which the Canadian side of the river possesses over the American side when ice is running. I will not go into estimates of cost in this discussion, further than to show by analogy that either one of the three sites discussed above can be developed at a much less cost than was involved in the development of the American Niagara Falls Power Plant. In the first place, no head race need be constructed, as the buildings may be located as I have shown them, and the water can pass from the river proper into the intakes. The tunnels will be shorter. The

tunnel for the American plant is 7,000 feet long, whereas the lengths of the three tunnels suggested for the locations covered by this discussion are, respectively, 6,220, 5,450 and 4,300 feet in length. The three suggested sites do not exhaust the possibilities of power development on this upper level of the river.

I have to suggest a further development, near the cataract, which is numbered 4 on the map. This development calls for a subterranean power house; such a power house, though unusual, is not an original suggestion, for there is such a one at Snoqualmie Falls, Washington Territory, 34 miles from Tacoma. There the shaft is 250 feet deep; the subterranean rock chamber is 200 feet x 40x30 feet. The length of the subterranean chamber in the proposed No. 4 development would be governed by the size of the units adopted for the service. Its width need not exceed forty (40) feet, nor its height, from floor to ceiling, thirty (30) feet, if the rock admits of using a flat ceiling, nor forty feet if it should be found best to use an arched ceiling. I will state here that I have been in cement quarries in Indiana where I have seen perfectly flat ceilings of limestone, unsupported for spaces of ninety (90) feet. Allowing for a margin of one foot outside of neat lines of such a subterranean chamber with arched roof, the cubature per lineal foot of length would be 59 9-10 yards; allowing \$5.00 per cubic yard to cover the cost of excavation and lining (I am advised that the going price for tunnel excavation at Niagara is \$3.50 per cubic yard), the cost per lineal foot would be \$299.50, which would bring the cost of a chamber, 600 feet long, up to \$179,700.00. A chamber such as this, close to the cataract, would have an advantage over a power house built in the open, correspondingly near to the cataract, because it would be free from the spray effects. To secure the water necessary for operating this plant, it would be necessary to run an impounding wing-dam on (as shown in Exhibit "A") from the north side of the intake of the Niagara Falls Park & River Railway Co.'s intake of such length and dimensions as would provide ample volume both for the existing plant and for the proposed development. The intakes for the proposed development would be located southerly of and adjacent to the intake of the existing plant. The available head for this development would be about 155 feet, and the water required to develop 100,000 net horse-power (75 per cent. efficiency) 7,574 cu. ft. per sec. The tail-water tunnel for this development would be only 450 feet long. The only structures connected with this plant which would be visible in the Park would be a shaft head house, which could be made an ornamental, even a monumental structure, and the intake works along the shore line.

The water required for the four suggested developments would be:

For No	Cubic feet per sec.
1	7,776
2	7,507
3	7,139
4	7,574
Total for proposed plants	29,996

The volume of water used in the N. F. P. & Ry. plant is not considered.

	Cubic feet per sec.
Ontario Plant	12,000
Toronto Plant	11,200
Canadian Plant	8,900
	32,100

Total chartered and suggested development on Canadian side from the river above the Falls calls for 62,096 cubic feet per sec.

The American developments now in operation and arranged for from the high level of the river calls for the following volumes of water:

	Cubic feet per sec.
American Niagara Falls Power Co.....	8,600
Niagara Falls Hydraulic and Manufacturing Co....	7,700
	16,300
Total on American side	16,300
Total on Canadian side	62,096
	78,396

81,396 cubic feet per second out of a total of 222,400 cubic feet per second, or an appropriation of 35.14 per cent. of the available water to develop power; leaving 144,006 cubic feet per second to continue the scenic effects of the cataract.

Water power in the Niagara Gorge.

The second division of this discussion has to do with the River below the Steel Arched Highway Bridge.

I find in the report of your able Superintendent, Mr. James Wilson, for the year 1897, a discussion of five possible developments on the lower River. The first of these to have its intake just above the Cantelever R. R. Bridge, and its discharge 3,500 feet down stream, developing under a head of 30 feet. This development as discussed by him is entirely feasible along the lines which he recommends, and a power of great value awaits preemption there. Mr. Wilson's suggestions are tentative and a very careful study of all the conditions which affect this situation must be made before the plans for development are entered upon. From data furnished me by Mr. Wilson it is evident that there will be violent changes of head for any water-power development in the Niagara Gorge, as the gauge readings show an extreme oscillation of 15 feet nearly. This oscillation makes me doubt the propriety of attempting the development of Mr. Wilson's suggestions No. 2 and No. 3 on seven foot heads, as a low head, subject to variations twice as great as the head itself, is of doubtful utility. Developments No. 4 and 5 having head respectively of 20 and 14 feet, are each meritorious suggestions, which like No. 1 must be worked out carefully in detail to reach the best results. I have not had time at my disposal to follow this work to a conclusion, but I have examined the conditions sufficiently, both upon the ground and by a careful consideration of Mr. Wilson's report, to satisfy me of the great value of the water-power possibilities which exist in the Niagara Gorge.

Respectfully submitted.

ISHAM RANDOLPH,
Advisory Engineer.

REPORT ON LONG-DISTANCE HIGH-TENSION TRANSMISSION.

By L. L. and P. N. Nunn, Electrical Engineers.

The purpose of these recommendations is to provide for the transmission of power by means of three phase, twenty-five cycle, alternating electric current.

The requirements will be given in detail for the delivery of twenty thousand horse-power at the terminus of transmission, and, by comparison, the requirements for both ten thousand horse-power and thirty thousand horse-power.

Duplicate Lines.

We recommend for twenty thousand horse-power a transmission of the general type and construction shown by accompanying exhibit A, consisting of two distinct pole lines, entirely separate, except at junction points, each carrying the three conductors necessary for a complete three wire, three phase transmission.

By means of the junction points, each of the above pole lines is divided into sections of approximately twenty miles each. At each of such junction points the conductors of the two otherwise separate pole lines are brought together and paralleled, or cross connected, and each of the four termini of the four sections thus connected is equipped with a triple pole automatic switch. Such equipment occurs at each end of each of the divisions comprising the two pole lines.

The purpose of the automatic switches, in short, of the whole junction point design, is to provide means whereby any one of the sections may be cut out of the service without interrupting the operation of the remaining sections, and the purpose of using automatic switches, or circuit breakers, is to provide means by which the sections may be automatically cut out, in case of accident, so promptly as to prevent appreciable disturbances throughout the system.

Continuity of Service.

for important industries, is a prime requisite of any source of power, and while any power line properly equipped and thoroughly constructed upon a favorable right of way should cause but little interruption, nevertheless it has always been recognized, and is still correctly regarded, as the weakest link in the chain of transmission. With duplicate water wheels, or engines, generators, transformers, in short, with everything also in duplicate, it is regarded as essential for the best results that pole line be also in duplicate.

In addition to the mere advantage of duplicate conductors in case of accident, there is also another and important advantage in the provision by means of which any section properly patrolled may usually be cut out of service, repaired and returned to service, before actual accident occurs.

Whereas, when one of duplicate generators, water wheels or transformers is removed from service, but one-half of the load can be carried, the above design of duplicate lines provides for the removal of the above sections, one at a time, without affecting the amount of power transmitted, and with a temporary increase in the loss of transmission of only a few per cent.

Another, and in this case very important, advantage derived from a duplicate line lies in the more favorable "Regulation," or fluctuation, in voltage at delivery, due to the varying loss of electric potential in the transmission. These variations or fluctuations of voltage with duplicate transmission are but approximately one-half as great as with a single circuit, while the corrective effect of charging current, due to electro-static capacity, in relieving producer from the losses due to idle current, is substantially twice.

Greater cost may be urged as an objection to duplicate lines. When the amount of power to be transmitted is large, as in this case, requiring large conductors, the cost of copper is an almost controlling factor in the cost of transmission. This cost for copper, for such a given amount of power, transmitted at a given loss, is no greater for duplicate than for single transmission; the conductors in the former case being required of just one-half the weight of those in the latter.

Right of way is likely to be the next most important element of expense. The cost of a wider strip is usually but slightly greater than that of a narrower strip, because the principal element of damage to property lies in the cutting of premises, rather than in the acreage purchased. Moreover, of the total expense for right of way, legal and other contingent expenses are likely to be greater than the amount actually paid for property, and these contingent expenses are no greater for the duplicate line.

Thus poles, cross arms, pins and insulators become the only elements of transmission expenses which are proportionally greater for the duplicate line.

Voltage.

We recommend the use of sixty thousand volts for this transmission.

High voltage is desirable because of the small amount of copper required, and consequently lessened cost of line. There is a certain loss of energy in all electrical transmission, due to the heating of the conductors.

In determining the voltage and size of conductors for any line, this energy loss is generally assumed at a certain allowable amount.

The relation of voltage and size of wire is such that for any given amount of power transmitted the size of wire decreases as the square of the voltage increases. For instance: At forty thousand volts a certain amount of power transmitted requires No. 000 wire, the loss by heating being 6.6 per cent.; at eighty thousand volts the same power can be carried with the same per cent. of loss by a number four wire, which is only one-fourth as large as number 000 wire.

There is a limit, however to the voltage for which we can obtain suitable insulators at the present day. There are in successful operation several transmissions using forty thousand and fifty thousand volts, and perhaps if the line were to be put into operation at once we would find it necessary to limit the voltage to the above figures, which are undoubtedly the commercially advisable pressures for the present day. On the other hand, there are in the process of being perfected insulators which promise well to stand up under eighty thousand volts, and there is little question that within the next two or three years eighty thousand volts will be as practical as is forty thousand at the present time. Hence our recommendation for sixty thousand volts in this case.

Conductors.

Accepting a pressure of sixty thousand volts, we recommend the use of No. 00 B. & S. gauge copper wire. The energy loss would be approximately 7.1-2 per cent, when the line is carrying its full load of 15,000 kilo-volt-amperes, which is, at unity power factor, twenty thousand horse-power for the duplicate line, or ten thousand horse-power per single line.

We recommend bare wire. All ordinary insulators are worse than useless as a protection against sixty thousand volts. It is possible that a fallen wire may be prevented by it from grounding sufficiently to open the circuit breakers, and cut it out of the line, and still be deadly to any person who might touch it.

Adequate insulation for protection against such voltage would be too costly to be considered.

TABLE OF VOLTAGES AND COPPER SIZES SUITABLE FOR MEANS OF FOLLOWING DISTANCES:

PER MILE OF DUPLICATE TRANSMISSION.

40,000 volts per 50 to 70 miles.

Horse Power.	Size. B. & S.	Energy Loss.	Max. Reg.	Copper in pounds.
10,000	00	0.10 %	0.12 %	12,774
20,000	250 000	0.10 "	0.17 "	24,156
30,000	C M. 350,000 C. M.	0.11 "	0.22 "	33,816

60,000 volts, 70 to 100 miles.

10,000	2	0.09 %	0.095 %	6,384
20,000	00	0.09 "	0.11 "	12,774
30,000	0000	0.03 "	0.12 "	20,292

80,000 volts, 100 to 150 miles.

10,000	2	0.05 %	0.05 %	6,384
20,000	00	0.05 "	0.06 "	12,774
30,000	0000	0.05 "	0.07 "	20,292

Span.

We recommend a span of 160 feet, or 66 poles per mile, for duplicate line. Shorter spans are obviously less liable to break than long ones. Weight of sleet freezing on the wire and the wind pressures are smaller for shorter spans. Through agricultural tracts and thickly settled districts, where the falling of a wire would be of the greatest danger to life and property, especially ripe crops, it is advisable to use shorter spans, down to 120 feet, while in thinly settled areas, waste land or public domain, 200 feet will answer.

The surveyor who lays out the line may vary the span slightly at times, so that the poles shall come on the higher points, not in hollows.

At railroad and other line crossings the span must be the shortest possible, down to twenty feet.

Arrangement.

The general design of the pole and its trimmings is illustrated by exhibit B. The wires are arranged in the form of an equilateral triangle, which is at once a symmetrical and simple arrangement, advantageous both from an electrical and a mechanical standpoint. The mutual reactance and capacity effects are thus kept equal, so that there is an even balance in the electrical conditions as well as balance in mechanical strains. It is obvious that there is no symmetrical arrangement of three wires horizontally on cross arm, nor could suitable distance be provided without going to excess in length of cross arm.

Construction.

Poles—The poles should be winter cut Canadian red cedar. The standard size for forty thousand and sixty thousand volts should be forty feet long, and not less than eight inches in diameter at the top. For eighty thousand volts they should be forty-two feet long. All defects, such as large, loose or protruding knots, rotten hearts, excessive season checks, etc., should be excluded.

Winter cut timber is much preferable, even at a materially higher price. The sap is mostly in the ground when such poles are cut; consequently, they are not checked as badly as summer cut poles. Timber grown on a north slope is preferable, on account of its slower growth, and because it has a better taper. If possible, select poles the greatest per cent. of whose cross section is red or heart stock. Knotty poles last longer, though they are somewhat harder to handle, because there is more resin in the wood.

No pole should be accepted which is in wind more than four inches, or which is in wind more than one direction.

The pole is to be framed and roofed as shown on exhibit C. The mortise must be at right angles to the principal axis of the pole, and shall be neatly and cleanly cut, so that the cross arm shall be square with the pole when seated and wedged.

The sides of the mortise must fit the cross arm snugly, as wedges can not be used on the side. The hole for the top pin is to be bored approximately in line with the axis of the pole.

The roof, pin hole and mortise are to have two coats of elastic bitumen paint. The butt of the pole to two feet above ground line shall have two coats of carbolineum, which should be applied hot.

Holes.

The holes for forty foot poles should be six feet deep in average ground. For each additional five feet of length in the pole the hole should be one foot deeper. On hillsides the depth must be measured from the lower side. One foot extra of depth should be allowed at angles. The holes should

be from four to six inches larger than the butt of the pole, to allow room for tamping.

Cross Arms.

We recommend for sixty thousand volts a cross arm four inches by six inches, by eight and one-half feet long. It is to be exact size when dry and surfaced. For forty thousand and eighty thousand volts, the cross arms should be 3 1-4 in. x 5 1-4 in. x 7 feet and 4 in. x 6 in. x 10 feet, respectively. They must be surfaced on all sides, roofed, and have two holes for insulator pins, as shown on exhibit C.

The material for these cross arms is to be selected clear, long leaf yellow pine, free from excessive gum, large or rotten knots, and imperfections generally. It is especially insisted upon that the cross arms shall be close and straight grained, so as to avoid danger of splitting out at the ends.

The cross arms should be treated with a mixture of elastic bitumen paint and creosote, in such a manner as to saturate the outer fibres with the preservative, and leave a heavy coating all over the arm.

Pins—The pin recommended for sixty thousand volts is 2 1-2 inches in diameter by 17 1-2 inches long, for cross arm pins, and 2 1-2 x 20 inches for pole pins. The general shape is shown on exhibit E. The design of the pin is, however, a matter largely depending on the kind of insulator used. The pins are held in place in the top of the pole and in the cross arm by small dowel pins, as shown on exhibit C.

The material for these pins should be selected black locust, straight grained, and free from knots. No split, splintered or rough pins should be used. The threads should be carefully cut.

The pins should be treated with paraffin. The operation consists of immersing the pins in paraffin oil at a temperature of 130 deg. F. The temperature is gradually raised in three hours to 240 deg. F., where it is held for six hours; then it is allowed to cool down again to 130 deg. F., when the pins are removed. The process requires considerable care in execution, but if properly done it is possible to drive the paraffin entirely through the fibre of the pin, and leave a smooth coating on the outside.

Dowel pins and wedges should be of oak, and should be dipped in elastic bitumen paint before being driven. The pin holes should be drawn bored, 1-16 inch.

Insulators—The insulator recommended for sixty thousand volts is of the type having a large, nearly flat petticoat near the top, with a sleeve extending down the pin. The petticoat should not be less than 10 inches in diameter, and the sleeve should extend about the same distance down the pin. For forty thousand volts an insulator 6 inches in diameter, and with no sleeve, may be used. The weight and cost of insulators increases very rapidly with increase of voltage. Good forty thousand volt insulators can be had at 25 cents each; forty sixty thousand volts they would probably cost about 75 cents; for eighty thousand it is estimated they would cost from \$1.25 to \$1.50.

In General.

The construction should be such as to leave no places for moisture to collect, which is both dangerous to the insulators, and shortens the life of

the structure. All is to be made strong and solid, without the use of bolts or any metal to draw the metal together, but by good workmanship and the use of the above proposed framing.

Preservative and insulating paint is to be used on all exposed places, worked by tools.

Angles are to be turned in curves made up of short 10 foot spans, the angle between each span and the one preceding being not over 5 deg. For instance, if a 14 deg. angle is to be turned, it should be made with five poles and four short 10 foot spans, the deflection at each of the three intermediate poles being 4 deg. 40 min.

In places where there are likely to be excessive strains on pins and cross arms, as at entrances to switch and sub-stations, two or three poles should be set close together, having double cross arms, like the scheme shown by exhibit D, or the device illustrated by exhibit H may be used instead. This device has five pins and insulators on each of the three bars, two of which are supported at the ends of regular cross arms, and the other at the tops of the two poles. The structure is braced so as to be very rigid.

There should be no abrupt angles in a vertical direction. Where the profile of the ground has sharp rises and descents, a judicious use of different lengths of poles and proper selection of places to set them will avoid bad strains.

Switch Stations.

The junction points of the line must have buildings suitable for containing the automatic switches. These should be of fireproof construction, preferably of brick, or brick and steel, with iron roof.

A diagram of the connections showing the location of the switches is given on exhibit F.

Inlets and Outlets.

The means of conducting the high-tension wires into and out of the switch and sub-stations is a point requiring great care. An approved design is shown by exhibit G. The opening in the wall is 30 inches square, and is closed by panels of ceiling. Through the centre passes a 6x6 inch paraffined oak bushing, 4 feet long, carrying two concentric glass tubes, which in turn carry the conductor. This bushing must be entirely covered by a hood which will protect it from snow and rain, the wires entering from below. No metal should be used except in fastening the ends of the ceiling at the edge of the panel.

Switches.

The switches recommended for the junction points are of the oil immersion type, single pole, and are best erected in separate masonry compartments built along the ends of the junction house upon the floor level.

The cost of these switches would probably be about \$1,500 for the number required in each switch station.

Recommendations by

L. L. AND P. N. NUNN.

April 27, 1903.

S N F.

We estimate the cost of constructing a transmission for twenty thousand horse-power, at sixty thousand volts, of No. 00 B. & S. gauge copper, at 15 1-2 cents per pound (the present market price), as above outlined, not including cost of right of way and surveying, presuming nothing dutiable.

PER MILE OF DUPLICATE TRANSMISSION, \$3,600.00.

The maintenance of such a transmission, including replacing poles every fifteen years, not including fixed charges or interest on investment, should not exceed,

PER YEAR PER MILE OF DUPLICATE TRANSMISSION, \$125.00.

REPORT
OF THE
COMMISSIONER OF PUBLIC WORKS
FOR THE
PROVINCE OF ONTARIO
FOR THE
YEAR ENDING 31ST DECEMBER,
1902.

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO.



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CONTENTS.

	PAGE
Commissioner's Report	3
Report of the Architect	4
Report of the Engineer	13
Report of the Superintendent of Colonization Roads.....	30
Statements of the Accountant and Law Clerk	33



WARWICK BROS. & RUTTER, PRINTERS
TORONTO.

REPORT
OF THE
COMMISSIONER OF PUBLIC WORKS
FOR THE
PROVINCE OF ONTARIO
FOR THE
YEAR ENDING 31ST DECEMBER,
1902.

To His Honor Sir Oliver Mowat, K.C.M.G.,

Lieutenant-Governor of the Province of Ontario, etc.

As required by the provisions of the statute in that behalf, I beg to submit the reports of the Departmental Architect, Engineer, Superintendent of Colonization Roads and the Accountant and Law Clerk for the year 1902.

The report of the Architect gives details of the works in connection with the maintenance of the Legislative and Departmental Buildings, and of the construction and completion of additions to the buildings at the several Public Institutions, and other Provincial Buildings under capital account.

The report of the Engineer contains details of the work at the several reserve dams; timber dams and slides and swing and fixed bridges crossing same; the blasting, dredging and improving channels of navigation, and clearing and dredging streams, etc.; and tabulated statement showing the mileage of completed railways and the number of miles now under construction.

The report of the Superintendent of Colonization Roads gives details of the works, etc., in connection with the building and repairs to colonization and mining roads during the year 1902.

The Accountant's Statement No. 1 shows the expenditure on maintenance and repairs account for Government and departmental buildings, institutions, etc., for the year 1902; Statement No. 2 shows the expenditure on capital account for public buildings and works, roads, railways, etc., for the year 1902; Statement No. 3 shows the total expenditure on capital account for public buildings and works, roads, railways, etc., from the 1st of July, 1867, to the 31st December, 1902; and No. 4 is a classified statement showing (a) the expenditure for four years and six months from 1st July, 1867, to 31st December, 1871; (b) the expenditure for thirty-one years from the 1st January, 1872, to 31st December, 1902; and (c) the grand total of expenditure from 1st July, 1867, to 31st December, 1902.

The Law Clerk's Statement No. 5 shows the several contracts and bonds entered into during the year 1902.

Respectfully submitted,

F. R. LATCHFORD, Commissioner.

Department of Public Works, Ontario,
January, 1903.

REPORT OF THE ARCHITECT.

Department of Public Works, Ontario.

Toronto, December 31st, 1902.

To Hon. F. R. Latchford, Commissioner of Public Works, Ontario :

Sir.—I have the honor to report upon the works carried on by this branch during the past twelve months.

Government House.

Repairs generally have been attended to and the grounds and gardens kept in the usual good order.

New Parliament Buildings.

Repairs have been made to the building as found to be necessary, including the roofs, proper attention having been paid to the snow-cleaning. Several vaults have been fitted up in the basement, and some of the rooms in the departments have been painted, as it is now nearly twelve years since the buildings were first occupied and comparatively little decorating has been done. It is proposed to do considerable of this work next season, including some of the main corridors, and an amount will be asked for in the appropriations to cover the expense of same. The hose for fire protection has been tested, and 450 feet found to be defective has been replaced by new hose. An electric fire alarm system is being installed, with signal boxes on each floor, the wires leading to alarm station in the boiler room. Additional offices have been fitted up on the second floor in the centre of the building for the Board of Health, the rooms formerly occupied by them being now occupied by the officials of the Treasury Department. An additional office is also being erected on the landing of the private stairway on the second floor of centre building.

The roads and grounds surrounding the buildings have been properly attended to.

Toronto Asylum.

An addition has been built to the bakery, the contract having been executed by Mr. George Henry, and the steam heating and plumbing by men employed by the Department. Repairs to the roofs, etc., have been attended to. Considerable repairs will have to be made as soon as the weather will permit, to the stonework of the entrance gates on Queen street. The posts and walls at sides of same will have to be reconstructed owing to sinkage in the foundation.

Mimico Asylum.

Alterations have been made to the Laundry and Drying rooms, both having been remodelled and additional machinery supplied for laundry, manufactured by the Canada Laundry Company, which is being installed by the employees of the institution. The Hanrahan system of dry kilns has been installed in the drying room. The work has been carried out under the directions of this Department.

London Asylum—Infirmiry.

A large amount of work has been done on this building during the past season, including metal ceilings, electric wiring, plastering, heating, plumbing, carpenter work, painting and drainage. The contract for

metal ceilings was awarded to Messrs. Steveley & Sons of London. The contract for wiring for electric lights was awarded to the Electric Construction Company of London, and the contract for plastering to Mr. Anthony Irwin of London. All have been carried out satisfactorily. The contract for plumbing and heating was awarded to the Messrs. Elliott Bros. of Kingston, their work being nearly finished. In all cases contracts were awarded after tenders had been duly called for, the lowest tenders being accepted. The carpenter work and painting are being done by day work, the material being purchased by tender and the orders given to the lowest bidders. A hot water heating and ventilating system has been installed, the work having been done under the supervision of officials of the Department. An addition has been built to the laundry 50 x 35 feet, the whole of the work excepting plumbing and heating being done by men employed by the Department. The plumbing was done by Mr. T. L. Partridge of London, and the heating by the Messrs. Elliott Bros. of Kingston. Repairs have been made to the various buildings as required.

Hamilton Asylum.

Extensive alterations were made under the direction of this Department to the plumbing system of the Main Building, which was in an unsanitary condition and altogether out of date. The work consisted of the fitting up of two more bathrooms with the Gegenstrom system of bathing apparatus in the Main Building, the floors of each apartment being tiled. Eight of the water closets in this building were also remodelled, the old apparatus being removed and replaced by W.C.'s of a modern type, the partitions between the closets being of marble, and the walls lined to the height of five feet with same, the floors have been laid with tile and the ceilings covered with sheet steel, the whole now being a complete and up-to-date plant.

The marble work and tiling was done under contract by the Middleton Marble Works of Hamilton; the sheet metal work by Mr. James Findlay of Hamilton; the plumbing by men employed by the Department.

Kingston Asylum.

Plans and specifications were prepared by the Department for a cottage to be used as a Home for Convalescents and Nurses. Work was commenced in July, and the walls carried up to the top of first floor joists, which have been put on, and the rough floor laid on to protect the building from the weather. Work will be continued in the spring and the building completed in the summer. The building is 35 x 42 feet, the outer walls being built of stone. It has been located a little to the southwest in front of the Main Building, and has been designed to harmonize with buildings adjacent thereto. The work is being done by day labor under a competent foreman, the materials being purchased by tender. Owing to several of the old boilers having become worn out, new boilers have been installed, an amount to cover the cost of same having been appropriated in this year's estimates. Plans and specifications were prepared and tenders called for two horizontal multi-tubular 100 horse power boilers, and the contract awarded to Messrs. Selby & Youlden of Kingston, who have executed the work very satisfactorily. As additional power is required for the electric plant, another 100 horse power boiler will be required for next season to take the place of one of the old 50 horse power boilers which has been fitted up temporarily for this winter. This will give a unit of 300 horse power, and will be sufficient for all purposes in connection with the Main Building. Owing to the change in position of boilers, and the increased capacity, the steam mains and returns had necessarily to be changed.

Electric mains of increased capacity have been continued from the power house to the Engineer's and Carpenter's cottages, at the main entrance gates. Considerable painting has been done to the outside woodwork of the Main Building, and repairs generally to the outside of the buildings have been made.

Asylum for Females, Cobourg.

Permanent sidewalks and steps of cement have been laid to front and side entrances, and new fencing placed on the west side of the lot. The old stone fence from street line to line of main building, which was found to be in a very defective condition, had to be taken down and rebuilt. Repairs were also made to the old wooden fence where necessary. More of this work will require to be done during the ensuing year. The roadway from the east side has been extended to the rear of the boiler-house, being constructed of stone and gravel. An ice-house has been erected conveniently situated to the Main Building. A large amount of work was done by this Department in fitting up store-rooms, clothes-rooms, etc., etc., and everything left complete and satisfactory, and as the building now stands it is one of the most modern and best equipped asylums in the Province.

Central Prison, Toronto.

The chapel, which was commenced last year, has been completed, and forms an artistic feature in the interior of this otherwise sombre building. It has been thoroughly equipped for the purpose for which it is to be used. With the exception of the metal ceilings, slating and galvanized iron work of the roof, the entire work has been done by prison labor under the supervision of this Department, and is a credit to all concerned. The basement under the chapel has been fitted up with a spray bath system of bathing apparatus with water closets walled off at each end for the officials and prisoners respectively.

Reformatory for Females, Toronto.

The plumbing apparatus in connection with lavatories, etc., which was in an unsanitary condition, has been removed, and modern appliances, placed in more favorable positions for light and ventilation, have been installed by this Department.

Ontario Refomatory for Boys, Penetang.

The work done under this Department consisted of repairs to the roofs of the different buildings. The old tin on the roof of the main centre building, which was rusty and worn out, was taken off and the entire roof slated, the valleys and eaves being covered with galvanized iron. The work has been done in a thorough manner by the Messrs. Douglas Bros. of Toronto.

Institute for the Blind, Brantford.

Repairs have been made to the Main Building, and woodwork to front of same has been painted. A new high pressure boiler has been installed, and the old high pressure boiler altered into a hot water heater to replace a heater that was worn out. Repairs were also made to steam boilers, including renewal of tubes in both of them. The whole of the work was done by the Waterous Engine Works Company of Brantford.

Institution for Deaf and Dumb, Belleville.

Repairs were made to the drains and water supply mains, and the girls' outside lavatory has been heated by steam. The plans were supplied by, and the work was done under the supervision of this Department.

Normal and Model School, Toronto.

The usual amount of repairs have been made to the Education Department Building and to the Normal and Model School Buildings as was found to be necessary from time to time.

Normal and Model Schools, Ottawa.

The steam mains and returns in connection with the heating plant in the Model School have been renewed and larger pipes placed in their stead, the work being similar to that done in the Normal School last year. The whole plant is now completed in a satisfactory condition, and is working smoothly and effectively, and there is no doubt that there will be considerable saving in the consumption of coal. The chimney to boiler-house, the flue in which was of insufficient capacity, has been taken down and rebuilt, the flue being increased by twice its area and 25 feet in height. The contract for same was executed by Mr. R. Lester of Ottawa, whose tender was the lowest for the work. Considerable repairs have been made to the buildings, fences and yards as required. Now that the heating system has been put in good shape it is proposed that other very necessary improvements be made, first in the ventilation, as at present there is practically none to speak of, excepting through the windows. It is also proposed to improve the lighting by enlarging some of the windows to the class rooms and by placing borrowed lights in the walls of corridors, which at present are dark and gloomy. It is also proposed to light the whole of the buildings with electricity, the Assembly Hall only being now lighted in that way. Improvements will also have to be made to some portions of the plumbing.

Plans and specifications have been prepared by the Department for the equipment of the Domestic Science class room in the northeast angle of the building on the ground floor of the Model School. The work will be completed in the course of a few weeks. The equipment is for 24 students and will be first-class and up to date in every respect.

Ontario Normal College, Hamilton.

Plans and specifications were prepared by the Department for the equipment of a Domestic Science class room in this institution, to accommodate 26 students, from designs prepared by Mrs. Hoodless. The equipment for the class room in Ottawa was also designed by this lady.

Normal School, London.

A cement floor has been laid in basement under the Main Building and a room fitted up in the east end of same for a class room for Manual Training, the walls being sheeted up to a height of 6 feet with red pine and the balance finished with plaster, the ceiling being sheeted with pine. The whole of the woodwork has been finished in natural wood, with the exception of ceiling, which has been painted. The room has been fully equipped with the latest appliances under the direction of Mr. Alfred Leake, Director of Manual Training. Four glass cases have also been made and placed in the Museum. A few necessary repairs have been made to the Building.

School of Practical Science.

A large amount of repairs and alterations have been made to this building during the past year, including renewal of roadway and repairs to

plumbing and heating. Two additional rooms have been partitioned off in the basement and two in the attic. The lecture room on the first floor in the west wing adjoining the Principal's room has been converted into a draughting room and electric lighting has been put in for same. A room has been erected in the corridor on the upper floor to be used as an office for the Fellows in connection with the school, and a room formerly used as a museum in the northwest angle of the old building on the upper floor has been converted into a lecture room, the whole of the work having been done by men employed by the Department.

The most important work undertaken by my branch during the past year was in connection with the Chemistry and Mining Building now in course of erection in College street, for which the plans and specifications were prepared after a great deal of time had been spent in preliminary work which was necessarily entailed owing to the numerous and various requirements of a building of this nature. Before commencing the plans the Principal and the architect visited buildings of a similar class at Cornell University in Ithica, the University of Columbia in New York City, the University of Pennsylvania, Pa., the Massachusetts Institute of Technology in Boston and the McGill University in Montreal, with a view to obtaining information regarding the laying out of the buildings, and afterwards visited the Buffalo and Pennsylvania Railroad station in Pittsburg, and several of the science buildings in New York City, regarding heating, ventilation and equipment. The plans finally decided on and now being carried out are the result of deductions made from the information gathered during these visits, the best and most suitable features having been embodied in the plans of the building, and while in some particulars resembling the layout of these buildings in grouping of the departments, the building as a whole differs from all of the university buildings visited in this respect: Chemistry and mining are here combined in the same building; in other institutions the work is taught in separate buildings.

Plans and specifications were completed and tenders called for in May. When the tenders were opened it was found that the cost of the building, if these plans were carried out, would exceed the estimate, the cost of materials and labor having increased from the time the estimate was made not less than 30 per cent. It was therefore deemed advisable to have the plans and specifications redrawn and new specifications prepared. The general design of the exterior was modified, and a large amount of the stone and ornamental work was omitted, the size of the building and the general layout being the same as first plans. Tenders were again called for in July, and contracts awarded as follows: Cement, mason and brick work, to Mr. John Aldridge; carpenter work to A. J. Brown; iron work to the Dominion Bridge Company; roofing and copper work to George Duthie & Sons; plaster work to Wm. Hynes, all of Toronto, and painting to the Messrs. Ross Bros. of Hamilton. The whole of the foundation walls have been erected. Owing to the depth that foundations had to be carried through the filled earth to get a solid bearing at the east end of the building (in some places from 20 to 28 feet below the level of the ground), and the constant frequent rains, considerable delay was occasioned in proceeding with this part of the work. The brick work of basement has been commenced, and the work will be carried on during the winter when the weather is favorable, and it is expected the building will be completed before the end of 1903.

The south facade on College street is 261 feet in length, the facade to the west 132 feet, and to the east 86 feet. The boiler room, fan room and electric plant room are located in the rear of the centre of the building ex-

tending beyond to the north 78 feet, the coal vault being alongside of the boiler room. What is known as the Milling Building in connection with the Mining Department, in which the milling plant will be installed, will be placed immediately north of the boiler room and adjacent thereto extending northward 78 feet and 80 feet from east to west. This part of the building will be only one story high. The Main Building will be four stories in height, each story being 16 feet in height, including the basement. The foundations below the ground line have been built entirely of concrete. The interior of all walls will be lined with pressed brick, of a light buff tint, which will give a rich and pleasing appearance. The exterior of the building has been designed with due regard for economy in conformity with the requirements for which it is to be used. The design is in the Italian Renaissance and is severely simple and massive in character. The basement walls on the three facades will be constructed of Credit Valley brown stone surmounted with a plinth of similar material, above this, to the copper cornice at eaves of roof, the walls will be of plum-colored bricks with cornices and trimmings of brown stone. The principal feature is the centre portion of the south facade, the main entrance to the ground floor being located in the centre, and is approached by a flight of massive stone steps, the main entrance to the basement floor being under the same with an approach at each side. From above the ground floor four large Ionic columns with carved capitals extend to the entablature of the main cornice, surmounted by a gable the full width of the projection. The students' entrance is located at the west facade entering into the main corridor, which extends from that point to the Museum at the west end of the building.

The basement floor consists of a main corridor from west to east, being joined to the main central corridor from north to south in the centre of the building. The centre portion on each side of corridor is divided into Metallurgical Furnace room, Commercial Electro-Chemical plant room, Senior Electro-Chemical Laboratory, Electro-Chemical Preparation and work room, Electric furnaces, Lecture room in Chemistry, private room, Demonstrator in Mining and janitor's room. The west wing is divided into Assay Laboratories and rooms to be used in connection with the work with the exception of the Junior Electro-Chemical Laboratory, which is located in the southwest angle. The Museum, which is continued up through the ground floor, occupies the whole area of the east wing and is approached by entrance from the corridor to be used by the students, the entrance for the public being from the outside at the east end. (The corridors extend up over each other through the whole building).

The ground floor centre portion is divided on the north side into store-room, lecture room and reading-room, and on the south side into Principal's room, Secretary's room, Board room, private laboratory and balance room. In the west wing the large Chemical theatre occupies the north end, with preparation and store rooms, etc. adjoining, the theatre for general purposes, being to the south of the main corridor. The east wing is occupied by the Museum, which is also entered from the corridors on this floor.

The centre portion of the first floor consists of store room, Electrolytic Assay Laboratory and lecture rooms on the north side. On the south side of this portion of the building a fireproof room, calorimetry room, Professor's room, private laboratory, Demonstrators in Chemistry, Fellows' room and preparation room. The east wing over the Museum is divided into section grinding, maps and lithology with lecture rooms adjoining.

The west wing of the second floor is entirely devoted to the first year laboratory, the fellows' room, store rooms and a large lecture room adjoining. The centre portion of the west wing is altogether devoted to Miner-

alogy, divided into work rooms, demonstrators' rooms, laboratories and Professors' rooms. The various floors are approached by spacious staircases in the centre building and in the west wing. Elevators leading to each floor are located at the junction of main building with the east and west wings. Lavatories for students and Professors are located on each floor. Particular attention is being paid to the heating and ventilation, and electric plant, which will be of the most modern type, and the building when completed will be second to none of its class on this continent.

Osgoode Hall, Toronto.

Repairs generally have been attended to throughout the buildings and grounds and some of the apartments painted, including the rooms occupied by the Judges in the Court of Appeal and the lunch room in connection therewith which has been suitably furnished. The lockers or wardrobes, which were located in several apartments of the building and which were too small to accommodate the number of persons who desired to make use of them, have been removed to the old court room in the west wing, which has been fitted up and is now used entirely as a robing room. The work was done by the Department. Repairs and renewals have been made to the furniture as required and the building kept in a good state of repair generally, including the heating plant, a few repairs having been made to the boilers and radiators. Files have been placed in the addition to the Surrogate Clerk's vault, similar to those in the original vault.

Agricultural College, Guelph.

The building for the Physical and Biological Laboratories and Museum has been completed. Plans and specifications were prepared by the Department for the Live Stock Judging Pavilion, tenders were called for and the contract for the whole of the work excepting the steam heating and light-contract for the whole of the work excepting the steam heating and lighting was awarded to Mr. A. J. Brown of Toronto. The building has been completed and will no doubt prove to be satisfactory in every way. The plan, as may be seen in the accompanying illustration, is circular and is designed to seat 500 people. The walls are built of stone and brick and the roof is of wood covered with galvanized iron and surmounted by a dome, which is used as a main ventilator. The dimensions of the building are as follows: Diameter 70 feet, height of ceilings at walls 12 feet, and at centre 20 feet. Plans and specifications were prepared by the Department and tenders were asked for a duplicate electric light plant for lighting the whole of the buildings and the grounds, the contract being awarded to the Canadian General Electric Company, who have executed the work in a most satisfactory manner. Plans and specifications were also prepared for wiring for electric light for the grounds and buildings, and after tenders had been called for, the contract was awarded to the Messrs. Keith & Fitzsimons Company of Toronto. The work has been completed, and it is expected that considerable saving will be made in changing from gas to electricity. Tenders were also called for the electric fixtures for the buildings and the contracts for the whole of the buildings excepting the Physical Laboratory and Museum awarded to Messrs. Keith & Fitzsimons, and the contract for the last-named building to the Rogers Electric Company of Toronto. In each case the lowest tender was accepted.

Algoma District.

The addition to court house at Gore Bay has been completed and lock-ups have been erected at Wawa and Chapleau.

A new main drain 200 feet in length has been laid from the court house and jail at Sault Ste. Marie and connected with the town sewer. Repairs

have been made to the court house and jail at that place. Furniture has been supplied to the lock-up at Blind River, and repairs have also been made to the jail at Little Current.

Thunder Bay District.

Repairs were made to the jails at Fort William and Port Arthur, and furniture was supplied where necessary.

Muskoka District.

Metallic fittings have been erected in the vault in connection with the Registry Office in Bracebridge. A new fence has been erected on the north side of the lot, enclosing court house and jail, and furniture has been supplied to the court house. Repairs have also been made and furniture supplied to the lock-up at Huntsville.

Parry Sound District.

A plumbing system has been installed in the court house and jail in Parry Sound consisting of w.c.'s, baths, etc., etc., the work being done under the supervision of the Department. A lock-up has been erected at Byng Inlet.

Nipissing District.

A lock-up has been built at Warren. Repairs to the court house and jail at North Bay have been attended to, and also to the court house and jail in Mattawa.

Rainy River District.

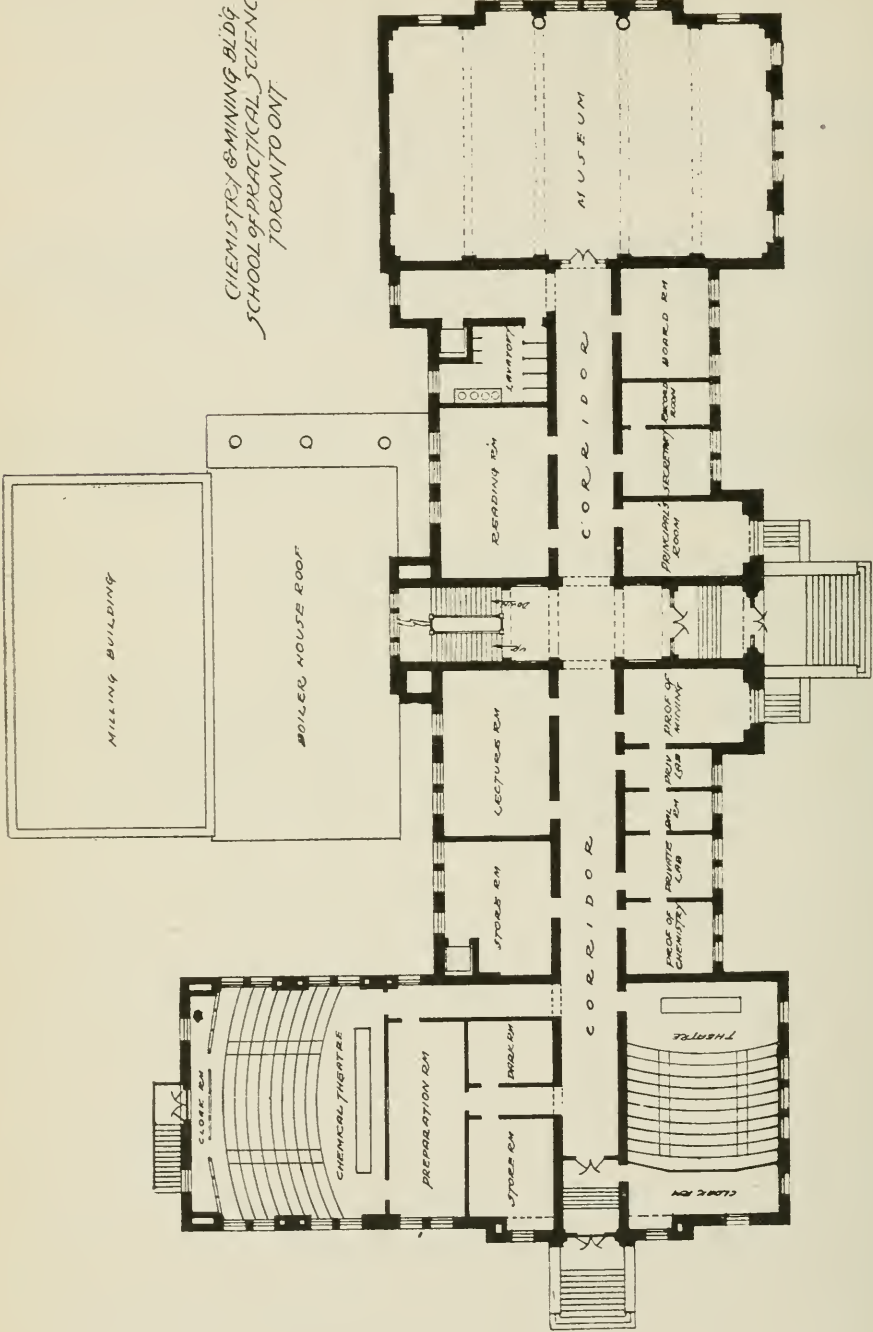
Lock-ups are being erected at Emo, Beaver Mills and Atikokan and are nearly completed. Extensive repairs have been made to the court house and jail at Rat Portage, consisting of foundation to jailer's house, re-shingling roof, painting and papering, etc. A plumbing system is also being installed in the court house, jail and jailer's house, the work being almost completed. Repairs have been made to lock-ups at Mines Centre and Fort Francis.

Mr. Tully, Consulting Architect and Engineer, made a joint inspection with Dr. Chamberlain, Inspector of Prisons, during the latter part of August of the Court Houses and Gaols in the Algoma, Thunder Bay and Rainy River Districts, the result of the inspection having been reported in detail on the 4th of September. Slight repairs to the buildings at Sault Ste. Marie were only required to be done under the Gaoler's inspection, application having been made to the municipal authorities at Sault Ste. Marie for permission to drain into the sewer on the main street, along which the sewer was constructed for a distance of 100 feet in front of the gaol property, and permission having been granted, connection was made from the main building to the sewer by a tile drain. Sheriff Carney reported that the municipality would not charge more than \$100.00 for draining into the sewer. Repairs are required at Port Arthur, including renewals of the shingles on the roofs of the jail and additions, which have been in use for twenty years. Mr. Tully made an inspection of the Registry Office, which is in the court house, and saw the fittings recently put in, and which he stated met every requirement. The buildings at Fort William were found to be in good repair. On the 23rd of August the court house and jail at Rat Portage was inspected, and the building also found to be in good repair. The lock-up at Mines Centre was also inspected.

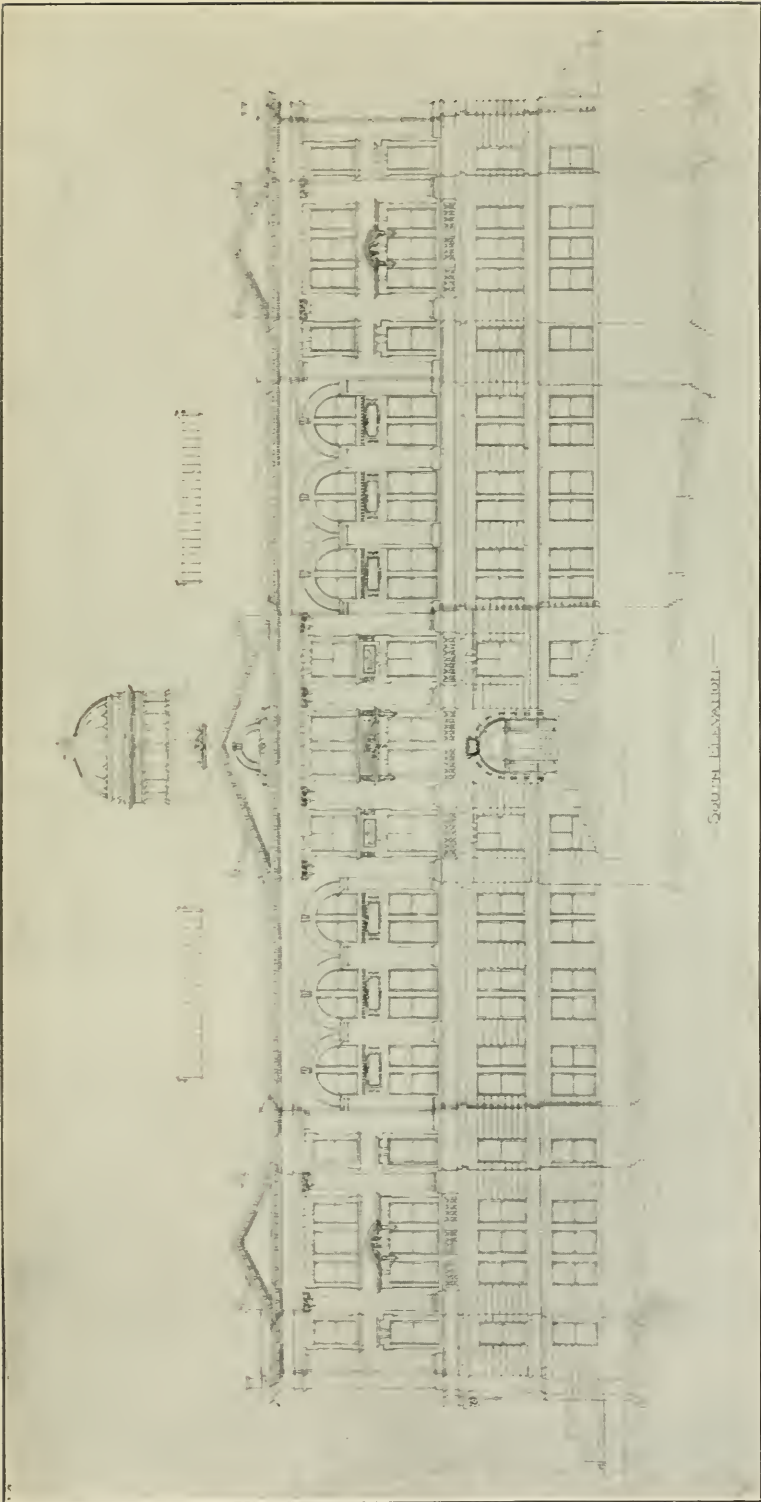
I have the honor to remain, sir your obedient servant,

F. R. HEAKES, Architect.

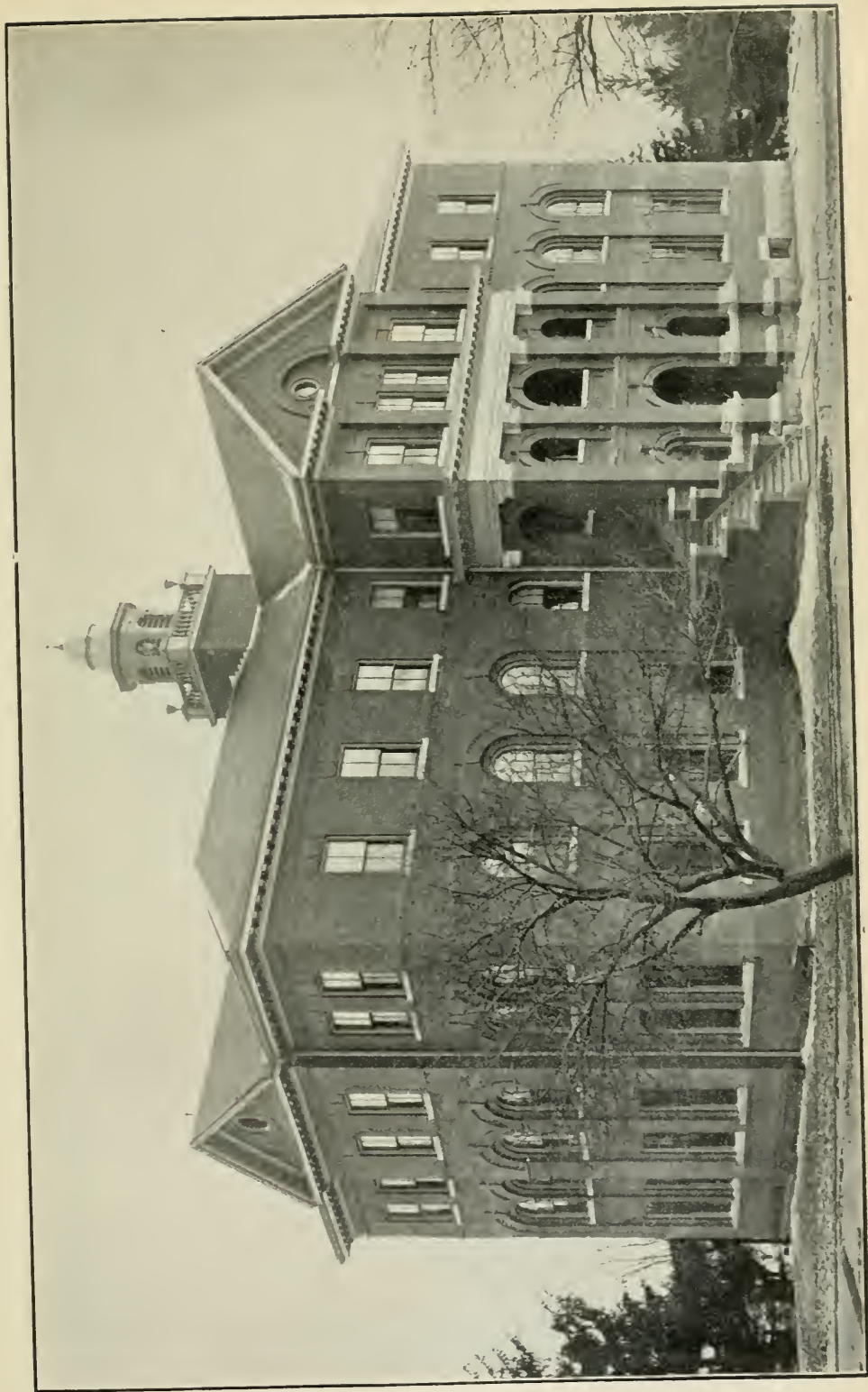
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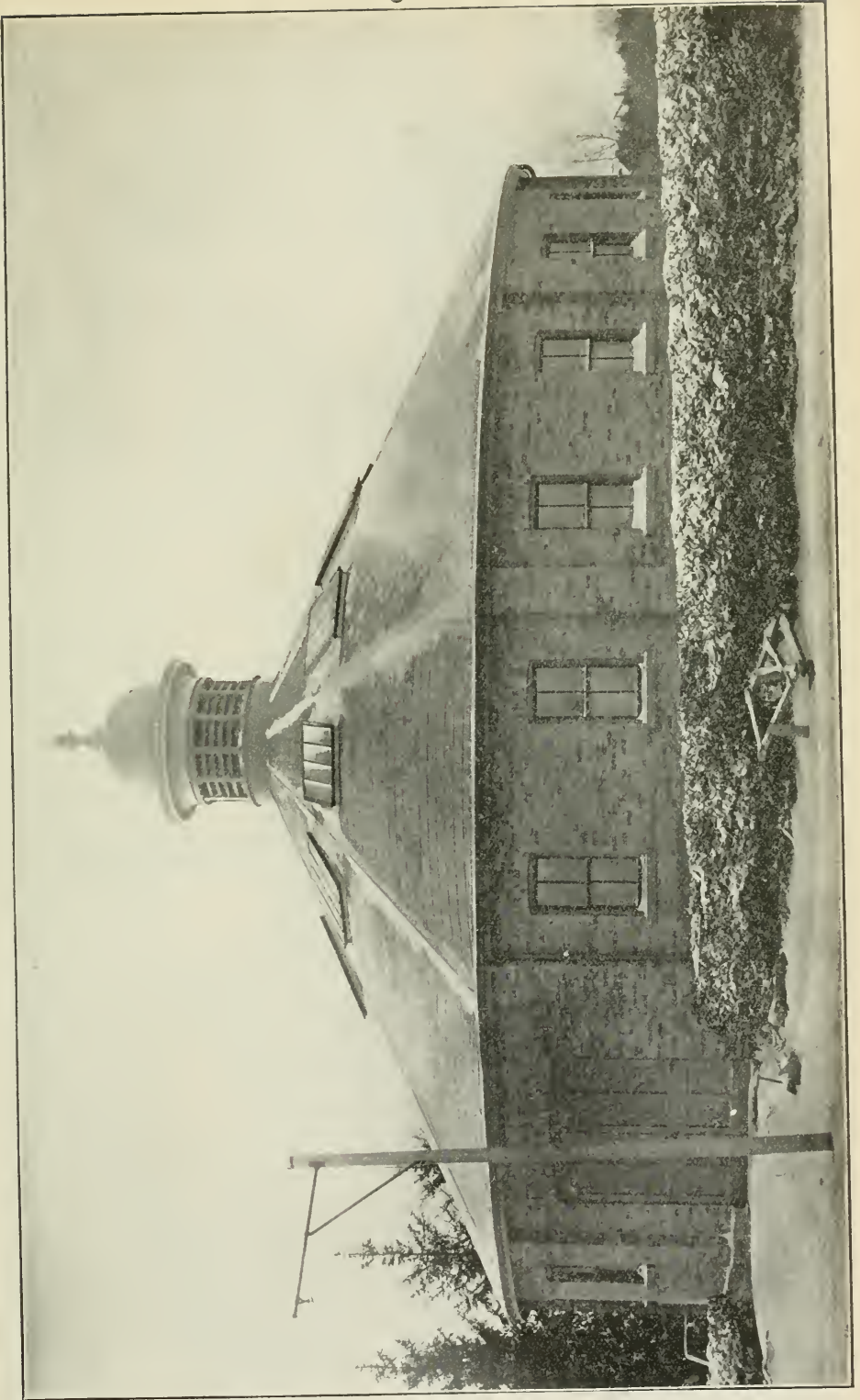
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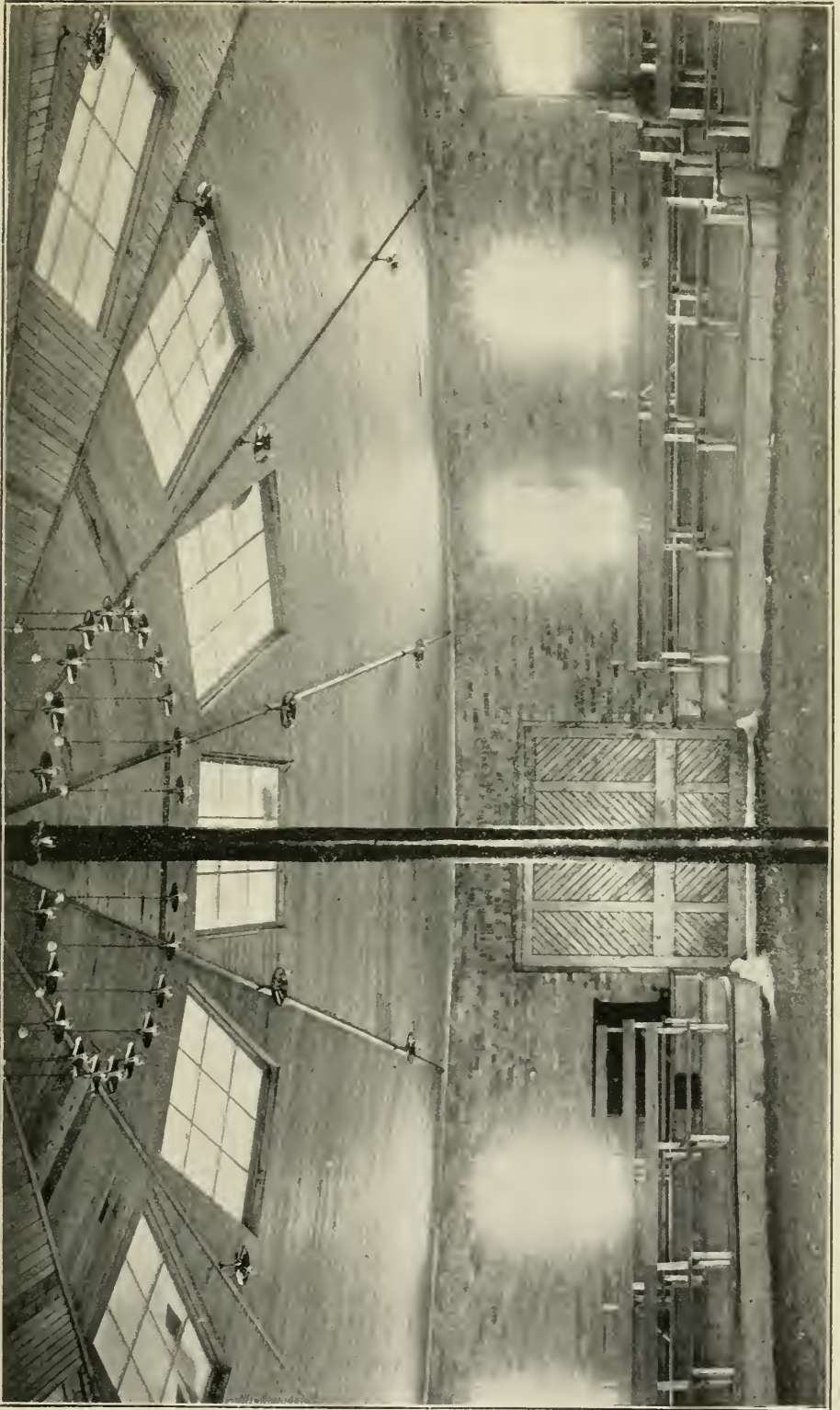
CHEMISTRY AND MINING BUILDING SCHOOL OF PRACTICAL SCIENCE, TORONTO.



PHYSICAL LABORATORY AND MUSEUM, AGRICULTURAL COLLEGE, GUELPH.



LIVE STOCK JUDGING PAVILION, AGRICULTURAL COLLEGE, GUELPH.



INTERIOR, LIVE STOCK JUDGING PAVILION, AGRICULTURAL COLLEGE, GUELPH.

REPORT OF THE ENGINEER.

DEPARTMENT OF PUBLIC WORKS, ONTARIO.

Toronto, 31st December, 1902.

Hon. F. R. Litchford, Commissioner of Public Works, Ontario :

Sir,—I have the honor to submit the following report on works which have been attended to by the Department; also respecting the extension of railways throughout the Province during the year 1902.

Muskoka Lakes Works.

The works which have been attended to out of this appropriation are as follows :

In order to enable a better class of boat to be put on with a view of affording improved accommodation to the large tourist traffic on these lakes, the lock at Port Carling has been increased in length 32 feet 10 inches, the size of the chamber now being 173 feet 6 inches from point to point of mitre sills, and the width 33 feet.

The construction of substantial coffer dams both above and below the lock was of course necessary when the space between was pumped out, and kept unwatered with an eight-inch centrifugal steam pump, and the old upper mitre sill and flooring torn out and the rock excavated to the required level.

The new walls, 14 feet in height, are constructed of 12 x 12 inch square pine timber, the bottom timbers being scribed and closely fitted and bolted to the rock, and the bottom of the chamber is formed with 12 x 12 inch floor timbers, the spaces between being filled with concrete and the whole covered with 3-inch planking. The new mitre sill is at the same level that the old one was, consequently the old gates were utilized. The landing piers above the lock have also been straightened, increased in width so as to properly connect with the new cribwork, and new 3-inch plank flooring has been provided, the pier on the northerly side being 110 and on the southerly side 140 feet in length.

The work was carried on steadily throughout the winter, the whole being completed on the 3rd of April, which was several days before the lakes were sufficiently clear of ice to admit of navigation being opened.

A new swing bridge has been constructed over the lock 68 feet in length and 15 feet 6 inches in width. The bridge is built on the Howe truss principle, with dressed lumber, painted, and rests upon a concrete pivot pier.

A concrete pier has also been constructed at the southerly end, which serves both as a rest for the bridge when closed and a retaining wall for the embankment forming the adjoining roadway. A similar pier is required at the northerly end, but owing to the wash from the numerous steamers passing through the lock at the time the work was in progress, it could not be constructed. It is intended, however, to proceed with this work before the busy season of navigation sets in for the coming year.

The adjoining fixed bridge over the river has been provided with two new main braces and two struts, the timber in these members having become too decayed to serve the intended purpose longer with reasonable safety. A new hand railing has also been provided from the fixed bridge to the swing, and the roadway between the two structures graded and improved. The large unsightly pile of rock which existed on the southerly side of the chamber has also been removed and the surface covered and levelled up with earth obtained from an adjoining bank. The dock below the lock has been extended 44 feet in length and 12 feet in width. The foundation consisting of cribwork filled with stone and the superstructure of 12 x 12 inch stringers

covered with 3-inch hemlock planking, the outer side of the work being protected from injury by the steamers with 4 x 8 inch oak waling pieces, with 33 x 1-2 inch iron bolted on the face. A point of rock at the westerly end of the dock which seriously interfered with steamers coming in and backing out, has also been blasted and removed, and similar waling pieces to those above described have been provided on the cribwork at the entrance to the lock, and also on the dock on the northerly side above.

The heel post of one of the upper gates has been temporarily strengthened by bolting on pieces of timber, but considerable repairs require to be made to these gates, in order to put them in good order, before the opening of navigation in the coming year.

Owing to the accumulation of machinery which had to be used in the extension of the lock, it was necessary to increase the size of the storehouse in order to provide the necessary accommodation. The building was therefore raised 2 feet in height and increased 8 feet in width, new joists and flooring being also provided, and the entire roof shingled. Some damage which the Lockmaster's office sustained while blasting was being done during the time the improvement to the lock was under way, was made good and the entire store house and office painted.

The dam has been supplied with four new stop-logs.

Madawaska River Bridge.

This bridge, which is fully described in my report for 1901, although practically was not fully completed and ready to accommodate traffic at the close of that year. An appropriation of \$850.00 was made in the estimates for the present year in order to enable the balance due the Hamilton Bridge Works Company, on account of their contract, and some other small liabilities incurred in connection with additional planking which was found to be required, and in the construction of approaches to be met upon the satisfactory completion of the work.

The bridge was opened for traffic during the month of January, and has been steadily used since, but the entire work was not satisfactorily completed until considerably later on in the season, when the outstanding liabilities were paid.

The structure is now in good condition, and it is not expected that any further expenditure in connection with it will be required for some years to come.

Petewawa Bridge.

A revote of the unexpended balance of the amount granted for service on the construction of this bridge, and an additional appropriation of \$350.00, the whole amounting to \$590.00, was taken last session.

The bridge, as stated in my previous report, in which the structure is also fully described, was practically completed and opened for traffic about the 25th of November, 1901, the further provision for it, made in the estimates for the present year, being required to meet outstanding indebtedness incurred in connection with the carrying out of the improvement, which could not be paid before the close of the year owing to some portions of the work not having at that time been carried out to the satisfaction of the Department, but which have since been attended to.

Bridge Across Sturgeon River, Township of Field.

As previously reported, this bridge, which is situated on lot 14 in the 5th concession of the Township of Field, was practically completed before the close of 1901, the appropriation of \$700.00 taken last session being required principally to meet outstanding liabilities at the close of that year.

Bridge at Huntsville.

As stated in my report for 1901, in which a description in detail of this structure was also given, the construction of this bridge was not commenced until toward the latter part of the month of October.

The work, however, was well advanced at the close of that year, and operations being steadily continued, the bridge was opened for traffic in the early part of the month of February of the present year, but the approaches yet require to be improved.

Black River Improvement.

The work attended to out of this appropriation consisted of dredging a channel through a shoal of sand, sawdust and other debris which had formed at the mouth of this river in Lake Simcoe, rendering it impossible for anything except small rowboats to enter the stream.

Operations were commenced on the 16th of May, and continued until the 3rd of July, when a channel 1,060 feet in length had been dredged with a bottom width of about 50 feet, and a depth of about seven feet of water provided.

Joseph River Improvement.

An appropriation of \$500.00 was granted last session for service on the improvement of this channel, which is really the natural outlet of Lake Joseph into Lake Rosseau, conditional an equal amount being provided locally or otherwise.

The condition was complied with, a cheque for the amount, made payable to the Honorable the Provincial Treasurer, being forwarded to him, and operations were commenced on the 12th of August.

The work consisted of straightening and deepening the rock cutting which was made some years ago by the Department at the outlet of Lake Joseph, so as to enable a larger class of steam yachts to navigate the channel than was contemplated or was necessary to accommodate when the original cutting was made.

The rock was first drilled and blasted and then removed by a steam dredge, the channel being now 90 feet in length and 30 feet in width, the depth of water in it being 5 feet 6 inches when there is 7 feet 6 inches on the upper mitre sill of the lock at Port Carling. Four buoys have also been put down to indicate the position of the natural channel, three of them being at a sandbar on the Lake Joseph side of the cutting, and one at what is known as "Tucks Narrows," a short distance below it.

The work was completed on 29th October, and the improvement is one which, it is expected, will be fully appreciated, especially by parties residing toward the upper end of Lake Joseph, as by taking this route they will be enabled to reach their destinations considerable earlier in the evening than was formerly possible when, owing to this channel being of insufficient capacity to accommodate their craft, they were forced to utilize the ordinary steamboat channel at Port Sandfield.

Bridge at Mattawa.

The improvement made to this bridge consisted of the enlargement and repairing of two of the piers and providing additional stone filling, also new stringers, handrailing and floor planking where required.

The work was attended to by the Municipal authorities, and upon examination being made was found to have been satisfactorily carried out, consequently a cheque for the appropriation of \$500.00 granted last Session to defray a portion of the cost was sent to the Treasurer of the Municipality.

Wabis River (District of Temiskaming).

The works attended to out of this appropriation consisted of the construction of two bridges across the stream, one on the line between lots 4 and 5 in the Vth concession, and the other on lot 11 in the same concession of the Township of Kerns.

The bridges rest upon pile abutments and are constructed on the Queen Truss principle, the spans being 45 feet in length in the clear and the width of roadway 14 feet.

Bridge at Muskoka Falls.

An appropriation of \$1,000.00 was granted last session to assist in the reconstruction of the bridge at South Falls on the Line between the Townships of Draper and Muskoka, and the work has been carried out by the Municipal authorities of the former Township during the present year.

The bridge consists of two spans of Warren trussing 63 and 32 feet in length each, the whole resting upon a substantially constructed stone pier, and abutments, the former being about 14 feet in height, and the latter about 5 and 10 feet 6 inches in height each, respectively.

The trusses and floor beams and joists are of steel and the flooring is of 3 inch pine planking.

The plans of the superstructure were submitted and approved of before construction was commenced, and upon the Department being notified that the structure was completed, examination was made, and as it was found that the work had been satisfactorily carried out, a cheque for the amount of the appropriation was sent to the Treasurer of the Township of Draper.

Des Joachims Rapids Bridge.

A re-vote of the appropriation of \$4,000.00 granted to assist in the reconstruction of the bridge over the Ottawa River, was taken last Session, the amount being granted on condition that the balance required to complete the structure be provided by the Province of Quebec and the Dominion.

The work was carried out under the direct charge of Dominion Government Engineers, and upon the Department being notified that it was completed, examination was made in the month of June, and as it was found to be satisfactory in all respects, a cheque for the amount of the appropriation was placed to the credit of the Receiver-General at Ottawa.

The new structure is located about a quarter of a mile up stream from the site of the old one where the river is divided into two channels by an island.

The sub-structure consists of first-class limestone masonry piers and abutments, and the superstructure of steel, the trusses being constructed on the single lattice principle with intermediate suspenders to sustain the steel floor beams, and the flooring is formed with 3 x 12 inch pine joists placed about 2 feet apart from centres, covered with 3 inch plank put on diagonally, with 2 inch planking on top laid at right angles to the centre line of the bridge. A substantial handrailing constructed with three rows of 1 1/2 inch pipe securely fastened to the trusses and steel channel standards, where necessary, is also provided at each side of the bridge.

The bridging on the Ontario side of the river consists of three trusses, two of them being 100 feet 6 inches in length from centre to centre, of shoe plates, and the other, (the centre one), being 226 feet 3 inches in length, the total length from centre to centre of shoe plates of the end spans, and including the distances on the piers between the centres of the shoe plates being 431 feet 9 inches.

The bridging on the Quebec side consists of two trusses 150 feet 6 inches in length each from centre to centre of shoe plates; the total length from

centre to centre of end shoe plates and including the distance on the pier being 302 feet 9 inches, making the total length of the trussing 734 feet 6 inches.

The chords of the trusses are 20 feet apart from centre to centre, the clear width of roadway between the wheel guards being about 18 feet. The embankments forming the approaches are built with rock covered with earth and sand on the roadway portion, the sides being built up so as to form dry stone retaining walls: the length built in this manner at each end of the structure on the Ontario side being about 150 feet, and the height adjoining the abutments about 20 feet. A road has also been constructed on the Ontario side connecting the approaches with the existing highway; also across the Island connecting the two bridges, a distance of about 800 feet. The approach on the Quebec side is about a quarter of a mile in length, constructed for almost the entire distance, as above described.

Maintenance Locks, Dams and Swing Bridges, Etc.

The improvements and repairs which have been attended to out of this appropriation during the present year are as follows :

Deer Lake Dam—Magnetawan River.

This dam, which is situated on Lot 2 in the XIIth concession of the Township of Burton, in the District of Parry Sound, was through the breaking of a boom up the river in 1901, seriously damaged by saw-logs, necessitating the following repairs to be attended to in the early part of the present year.

The dam is 113 feet in length, 25 feet in width, and 15 feet in height, the depth from the top of the cribwork to the slide floor being 9 feet. There are two stop-log openings in it, 29 feet in width each, and the stop-log platform is 89 feet in length, and 12 feet in width. The structure above the slide floor therefore consists of two shore piers and a centre pier upon which piers four feet in width and six feet in height are erected to support the stop-log platform, these latter piers being required instead of posts owing to the fact that the flood water frequently rises to a considerable distance above the top of the dam proper, during which periods posts would be very liable to be knocked out by floating driftwood, and the entire stop-log platform carried away.

The repairs attended to consisted of rebuilding the three main piers three feet in height at the front, and five feet at the back, and the entire reconstruction of the small piers and stop-log platform, which as above explained, rests upon them. The cribwork is constructed with 12 inch by 12 inch square white pine timber, the whole being compactly filled with stone, and the stop-log platform with 14 inch by 14 inch square stringers and 3 inch planking. Three new windlasses for handling the stop-logs have also been provided.

Works at Port Sandfield.

The repairs which have been carried out in connection with these works, which are situated at the artificial channel which connects Lakes Joseph and Rosseau in the Muskoka District, have been as follows :—

The swing bridge has been provided with new centre and rest piers, the old ones having become in such a decayed condition as to be dangerous. The new cribwork is constructed with 12 by 12 inches and 10 by 12 inches square white pine timber, the whole being securely fastened together with 3-4 inch square iron drift bolts, and the bridge has also been provided with four new needle beams.

The approach on the westerly side of the channel which is about 63 feet in length, has also been provided with new bents constructed with 12

ly 12 inch square timber placed about 20 feet apart from centres, the floor stringers being of similar sized timber, and the flooring of 3 inch planking. The approach at the easterly end of the bridge about 27 feet in length has also been reconstructed in a similar manner.

The cribwork on the westerly side of the channel having also become in a very decayed state above the water level, and in consequence of being undermined by the wash from the steamers when starting and stopping, leaning over the water to such an extent as to render it liable to fall into the channel before the elapse of any great length of time, has been entirely removed for a distance of 100 feet and replaced with close piling. The piling is constructed with 10 by 12 inch square piles driven at 10 feet centres with round anchor piles driven at a similar distance apart and 14 feet back from the face work, the piles being tied together with 1 1/4 inch round iron bolts which passes through the 8 by 12 inch square walling pieces which are provided on both sides of the outside pile.

The sheet piling is 8 inches in thickness sawn square and driven close, and upon the top of the whole there is an 8 by 14 inch square pine capping to prevent water finding its way into the end wood of the piles and causing decay. Piles were also driven to support the floor stringers of the landing platform, the platform being constructed with 10 by 12 inch pine stringers and 3 inch planking, the latter being fastened with 7 by 3/8 inch ship spikes. Oak walling pieces or fender strips have also been provided along the face of the work, the whole being securely fastened with 8 by 1/2 inch ship spikes and 3/4 inch square iron drift bolts.

On the easterly side of the channel a new course of timber has been provided on the cribwork for a length of 180 feet northerly from the centre pier, and the planking on the southerly side of the centre pier having become in a very decayed and dangerous condition, was removed and the cribbing filled with sand which was taken from the adjoining channel by the Departmental dredge.

Two new lamp posts and lamps have also been provided to facilitate navigation on dark stormy nights.

Bridges at Bala and Magnetawan.

The only work attended to at Bala during the present year was the painting of the highway bridge over the southerly outlet of Lake Muskoka, two coats of oxide mixed with oil, and the swing bridge at Magnetawan was painted three coats of white lead and oil, the ironwork being painted black.

Marys and Fairy Lakes Lock, Etc.

The sheeting on the cribwork at the head of the canal above this lock, which is situated about 1 3/4 miles southerly from the Town of Huntsville, has been renewed for a length of about 20 feet to stop leakage, and the highway bridge over the Peninsula Creek canal situated about five miles from Huntsville, has received two coats of oxide paint.

WORKS ON GULL AND BURNT RIVER WATERS.

Hall's Lake Dam.

The dam at the outlet of this lake in the Township of Stanhope, has been provided with two new courses of 10 x 12 inch Hemlock timber for the entire length, the old material having become in such a decayed condition as to be unfit for further service. The dam has also been provided with new stop-log posts and two new windlasses, and the stop-log platform has been entirely rebuilt, the flooring being of 3 inch Hemlock planking.

Workman's Dam.

The southerly end of this dam, which is situated on the Gull River a short distance up-stream from the village of Minden, has been rebuilt 5 feet in height and for a length of 43 feet with 10 x 12 inch square Hemlock timber. The timber is securely fastened together with 3-4 inch square iron drift bolts 22 inches in length, and the entire structure has been compactly filled with stone.

The cribwork on the southerly side of the slide which is 4 feet in width having become in a decayed and unsatisfactory condition for a length of 100 feet from the lower end, has been taken down and rebuilt with 10 x 12 inch Hemlock timber, a height of, about 3 feet, and the stone filling again replaced. Repairs have also been made to the flooring of the slide with 6 inch planking.

Horseshoe Lake Dam.

This dam situated in the Township of Minden, about 5 miles up-stream from the village of that name, has been provided with 2 new windlasses and 4 stop-logs, and the flooring of the slide opening repaired for 20 feet in width, and 6 feet in length with 6 inch Birch planking.

Works at Elliott's Falls—Gull River.

Owing to the formation of a jam of logs in the river in the month of May last, the long guide boom above this dam was broken and damaged to such an extent as to necessitate its reconstruction for a length of 50 feet. The boom is 3 feet in width constructed with 10 x 12 inch pine timber securely bolted together with 7-8 inch round iron bolts.

Repairs have also been made to the flooring of the slide at Norland, which is situated about 5 miles down stream from Elliott's Falls.

Hawk, Crab and Paint Lake Dams.

Hawk Lake Dam in the Township of Stanhope, has been provided with 1 new windlass and 5 stop-logs and Crab and Paint Lake Dams in the Township of Sherbourne have also been furnished with new stop logs, the former with 2 and the latter with 1.

Percy and Eagle Lake Dams.

The dam at the outlet of Percy Lake in the Township of Harburn, has been provided with 2 new windlasses and Eagle Lake Dam in the Township of Guilford has also received some necessary repairs.

Devil's Lake Dam.

The repairs to the dam at the outlet of this lake, which is located in the Township of Snowden, and is one of the feeders to the Burnt River, consisted of furnishing three new stop-logs; also ten wedge pieces on the face of the stop-log posts. Repairs have also been made to the slide flooring with six inch planking, and the entire structure has been well gravelled to make it water-tight.

Pine Lake Dam.

The dam at the outlet of this lake in the Township of Glamorgan, has been supplied with 1 new windlass, and 2 windlass frames and the stop-log platform 40 feet in length and 12 feet in width, has been provided with new 3 inch Hemlock planking.

White Lake Dam.

This dam situated in the Township of Glamorgan, has been provided with 2 new windlasses and frames, and 3 new stop-logs and the side of the waste water sluice has been repaired with 12 x 12 inch square timber, and the bottom of same, 24 feet in length and 12 feet in width, provided with new 3 inch Hemlock floor planking. The stop-lock platform has also been replanked with 2 inch Hemlock, and the slide has been furnished with 2 new floor sills and 6 posts and braces, the sides being repaired with 3 inch pine, and the flooring with 4 inch Birch planking.

Loon and Cocklong Lake Dams.

The dam at the outlet of Loon Lake in the Township of Dudley, has been provided with 1 new stop-log; also a course of 10 x 12 inch Hemlock timber for its entire length of about 70 feet, the timber being fastened with 3-4 inch square iron drift bolts 22 inches in length, and the adjoining pile dam has been well gravelled for its entire length of 86 feet. Cocklong Lake dam in the Township of Glamorgan, has been provided with 4 new stop-logs.

High Falls—Dam and Slide—Burnt River.

This dam, situated in the Township of Monmouth, has been supplied with 3 new windlasses and frames, and 3 new stop-logs for the waste sluice, and 6 for the slide opening. The waste sluice 20 feet in width and 10 feet in length, has also been replanked with 3 inch Hemlock, and the slide opening provided with 4 new stop-log posts of 12 x 12 inch Hemlock timber, and 2 pieces of half round hardwood bolted on the corners to protect the cribwork from injury, and repairs have also been made to the flooring.

Mississicua and Bottle Lake Dams and Slides.

The dam at the outlet of Mississicua Lake in the Township of Harvey has been provided with 3 new stop-logs and repairs have been made to the flooring of the slide opening. Repairs have also been made to the flooring of the slide at Scott's Mills, which is situated a few miles further down stream, and to the slide at the outlet of Bottle Lake, in the Township of Cavendish.

Lock at Young's Point.

This lock has been provided with a new set of lower gates, the old ones having become in such a decayed state as to render them unfit to longer serve the intended purpose with reasonable safety, and provision will require to be made in the estimates for the coming year to renew the upper gates also.

A quantity of gravel which had found its way into the lower recess to such an extent as to interfere with the proper working of the gates was also removed by one of the Departmental divers.

Balsam River Lock.

This lock has been supplied with a full set of gates, and the entire lock walls replanked with 3 inch Hemlock, the planking being fastened with 7 x 3-8 inch ship spikes.

Swing Bridges, etc., at Lindsay.

The easterly chord and swinging gear segment of the bridge on Lindsay street, has been repaired, and the turntable supplied with 2 new wheels.

The structure has also been provided with 3 new needle beams, and replanked its entire length with 3 inch Hemlock planking.

The storehouse at the upper end of the lock and the Lockmaster's office and storehouse at the lower end have been reshingled, and one of the Departmental scows has been provided with a new deck.

The bridge south of Lindsay has been supplied with one new wheel, the foundation of the turntable levelled up and some additional stone ballast put in at the westerly end of the structure.

The following are the Lockmaster's Returns of Lockages made during the present year :

Port Carling Lock.—4,079 steamers, 616 small boats, 856 scows and 205 rafts or cribs of timber.

Marys and Fairy Lakes Lock.—681 steamers, 101 small boats, 127 scows and 70 rafts or cribs of timber.

Magnetawan.—807 steamers, 66 small boats, 206 scows and 19 rafts or cribs of timber.

Lindsay Lock.—275 steamers, 150 small boats, 161 scows and 38 rafts or cribs of timber.

Young's Point Lock.—1,018 steamers, 104 small boats, 204 scows and 149 rafts or cribs of timber.

Balsam River Lock.—645 steamers, 64 small boats, 442 scows and 251 rafts or cribs of timber.

Smoky Falls Bridge—Sturgeon River.

In order to facilitate the driving of saw-logs and timber down this stream, and also ensure the safety of this bridge, 2 piers have been removed out of the river, and a new truss constructed which provides a clear opening of 63 feet where there was formerly three openings, two of 16 and one 15 feet in width, the piers occupying the balance of the distance. The entire structure has also been raised about 6 feet, the timber of the piers taken out being utilized to a certain extent in building the necessary additional height on the old ones.

A new pier of 21 feet in length, 8 feet in width and about 14 feet in height, has also been constructed at the easterly end of the bridge, to replace a framed bent and lessen the liability to interference with traffic, owing to the bent being knocked out by saw-logs striking it when being floated down the stream by the lumbermen.

A number of piles have been driven alongside the shore pier at the westerly end of the bridge, the piles being drift bolted to the cribbing, the object in doing this being to prevent further settlement than had already occurred owing to the cribwork having been undermined by the water.

The bridge has also been provided with approaches at each end, constructed of trestlework and earth-filling, this work being of course rendered necessary through the raising of the structure.

Indian Point Swing Bridge.

This swing bridge is situated on the Manitoulin Island about 10 miles southerly from Gore Bay, and at the outlet of what is known as Lake Wolsey.

The work attended to consisted of the construction of guide piers both above and below the centre pier of the bridge with a view to lessening the liability of injury to the structure by boats being carried against it by the strong current which frequently exists at this point.

The pier is constructed of 2 rows of close piling which extends about 40 feet above and below the centre pier with a cutwater formed at each end, the total length of the piling exclusive of cutwaters being about 100 feet.

The piling was driven so as to extend along each side of the centre pier, the distance between the rows being about 20 feet, and between these, 3 rows of piles were driven to stiffen the structure, with 5 piles in each row, the whole being fastened together with 6 x 12 inch timbers securely bolted to the piles. Some additional bracing of 10 x 12 inch timber was also put in the cutwaters and similar bracing between the centre row of piles. The pier on the northerly side of the navigable channel was also provided with wings constructed of a single row of close piling extending for a distance of 20 feet on each side of the pier.

The approach on the northerly end of the bridge has been improved by placing a round log at each side, with 3 x 12 inch plank on top for a distance of 700 feet, which it is expected will prevent the gravel from being washed off the road by heavy seas in stormy weather, and the snow from being blown off in winter. The approach has also been re-gravelled for a length of about 500 feet, and repairs have been made to the gearing of the swing bridge.

Mississagua River Bridge.

An appropriation of \$3,200.00 was granted last session for service on the construction of concrete piers to support what is known as "The Iron Bridge," over the Mississagua River in the Township of Gladstone, the cribwork piers upon which the structure rested having become in a decayed and unsafe condition.

The bridge, which has a clear span of 200 feet, was erected in 1886, the easterly pier resting upon solid rock, and the westerly one upon a pile foundation.

In order to enable the work to be carried out considerable preparation was necessary, framed bents having to be constructed at the easterly end and pile ones at the westerly to support the structure during the time the old cribwork piers were being removed, and the new concrete ones constructed, and similar provision had also to be made to support the wooden approaches at each end. When the cribwork pier at the westerly end was removed and the pile foundation exposed, it was not considered altogether satisfactory, and in order to make better provision for the reception of the concrete pier, and further ensure safety from settlement, seventeen additional piles were driven.

The pier is 24 feet 5 inches in height, 10 feet 3 inches in width at the base, and 6 feet at the top, the total length at the base from lower end of pier to point of cutwater being 35 feet 4 inches. The cutwater has a batter of about 3 inches to the foot, and the sides and back a batter of one inch in a similar vertical distance.

The easterly pier is 16 feet 3 inches in height, 24 feet 4 inches in length and 8 feet 2 inches in width at the bottom, and 22 feet in length and 6 feet in width at the top. As this pier connects with a glance pier which will be hereafter dealt with, the construction of a cutwater on it was not required.

In consequence of the timber forming the cribwork of the glance pier being in a decayed and unsatisfactory condition, it was entirely removed for a length of 28 feet and replaced with a dry stone and concrete wall, which connects with the portion of the old cribwork which was allowed to remain. The pier is 14 feet 3 inches in height and 5 feet 6 inches in width, the centre portion for a width of about 2 feet 6 inches being constructed of dry stone masonry, and the remainder of ordinary broken stone concrete, the entire top being covered to a depth of about 12 inches with the latter mentioned material. The cribwork portion of the glance pier which was allowed to remain in place, about 50 feet in length, has been provided with

a new top course of 12 x 12 inch square timber on both front and rear walls; also new cross ties placed about 10 feet apart.

The easterly approach, 44 feet in length, has with the exception of the flooring, which was in fair condition, been entirely rebuilt, two new bents with four piles in each being provided, new sway braces, caps and corbels, and new stringers and handrailing throughout.

The westerly approach, 46 feet in length, has also been reconstructed in a similar manner, and the entire ironwork of the main truss has been thoroughly scraped where rusted, and the whole painted two coats with iron oxide paint.

The work was commenced toward the latter part of August, and completed in the early part of November, the entire improvement being carried out without any interference whatever with traffic.

Bass Lake Dam.

A new dam has been constructed at the outlet of this lake on Lot No. 10 in the 2nd concession of the Township of Galway.

The dam is 94 feet in length, 12 feet in width, and will average about 8 feet in height. It is constructed with 10 x 12 inch hemlock timber, fastened together with 3/4 inch square iron drift bolts, the bottom courses being well scribed to the rock, and secured in place with 1 1/4 inch round iron rock bolts. The face of the structure is sheeted with two-inch hemlock planking with a course of one inch lumber on top, the whole being securely spiked to the timber, and the cribwork is compactly filled with stone. The slide opening is 8 feet in width and 8 feet in depth from the top of the cribbing to the floor and the slide extends a distance of 8 feet beyond the lower side of the dam. The stop-log platform, 24 feet in length and 12 feet in width, is covered with two inch hemlock planking and the necessary windlasses and chains, etc., required for handling the stop-log have been provided.

Dam on Squaw River.

The work attended to out of this appropriation has been as follows:

The front and back timbers of this structure, which is situated on Lot No. 30, on the boundary between the townships of Galway and Harvey, have been repaired in several places, and the sides of the slide opening rebuilt with 12 x 12 inch square timber to a height of seven feet, and new stop-log posts, stop-logs and platform provided.

The stop-log platform, 24 feet in length and 12 feet in width, is covered with 2 inch hemlock planking, and the necessary appliances for enabling the stop-logs to be handled have been supplied.

The face of the structure, which is 97 feet in length, has also been sheeted with two inch hemlock planking, with one inch lumber on top and the necessary gravelling has been done to make it water tight.

The work was commenced on the 19th of February, and completed on the 29th of March.

Docks on Rainy River.

The works attended to out of the appropriation of \$2,500.00 granted last Session for expenditure on docks along this stream are as follows:

At Boucherville, situated on Lot 16 in the Township of Morley, River Range, an extension has been made to the old dock, which was 20 feet in width and 60 feet in length. The extension is 40 feet in width, and a similar length to the old structure, making the total length now 120 feet. The structure is constructed with Norway pine piling with white pine caps and stringers, and the flooring is of two and a half inch pine planking. The dock is a good substantial structure with favorable approaches in rear and is well protected against damage during high water.

At Rapid River, on Lot 16 in the Township of Worthington, a dock 60 feet in width and 84 feet in length has been constructed with tamarac piling, red pine caps and white pine stringers and planking. This dock is situated in a very desirable location, and is likely to be extensively used by the settlers.

A dock has been constructed on Lot 48, River Range, in the Township of Barwick. It is 60 feet in width and 75 feet in length, and is constructed with tamarac piling and pine caps, stringers and planking in a similar manner to the one at Rapid River, and a similar structure in all respects to the above has been constructed at the foot of 3rd street in the Town of Rainy River. This dock is located immediately opposite the Canadian Northern Railway station.

An extension has been made to what is known in the locality as the "Big Forks Dock," situated on Lot 32, River Range in the Township of Woodyatt. The extension is 40 feet in width and 60 feet in length, making the total length of the structure now 120 feet. It is constructed in a similar manner to the others already described.

McKenzie Creek and Snake River Improvements.

The improvements attended to on McKenzie creek consisted of the cutting away of overhanging branches, and the removal of snags and sunken logs from the channel so as to enable the Wabigoon lake steamers to navigate the stream as far up as Dinorwic station on the Canadian Pacific Railway. The turning basin at Dinorwic has also been enlarged to 50 x 35 feet, a depth of three and one-half feet of water being provided, and the old dock, which was built by residents, has been lengthened 30 feet. Buoys have also been placed at the mouth of the creek indicating where the navigable channel is situated. The Snake River improvements also consisted of the removal of boulders, sunken logs and other obstructions which interfered with navigation between Lake Wabigoon and Beaudreault's Landing, the work being completed in the early part of August.

Landing Dock at Beaudreaults.

An appropriation of \$600.00 was granted last Session for service on the construction of a public landing dock at this point, which is situated on Minnehaha Lake, and at the head of navigation from Lake Wabigoon. The dock is 30 feet in width and 80 feet in length, the substructure consisting of cribwork piers filled with stone and faced with 3 inch planking, the flooring being of similar material. The work was completed on the 5th of July.

Bridge at Port Sydney.

An appropriation of \$1,000.00 was granted last Session to assist in the construction of this bridge over the Muskoka River in the Township of Stephenson, and the work has been completed during the present year.

The bridge is of steel, constructed on what is known as the "Pony Lattice" or Warren principle, and is 74 feet in length, the joist and flooring being of wood and the roadway 14 feet in width in the clear. The sub-structure consists of two first-class masonry abutments, the westerly one, which rests upon bed rock, being 19 feet in length and 17 feet in height, 6 feet in width at the bottom and 4 feet at the top. The easterly one is built upon a concrete foundation resting upon gravel, the concrete being 11 feet in width and 6 feet in depth, 22 feet in length on the face and 31 feet at the back. The masonry is 8 feet in width at the bottom and 4 feet at the top, the height being 14 feet. Substantial wing walls have been built to each

abutment, the one on the north side of the westerly one being 38 feet in length at the bottom, and 13 feet at the top, the height being 16 feet, and the one on the south side is similar, but only 33 feet in length at the bottom. The wing walls at the easterly abutment are 14 feet in length and 16 feet in height, and the approaches to both are formed of stone and gravel.

The work was carried out by the municipal authorities, and upon examination being made, was found to have been satisfactorily performed, consequently the amount of the appropriation was paid.

Stoney Creek Bridge, Township of Ryerson.

The bridge over this creek on the road between the VIIIth and IXth concessions of the Township, which was built about twelve years ago, consisted of a Queen truss span of 40 feet over the main stream, the easterly approach consisting of one span of 14 feet, and the westerly one of 18 spans 14 feet 9 inches in width each, of pile trestlework. Owing to the action of the frost, these trestles heaved up in a very irregular manner, making the bridge floor uneven, and presenting a very dilapidated appearance, the timbers being also badly decayed in places.

The 40 foot span has been entirely rebuilt, new cribwork abutments, compactly filled with stone, being provided for same, and two of the trestle spans over a small branch of the creek have also been renewed. The balance of the trestlework on the westerly side has been removed, and a permanent approach formed with earth filling, the embankment being about 236 feet in length and 18 feet in width on the top, with sides sloping one and a half feet horizontal to one foot vertical, the average depth being about 5 feet. The earth approach on the easterly side has also been increased in width.

Extension of Railways.

The following are as far as could be ascertained the details of work done during the present year on the different lines of railway under construction, with the exception of the Temiskaming and Northern Ontario Railway, which will be specially reported upon.

Ontario and Rainy River Railway.

The construction of this railway which, as previously reported, now forms a portion of the line known as the Canadian Northern, and which commences at Stanley on the Port Arthur, Duluth and Western Railway, and extends to the International Boundary on Rainy River, at what was formerly known as Beaver Mills, was commenced during the month of August, 1898, the work being continued until the latter part of June of the present year, when it was practically completed, and opened for traffic through to Winnipeg.

The length of the line in Ontario is 268 20-100 miles, the distance to Winnipeg being 419 miles and from the present easterly terminus at Port Arthur to that point 439 miles, the Port Arthur, Duluth and Western Railway track being utilized for 20 miles of that distance.

The line is a very important one inasmuch as it will without doubt materially hasten the opening up and development of a very large section of country rich in both lands and minerals, the greater portion of which it was formerly very difficult to reach.

James Bay Railway.

As previously reported, the construction of this railway, which commences at what is known as "Quebec siding," on the Canada Atlantic Railway, situated about four miles eastward from the water of the Georgian

Bay, was commenced during the month of July, 1901, and at the close of that year the work was well advanced.

Operations were continued during the present year until the month of October, when the line was completed and opened for traffic to Parry Harbor, a distance of 3 70-100 miles.

The extension of the line northward is contemplated, and I understand several parties have been out during the past summer surveying with a view to finding a favorable location, but so far nothing in the way of construction work has been done beyond the Seguin River.

Bruce Mines and Algoma Railway.

The construction of this line was commenced at a point a few hundred feet westerly of the Bruce Mines station building on the C.P.R. on 10th of August, 1901, and at the close of that year the grading had been completed for a distance of 14 1-2 miles, 10 miles of track laid and about one mile ballasted. Operations have been continued during the present year, the line being completed and opened for traffic in the early part of December from the C.P.R. to Rock Lake, in the Township of Aberdeen, a distance of about 14 30-100 miles.

The construction of the portion extending southward from the C.P.R. to the village of Bruce Mines and the water of Lake Huron, has also been proceeded with, and I understand both the grading and tracklaying are completed, and that the ballasting will be attended to in the coming year as soon as the season will permit of such work being properly carried out.

Magnetawan River Railway.

The construction of this railway, which extends from a point on the Northern Division of the Grand Trunk near Burk's Falls station to the end of the public landing dock on the northerly side of the Magnetawan River, in that village, a distance of a little over a mile, was commenced during the present year, and the line was completed and opened for traffic as a portion of the Grand Trunk System in the early part of November.

In addition to the main line proper, what is known as Main Line No. 2 has been constructed along the southerly side of the river for a length of 1,627 feet, and adjoining this two sidings have been provided, 775 and 503 feet in length each, respectively, and near the Grand Trunk junction there are also two sidings 320 and 1,269 feet in length each.

The construction of the line is an improvement which will be fully appreciated by residents of the country along the Magnetawan River, and around the shores of Se-se-be and Ah-mic lakes, as owing to the long haul from the head of navigation at Burk's Falls to the railway, being now rendered unnecessary, parties shipping out products of the country of any description will be able to realize more for them than was formerly possible and the cost of goods going in will also, it is expected, be proportionately reduced.

Algoma Central Railway.

Construction work has been steadily continued on this railway during the present year, and I understand that the grading is now completed on the main line from Sault Ste. Marie to the junction with the Michipicoten branch, a distance of 170 1-2 miles and that the line is completed and open for traffic for 64 1-2 miles of this distance.

The Michipicoten branch is, I understand, fully completed from Lake Superior to the junction with the main line, a distance of 22.10 miles.

The following revised statement to the close of 1902 gives in detail the mileage of each railway in Ontario, distinguishing between those constructed prior to and since Confederation :

REVISED STATEMENT.

No.	Name of Railway.	Terminal points.		Completed prior to Confederation.	Completed since Confederation.	At present under construction.	Total length in operation of each railway or system of railways in miles.
		From.	To.				
1	Grand Trunk Railway, Main Line.....	Eastern Province Boundary	Point Edward	457			
2	do Buffalo & Lake Huron Branch.....	Fort Erie	Goderich	158			
3	do London Branch.....	St. Mary's	London	23			
4	do Galt and Doon Branch.....	Galt	Berlin	7	4.5		
5	do Waterloo Junction Railway.....	Waterloo	Elmira		10.25		
6	do Toronto & Nipissing Branch.....	Toronto	Cobocook		88		
7	do Midland Ry., Main Line.....	Port Hope	Midland City	65	54.53		
8	do do Peterboro' Branch.....	Millbrook	Lakefield	13	9		
9	do do Lake Simcoe Junction.....	Stouffville	Jackson's Point		26.5		
10	do do Whitby, Port Perry & Lindsay.....	Whitby	Lindsay		46		
11	do do Victoria Railway.....	Lindsay	Haliburton		55.81		
12	do do Grand Junction Railway.....	Belleville	Peterborough		64.65		
13	do do Belleville & North Hastings.....	Grand Junction Ry.	Madoc		22		
14	do do Toronto & Ottawa.....	Wick	Briggewater		9		
15	do do do Manilla Link.....	Wick	Manilla		6.5		
16	do do do Onemece Link.....	Onemece	Peterborough		11		
17	do do do Port Dover & Lake Huron.....	Port Dover	Stratford		63		
18	do do do South Norfolk Railway.....	Simcoe	Port Rowan		17		
19	do do do Chemong Branch.....	Peterborough	Chemong Lake		9		
20	do do do Stratford & Huron.....	Stratford	Wiarton		106.27		
21	do do do Owen Sound Extension.....	Parkhead	Owen Sound		12.40		
22	do do do Georgian Bay & Wallington.....	Falmerston	Durham		26		
23	do do do Great Trunk Railway } Main Line.....	Suspension Bridge.	Windsor	229			
24	do do do do } Great Western Div. }	Toronto	Hamilton	39.5			
25	do do do do do } Toronto & Hamilton Branch.....	Glencoe	Fort Erie		145		
26	do do do do do } Loop Line Division.....	Kingscourt	Glencoe		20.60		
27	do do do do do } Kingscourt & Glencoe Link.....	Sarnia	Komoka	51			
28	do do do do do } Sarnia Branch.....	Wyonning	Petrolia	7			
29	do do do do do } Petrolia Branch.....	Harrisburg	Brantford	8			
30	do do do do do } Brantford Branch.....	Brantford	Tilsenburg		35.88		

REVISED STATEMENT. —Continued.

No.	Name of Railway.	Terminal points.		Completed prior to Confederation.	Completed since Confederation.	At present under construction.		Total length in operation of each way or system of railways in miles.
		From.	To.			Length in miles.	Length in miles.	
31	G. T. R. Western Div. — Wellington, Grey & Bruce	Harrishburgh	Southampton	27	102			
32	do do S. Extension	Palmerston	Kincardine		66			
33	do do London, Huron & Bruce	Hyde Park Junction	Wingham		69.75			
34	do do London & Port Stanley	London	Port Stanley	25				
35	do do Welland Railway	Port Colborne	Port Dalhousie	25				
36	Northern Railway, Collingwood Line	Toronto	Meaford	94	21			
37	do do Muskoka Branch	Barrie	Gravenhurst		53			
38	do do Hamilton & Northwestern, Main Line	Port Dover	Allandale		135.3			
39	do do do Collingwood Br.	Clarksville	Collingwood		40			
40	do do North Simcoe Junction	Colwell	Penetanguishene		33.34			
41	Northern & Pacific Junction Railway	Gravenhurst	La Vause		111.5			
42	Magnetawan River Railway	Burks' Falls Station	Burks' Falls Vill.		1.01			
43	Toronto Belt Line Railway, Eastern Section	G. T. R.	Junc. Northern Ry.		8.50			
44	do do Western Section	Don Stn., G. T. R.	Swansea		4.33		2720.12	
45	Canadian Pacific Railway, Main Line	Carleton, on G. T. R.	West. Prov. Bound.	57	1144			
46	do do do	Ottawa	East. Prov. Bound.		66.40			
47	do do Algoma Branch	Ottawa	Sault Ste. Marie		180.25			
48	do do Brockville & Ottawa Railway	Sudbury Junction.	Carleton Place	46				
49	do do St. Lawrence & Ottawa Railway and Chaudiere Branch	Brockville						
50	do do Ontario & Quebec Railway	Prescott	Ottawa	59.5	281.25			
51	do do do Don Branch	Toronto Junction.	East. Prov. Bound.	12				
52	do do do Detroit Extension	Main Line	Toronto		5			
53	do do Credit Valley Ry., Main Line	London	Windsor		112.50			
54	do do Orangeville Branch	Toronto	St. Thomas		119.13			
55	do do Guelph Branch	Streetsville	Elora & Orangeville		62.83			
56	do do Toronto, Grey & Bruce, Main Line	Campbellville	Guelph		15			
57	do do do Teeswater Branch	Toronto	Owen Sound		122			
58	do do do Wingham Branch	Orangeville	Teeswater		73			
59	do do West Ontario Pacific Railway	Glenaman	Wingham		4.75			
60	do do Atlantic & North-West Railway	Woodstock	London		27			
		Renfrew	Eganville.		19.25		2406.86	

61	Michigan Central Ry., formerly Canada Southern, Main Line	Windsor	Suspension Bridge, Courtright	226.80	.....	.....
62	do St. Clair Branch	St. Clair Junction	Esses Centre	62.2	.....	.....
63	do Amherstburg Branch	Amherstburg	Eddy's	15.7	.....	.....
64	do Oil Springs do	Oil City Junction	Petrofen	5.2	.....	.....
65	do do do	Petrofen Junction	Leamington	4.9	.....	.....
66	do do do	Leamington & St. Clair Branch	Fort Erie	15.9	.....	.....
67	do do do	Port Erie Branch	Niagara	17.4	.....	.....
68	do do do	Niagara do	Depot Harbour	30	.....	378.10
69	Parry Sound Colonization Railway	Port Erie	Scotia	51.20	.....	263.80
70	Ottawa, Arnprior & Parry Sound Railway	Ottawa	East. Prov. Bound	212.60	.....	.....
71	Canada Atlantic Railway	Ottawa	Hawkesbury	68.08	.....	.....
72	Central Counties Railway	Glen Robertson	Rockland	21	.....	.....
73	do do do	South Indian	Harwood	17	.....	106.08
74	Cobourg, Peterboro & Marmora Ry., Marmora Line	Cobourg	Renfrew	11.5	.....	14.50
75	Kingston & Pembroke Railway	Kingston	Trenton & G. T. R.	103	.....	103
76	Prince Edward County Railway	Pictou	Belmont Mine	32.44	.....	32.44
77	Central Ontario Railway	Trenton at G. T. R.	Sarnia	95	.....	95
78	Ontario, Belmont & Northern Railway	Central Ont. Ry.	Tweed	9.57	.....	9.57
79	Erie & Huron Railway	Rondeau	Harrowsmith	70.47	.....	70.47
80	Napanee, Tanworth & Quebec Railway	Napanee	Grand Trunk Ry	50	.....	57
81	do do Harrowsmith Br.	Yarker	Lake Noshousing	7	.....	3.50
82	Bay of Quinte Railway	Deseronto	Bancroft	3.5	.....	5.00
83	Noshousing & Nipissing Railway	Lake Nipissing (S. E. Bay	Westport	45	.....	15.00
84	Frontville, Bancroft & Ottawa Railway	Frontville	St. Catharines	12.50	.....	81.00
85	Brookville, Westport & Swift Ste. Marie	Brookville	Wentworth	18	.....	85.51
86	St. Catharines & Niagara Central Railway	Niagara Falls	Welland	62.5	.....	80.50
87	Lake Erie & Detroit River Railway	Walkerville	Port Burwell	18.58	.....	18.58
88	Port Arthur, Duluth & Western Railway	Port Arthur	Cornwall	55.00	.....	55.00
89	Toronto, Hamilton & Buffalo Railway	Wentworth	Golden Lake	21.50	.....	21.50
90	do do do	Brantford	West. Prov. Bound. & W. Ry.	208.00	.....	208.00
91	Tilsonburg, Lake Erie & Pacific Railway	Tilsonburg	Michigan Point	64.50	.....	64.50
92	Ottawa & New York Railway	Ottawa	Main line	22.10	.....	86.60
93	Pembroke Southern Railway	Pembroke	Gertrude Mine	13.50	.....	13.50
94	Ontario & Rainy River Railway	Stanley on P. A. D.	Rock Lake	16.50	.....	16.50
95	Algoma Central Railway	Sault Ste. Marie	Parry Harbour	3.70	.....	3.70
96	do do Michigan Point Branch	Michigan Point .....	.....	.....	.....	.....
97	Manitoulin & North Shore Railway	Manitoulin .....	.....	.....	.....	.....
98	Bruce Mines & Algoma Railway	Bruce Mines .....	.....	.....	.....	.....
99	James Bay Railway	James Bay .....	.....	.....	.....	.....
				1,447.50	119.0	7,101.36
				5,633.86		

From the foregoing it will be seen that besides the Temiskaming and Northern Ontario Railway, which, as already stated, will be dealt with in a special report, construction work has been in progress on five lines of railway during the present year, all of which with the exception of the short spur line to the Magnetawan River, have been previously reported upon, and that 82 21-100 miles have been completed and opened for traffic.

I have the honor to remain, sir,

Your obedient servant,

ROBERT McCALLUM,

Engineer Public Works.

REPORT OF THE SUPERINTENDENT OF COLONIZATION ROADS.

To the Honorable F. R. Latchford, Commissioner of Public Works, Ontario:

Sir.—I have the honor to submit my report upon the work accomplished under the management of the Colonization Roads branch of your department during the year 1902.

The year was not favorable for road making, being generally wet, and wages and general expenditures being also considerably higher owing to the unusual demand for labor throughout the whole of the Province, there has been in some instances less work done than in most former years, but altogether the reports of the various inspectors show a very fair quantity of roads opened and improvements made for the small sums of money at the disposal of the Department.

The aggregate for the expenditure of \$196,246.07 represents about two hundred miles of new roads opened and seven hundred and forty-eight miles of repairs, sixty-six hundred and sixty feet of bridging and improvements, including mining roads and a large amount of ditching and draining in Thunder Bay, Rainy River and Temiskaming districts, which latter are among the chief considerations in road making.

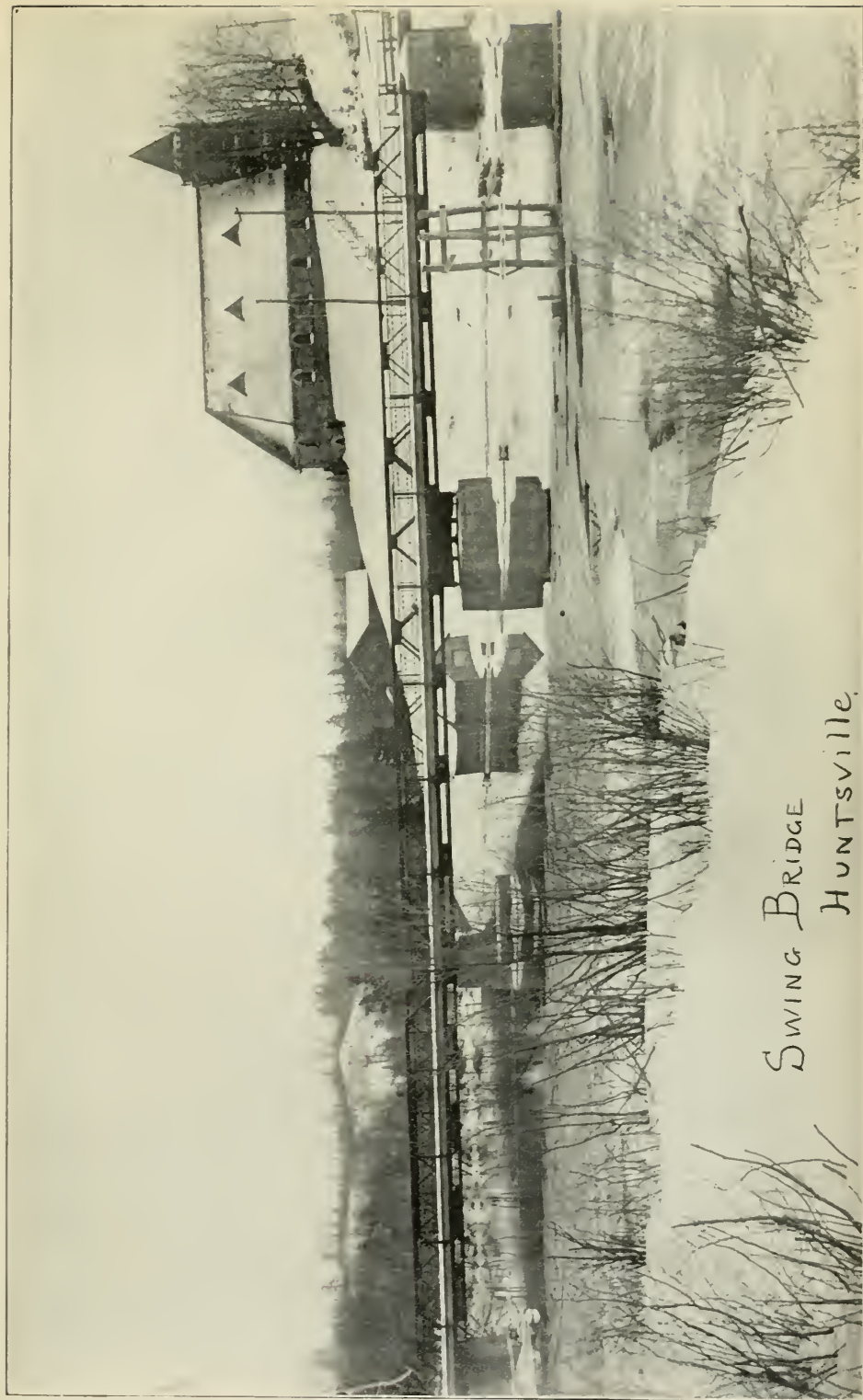
In sections where colonization is being encouraged, expenditure along certain leading lines has been concentrated in order to provide access to distant portions, and I would recommend in future that the expenditure be concentrated to a greater extent than heretofore upon main thoroughfares in order that settlers may be in a position to reach, with their supplies and effects, the more outlying locations, and thus provide for a more expansive development of New Ontario lands.

I would also suggest that settlers be encouraged to organize into municipalities that they may better manage the opening of local roads leading into any which have been or may be opened by the Government or through its assistance, and I believe many advantages in the matter of schools and other matters would be secured in this way.

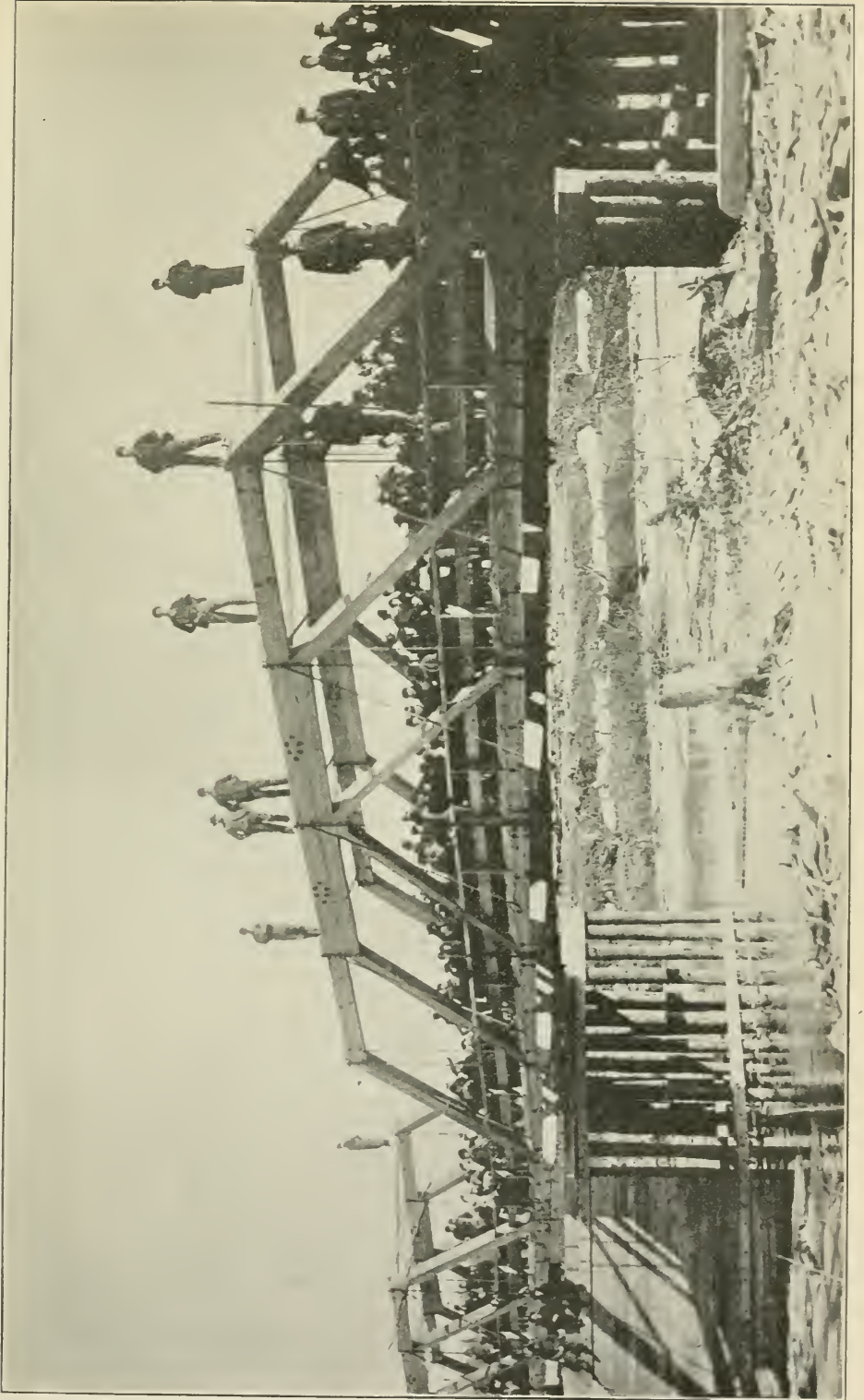
The following are the operations of the season :

Algoma Mills and Blind River Road. The construction of this road was commenced at the town line of Cobden and Striker, at centre of con. 1, opening half a mile to con. 2, and thence east. Also, between lots 11 and 12 of con. 2, the road was opened 30 feet wide for immediate use for settlers, and on the town line between Striker and Long a bridge was replanked and the approaches filled in.

Atwood and Curran Road. From lots 16 and 17, Atwood, into Curran, between sections 2 and 3, a mile and five-eighths of a mile was chopped out 40 feet wide and grubbed 25 feet wide. This is in Rainy River District.



SWING BRIDGE
HUNTSVILLE



A TYPICAL BRIDGE OPENING IN NEW ONTARIO.

Balfour Township Roads. Repairs over roads previously opened and done largely with a grading machine, making excellent portions. In addition half a mile was opened from con. 4, between lots 4 and 5 northward.

Blind River and Iron Bridge Road. From the mouth of Mississauga River on east side two and a half miles were opened northeasterly.

Birch Lake and Webbwood Road. A mile and three-quarters opened, graded and ditched from centre of lot 3, con. 6, May, across half of lot 3 to west side of lot 4 and over lots 5 and 6, which had previously been chopped out.

Bruce Mines and Desert Lake Road. From the C. P. Railway track at the line between concessions 4 and 5, Plummer Additional, "Copper Bay location," a mile and a half was graded to concession 7.

Bruce Mines and Rydal Bank Road. Four miles graded between lots 4 and 5 to con. 8, from the C. P. Railway north.

Bridge Repairs. In Thunder Bay District the chief work was upon Stanley bridge, formerly known as Kaministiquia bridge, while a considerable sum was spent upon Paipoonge bridge over the same river.

Burris Road. Two miles in the Township of Burris, between lots 8 and 9, and half a mile in Devlin, between sections 32 and 33, were opened as a good winter road to the railway.

Carpenter and Lash Road. The chopping, grubbing and crosswaying of two miles and a half from opposite section 36 Lash east to section 32, Devlin.

Carpenter and Dobie Town Line Road. This work was from concessions 3 and 4 north to con. 5, opening about two miles through bush and muskeg, the latter being a mile and a half long and which was crosswaved.

Carpenter and Emo Road. Chiefly the crosswaying and ditching of more than a mile with tap drains of almost an equal length. The work is between lots 10 and 11, Carpenter.

Carnarvon, 12 Con. Road. Two miles of grading and ditching from centre of lot 2 to east side of lot 8.

Cockburn Island Roads. About a mile and a half of work in turnpiking and general improvements.

Conmee Township Road. Three miles opened north between lots 6 and 7 northward as far as settlement at the time had extended. The timber passed through is heavy birch and tamarac upon the high lands with heavy cedar in the valleys. Roads in this township, the inspector says, should be extended.

Coffin 4 and 5 Con. Road. Commencing between lots 10 and 11, con. 4, a road was chopped, cleared and graded across lots 10 and 9 almost a mile into a settlement of considerable importance.

Crozier and Fort Frances Road. From lot 47, Township of McIrvine, thence west 20 chains, thence north 5 chains and thence 3 miles to the N.W. corner of section 15, Crozier, a most important work.

Crozier and Lash Road. This work was chiefly obtaining timber to crossway a three mile swamp or muskeg from centres of sections 8 and 5 Crozier to centres of section 12 and 11.

Crozier, Devlin and Lash Road. The chopping and crosswaying between sections 32 and 27 and building a bridge over Lavalle river 66 feet long at section 32, a mile of work.

Dawson Road. Some even miles of improvements were made in the Townships of McIntyre and Oliver, the municipality of Sheeniah giving \$250 on account of the work to supplement the Government grant of \$5' 0

Day Mills and Dayton Road. On this road work was begun at middle of lot 3, con. 5, Bright Additional, thence west to lots 3 and 4, thence north one mile to town line of Day and Bright, thence west on town line sixty rods to lots 2 and 3, con. 1, Day, and thence north through con. 1 Day, about two miles altogether, and over one-half of which a grading machine was used with advantage.

Devlin Road. From lots 32 and 33, Woodyatt, north to centre of sec. 28, Devlin, some three miles of double ditching and draining was done for the general advantage of the district.

Devlin and Woodyatt Road. A mile of new road opened from the town line between Devlin and Woodyatt, at S.W. corner of section 4, Devlin, east into a settlement hitherto without a general highway.

Dobie Road. About a mile opened and double ditched between concessions 2 and 3 from the town line of Carpenter and Dobie west.

Dorion Road. Through concessions 3, 4 and 5 a good road has been opened, serving two settlements, who, the inspector says, are good and thrifty, and he requests a substantial grant next season for further assistance and development.

Eton Township Roads. On concession 2 across lots 3, 4 and 5; between lots 4 and 5, through concessions 1 to 4; between lots 6 and 7, through concessions 2 to 5; on concession 3, through lots 3, 4, 9, 10, 11; and on concession 4, across lots 7, 8 and 9, some eight miles were opened or substantially improved. A further expenditure should be made next year for the opening of leading roads.

Emo and Lash Road. Repairs from Emo north with ditching, some two miles.

Great Northern Road. Two miles of repairs from the western boundary of Raukin location across said location, with an equal length from the C. P. Ry crossing at Garden River east to Echo River.

Grand Portage Road. This work was from the S.W. corner of lot 2, con. 6, Wells, extending to the N.E. corner of lot 1 at boundary between Wells and Parkinson and at the corner of four townships, a mile and a quarter of new work, well ditched and graded.

Gordon Lake and Port Lock Road. From the south end of lot 3, concession 2, Johnson, north through the centre of lot 3, concession 3, and north between lots 3 and 4, to concession 6, three and a half miles were well graded with a machine.

Goulais Bay Road. Some small but necessary repairs over some five or six miles in Pennefather and Fenwick.

Harrow Township Roads. From lots 10 and 11, con. 5, east to lots 6 and 7, about two miles of grading was done.

Hymer Roads. In the Township of O'Connor, from the second concession line west half a mile was cut out and on the fourth line one mile was opened with some repairs on main roads. In Gillies Township the main road was extended to the second concession with some work along the fifth concession to lot number three to afford access by settlers to their farms.

Isbister and Port Finlay Road. Three miles improved over a section opened roughly in 1900 from S.E. corner section 22, Laird, north to Isbister station.

Johnson Bridge. A bridge in the township of Shedden on section 8 with a length of one hundred and twenty feet and reported by the inspector as an excellent structure.

Jaffray Township Road. From last year's work this road has been cut northeasterly towards Sturgeon Lake about three miles.

Korah Township Road. A mile of road opened from the southwest corner of section 11, north, between sections 10 and 11.

Lash and Aylesworth Road. A high crossway was built between sections 2 and 3 south, also between sections 10 and 11 south, with the necessary grubbing, ditching and drainage, representing about half a mile of work.

Little Current and Providence Bay Road. This was work from the Government road between lots 13 and 14, con. 12, Bidwell, north, half a mile to town line, between Howland and Bidwell and continuing north on 20 side line of Howland to con. 4, two and a half miles, the latter being general grading and the first half mile new work. On the 15th side line in con. 2 some eighty dollars were spent in cutting down a heavy clay hill.

Lybster Road. From mile-post 34 on Port Arthur & Duluth Railway, a road has been cut out, grubbed and partly ditched to Silver Mountain road into a Finlander settlement. These people are reported as good workers and making steady progress in their operations.

Marks Township Road. This work was chiefly on the town line west from the main road in O'Connor to give access to settlers of the south end of the township and of North Lybster.

McGregor Township Road. A road cut out from 27 concession D north-easterly, crossing the north branch of Current River, on lot R, con. A; and again lot 16, con. 14, to boundary of township, from which latter point a trail was cut out northeasterly a length of about eight miles.

McIntyre-Gorham Road. The work of last year was improved through the township of Gorham and extended towards the dam on Currant River. Some work was also done between municipality and the town line.

Mather and Dobie Town Line Road. A new road opened east from the town line of Shenstone and Dobie through a new settlement one mile in length, ditched through the entire distance.

May Concession 1 Road. About a mile of work on this road from lot 3 west, well and properly graded.

Manitowaning and Sheguiandah Road. From the old Government road between lots 48 and 49, con. 1, Assignac, north to town line, three-quarters of a mile was opened to town line between Assignac and Sheguiandah and again continuing north between lots 20 and 21 through concessions 1 and 2, making two miles altogether of general grading and ditching.

Meldrum Bay and Silverwater Road. A mile and a quarter of tap drains were opened on the 20th side road and on concessions 10 and 11 repairs were made.

Mine Centre Road. Some three miles of chopping, grubbing and ditching was done on this road, which leads to Turtle Lake and to mining lands.

Morley and Shenstone Road. About a mile and a half of crosswaying was done and nearly half a mile of double ditching.

Morley Township Roads. From Rainy River road between lots 15 and 16, Morley, work was extended north about five and a half miles; tap drains were opened through several sections for more than a mile and a half to secure drainage.

Nairn and Webbwood Road. A mile and a quarter of grading from centre of lot 2, con. 6, Hallam township, to the east side of lot 12, Merritt; some other work was done in opening other portions roughly.

Needing 15 and 16 side line Road. This road is a connecting line between the Oliver road and Stanley, and Fort William road, and being through a low wet swamp was deeply ditched on each side.

Nelles and Pattulo Road. Sixty chains of crosswaying on a bad muskeg.

Oliver Township Roads. An extension of the 7th concession line was made and the 2nd concession opened to the Murillo road.

Paipoonge-Blake Road. On the town line at lot 14 a bridge was built over Slate River, and in consequence of a deep gully required a structure one hundred and thirty-five feet long and the road extended to lot 6; work was also done on the 2nd concession, and other work upon bad portions of the 4th concession to give an outlet for the "Illinois" settlement.

Paipoonge-O'Connor Road. This highway is about six and a half miles from the main road in O'Connor along the 5th concession to 22nd mile bridge at McEwans, and thence to Silver Mountain road. Only grubbing and fixing of soft portions could be done for the appropriation, and the whole road ought to be graded next year or later.

Paipoonge and Neebing Roads. Half a mile of work from lot 10 to lot 8 of concession 4, Paipoonge.

Pattulo Road to Pine River. Fifteen chains of crosswaying between sections 34 and 35, Dilke, and thirty chains between sections 5 and 6, Pattulo, with ten chains of tap drains.

Patton Road. Between lots 10 and 11 from concession 3 north to concession 4, a mile was opened through a difficult section.

Prince Township Roads. From the centre line of sections 14 and 23, Prince, and thence west one mile to centre of sections 15 and 22, a very good road has been opened.

Rainy River Road. Several bridges were built upon this main road from Fort Frances to the mouth of the river and to Lake of the Woods. Three miles of excellent work was done in crosswaying and ditching, making material improvements over a considerable section of the road. The bridges aggregate a length of nearly five hundred feet.

Kat Portage and Keewatin Road. The filling in at foot of bay between the C. P. Railway track and bay for four hundred feet, a 16 feet wide embankment with an average depth of five and a half feet, representing about 1,400 cubic yards of stone filling.

Rayside Road. On the 4th concession of Rayside from lot 6 to lot 7 half a mile was improved at a cost of about \$50. Between lots 6 and 7 from con. 3 to con. 5 a mile was well graded with a grading machine at a cost of about \$100, and between lots 2 and 3, through concessions 4 and 5, a mile was also graded.

Roddick, Crozier and Miscampbell Road. A road opened from s. cor. sec. 22, Crozier, to the township of Miscampbell, then again south from said corner of sec. 22 to the Rainy River road, in the township of Roddick, a length altogether of seven miles opened, grubbed, graded and generally ditched.

Salter Township Roads. From the main or Government road at the north side of section 32 and 33 Salter township, thence south between said sections half a mile was opened involving heavy ditching for drainage and reclamation of several sections.

The townships assisted the work to the extent of over \$100, supplying a grading machine without cost to the Government.

Sandford Township Road. The grading and repairing of main road Eton to Eagle River station.

Scoble Township Road. Between the Townships of Blake and Scoble half a mile was opened west and half a mile south.

St. Joseph Island Roads. From S and T concessions between lots 50 and 51 south to concession U, a mile and a quarter was ditched upon each side and one hundred and twenty-five rods of off-take drains opened, making a considerable quantity of land available for agricultural purposes. Also on the 10th side line a swamp was opened through concessions 1 and K, making altogether two miles and a half of improvements.

Scramble Mine Road. About a mile of corduroy from Champion Mine to Margach station was covered with other work of a general character and required to make the road useful.

Shenstone and Dobie Town Line Road. Five and a half miles of work, chiefly ditching and crosswaying. The road is from con. 1 Dobie extending north into Mather township.

Silver Mountain Road. A road from Stanley Station into mines, and repaired over ten miles of its length. It is for the benefit of settlers of O'Connor, Marks, Gillies, Lybster and Strange.

Strange Township Road. A road was opened from Whitefish Station to Silver Mountain Station for the benefit of settlers and lumbermen in the township of Strange and other townships.

Stanley, Corbet's Creek Bridge and Fort William Road. This road was cut out last year was fully reported. This season the expenditure was for the purpose of opening deep ditches, mostly in the Township of Paipooenge, with a good deal of grading and ditching.

Sylvan Valley and Port Finlay Road. From boundary of Laird and McDonald southward between sections 1 and 2 Laird, one mile, and from S.E. corner section 2 west three-quarters of a mile of general grading and ditching was done.

Tait and Shenstone Road. Nearly six miles of ditching, draining and general work in Tait and Shenstone, three miles in each township, north and south from the town line between each and between sections 4 and 5 Tait, 32 and 33 Shenstone and the other sections.

Thessalon Bridge. A bridge constructed on lot 7, concession 5, Wells, 104 feet long, comprised of four 20 feet spans resting upon cedar bents about fourteen feet high.

Tehkummah Con. 6 Road. From the west side of lot 3, eastward to the town line of Tehkummah and Assignae and thence north to con. 5, general repairs were effected.

Vankoughnet Road. Work was commenced at the northeast corner of section 1 Pennefather, thence southeast, grading about a mile.

Wabigon-Elm Road. The grading and repairing from Elm Bay to Wabigon. A hill at Thunder Creek was cut down.

Wabigon and Dinorwic Road. A new road being cut out along the C. P. Railway between these two stations about 5 miles in length, and which can now be used as a winter road, but requiring more money to grade and build two bridges another year.

Wainwright Road. Between concessions 3 and 4, on lot 3: between concessions 2 and 3, lot 4 and between concessions 1 and 2, lots 4 and 5, and across lots 9, 10, 11 and 12, grading and general repairs were made.

Wells Road. A mile and a half of excellent grading and ditching from between lots 3 and 4, con. 3, Wells, west over lots 4, 5 and 6.

Whitefish and Sudbury Road. From the west side of lot 11, con. 2 Graham (north side of C. P. Railway track), one mile was graded to Ver million River and general repairs were also made over another mile and a half. The section is rough, but excellent work is reported.

Whitefish Bridge. A bridge one hundred feet long with two 30 feet spans and centre crib 6 by 18 feet, built over Whitefish River near the 25 mile post of the P. A. and D. Railway, to accommodate settlers in the township of O'Connor: several days of voluntary work were given.

Winnipeg River Road. A new road made between 77 P and lot 3, con. 6, with grading between concessions 6 and 7.

Worthington and Blue Road. A new road north from the railway in Worthington into the township of Blue, dating from the S. E. corner of

section 34 of the former township northward and representing about a mile and a half of work.

Worthington and Victoria Road. A mile of ditching from lots 10 and 11, con. 2, Denison, eastward.

Zealand Township Road. More than two miles of gravelling was done upon this main road and repairs were made where most required over about five and a half miles.

WEST DIVISION.

Armour and Strong Road. A bridge with a 40 feet clear span and another of 16 feet well covered with 3 inch planking and approaches at each end. It is on lot 4, con. 4, Joly.

Armour, 10 Side Line Road. From concession 10 south to concession 9 a mile and a quarter was opened and the inspector says is of great benefit to the district.

Aspdin and Muskoka Road. This work was done in sections extending over four miles and a half between Aspdin in Stisted and the Muskoka road in Stephenson.

Baysville and Huntsville Road. From the ninth concession of McLean to the first of Brunel two miles were well repaired.

Baxter Township Road. Three miles of repairs were made in the above township from lot 24, con. 5, to lot 32, con. 2.

Bethune Roads. From concession 8, Bethune, work was continued south on the 10th side line for half a mile, thence south 10 chains, and thence southwesterly to concession 6, making a mile and three-quarters of new road. Again from the east side of lot 15 west to lot 12, con. 12 of the same township one mile was successfully repaired.

Beaver Lake Bridge. A bridge on lot 5, between concession 12, Bethune, and the boundary of Proudfoot, comprised of 11 pile bents and 14 feet centres.

Berkendale to Fox Point Road. About half a mile of work from lot 8, con. 6 (at Berkendale, P.O.), to lot 15, con. 3, at Fox Point, P.O., in the Township of Franklin.

Bridge repairs in Matchedash. Two bridges were repaired, one being on lot 5, con. 3, and the other on lot 3, con 4.

Brunel Road. These improvements were from the locks on Baysville road, con. 12, to side line between lots 25 and 26 of Brunel, a length of four miles. A deviation was made into lot No. 19.

Buck and Round Lake Road. Beginning at lot 9 and extending westward to lot 12, nearly half a mile was opened in McMurrich township.

Cardwell No. 3 Road. A mile and a half was well drained and graded between concessions 11 and 12, the work being, however, chiefly on lot 27, where considerable crosswaying was done in order to make the road quite satisfactory.

Carling 20 Side Line Road. From the east side of lot 24, concession 4, to lot 25, concession 5, and thence along side line to concession 6, two miles of excellent work was done.

Chaffey Road. One mile of improvements through lots 26 to 29 inclusive on the 13th concession line of Chaffey.

Christie Township Road. On the sixth concession line from lot 24 to lot 26, three-quarters of a mile of new road was opened.

Commanda Creek Bridge. A bridge 87 feet long, consisting of two piers 11 feet high and one abutment, and is on the 10th concession of Pringle.

Croft Township Road. From lot 21 northwest, ending at lot 23, one mile of road was opened.

Croft and Hagerman Road. This was the blasting of some rock on the town line for the improvement of the road towards Ahmic Harbor.

Dunchurch Road. Two and a half miles of repairs from lot 33, Croft, eastward.

Eagle Lake Road. This work was from Nipissing road eastward, representing three and a half miles of excellent improvements.

Edgington Road. Chiefly a bridge over Leonard Creek on lot 13, concession 2, township of Christie, with 1 span of 20 feet and 6 spans of 20 feet each all upon piles properly driven.

Foley Township Road. Nearly a mile opened through a heavily timbered bush from concession 7 south through lot 28, into concession 5, with a slight deviation upon lots 26 and 27 and shown on a prepared plan of the road.

Franklin Township Road. From lot 18, concession 14, to lot 15, concession 12, a mile and three-quarters were well graded and permanently improved.

Golden Valley and McConkey Road. Some four miles of work from lot 6, concession 8, Mills, to lot 10, Pringle.

Great Northern Road. Improvements from half a mile north of Dunchurch northward three miles.

Grassmere Road. Half a mile of general improvements on lots 24 and 25, in the township of Sinclair.

Himsworth Road. From concession 17 to concession 20, on the 15th side line, two miles of excellent work was done.

Himsworth and Nipissing Road. A mile and a quarter opened upon the boundary of Himsworth and Nipissing, between concessions 11 and 13.

Jacks Lake Road. This work is from concession 9 north to Wolf River, representing a mile and a half of new work in the township of Pringle.

Joly Road. Beginning at lot 17, con. 7, Joly, and extending east to the line between lots 17 and 18, thence south to concessions 6 and 7 and near the centre of lot 18, a road was opened upon an old lumber trail.

Lamb Lake Bridge. A bridge erected on lot 15, con. 4, Proudfoot, consisting of 4 pile bents, one span of 24 feet and two of 16 feet each with one hundred and twenty-five feet in length of approaches.

Leg Lake Road. Two miles of grading from lot 24, concession 3, to lot 29, concession 2 of the Township of Muskoka.

Lindsay and St. Edmunds Roads. Gravelling, grading, ditching and other general improvements were made upon main roads in the above townships, repairing the highways leading northward towards Tobermory and representing some three or four miles altogether.

McConkey, 2 Con. Road. This was about the shore of Carriboo lake from lot 35, Harley, to west side of lot 7, McConkey, chopping, logging and grubbing nearly two miles.

McKenzie Township Road. One mile of substantial grading between lots 19 and 20.

McMurrich, 20 Side Line Road. Almost a mile of new road was opened from con. 2, southward towards Stisted. A rocky hill was also repaired on lot 3, con. 10, and 46 rods long.

McMurrich and Monteith Road. This work was from con. 8 north to con. 10, between lots 30 and 31 of McMurrich; a mile and a quarter was well opened and graded.

Machar Roads. On the 10th side line about half a mile was opened in concessions 9 and 10, and on the 5th side line an equal length was opened. Also from this line between concessions 2 and 3 across lots 15, 16 and part of 17, crosswaying was done for more than half a mile and well covered with earth.

Macaulay Road. Three miles of repairs from lot 18 to lot 30, con. 7, McLean or from Baysville west.

Maple Lake Road. From half a mile east of Maple Lake station in the township of Christie improvements were made to Rosseau and thence eastward three miles, making ten miles of improvements altogether.

Magnetawan and Ahmic Harbor Road. Beginning at the east side of lot 4 and continuing west on con. 8, Croft, one mile of extensive improvements were made over a very rough and rocky section.

Millin's Bridge. A bridge about lot 22, con. 6, McDougal, was raised about four and a half feet and a centre pier of cedar 14 by 16 introduced.

Morrison Lake Road. From lot K, con. 18, Wood, extending to lot 35, one mile of good work was done.

Matchedash and Orillia T. L. Road. One mile and a third opened between concessions 3 and 4, and made very satisfactory.

Monteith Road. A continuation of work of last year west to the Seguin road representing three miles. Some fourteen cedar culverts were put in and a considerable amount of crosswaying.

Morrison Road. This is from lots 26 to 30 inclusive west from Muskoka road a mile and a half. The township council spent some \$50.00 additional in connection with the Government grant.

Muskoka Road. In the township of Macaulay on lot 3, con. 11, 100 rods were opened as a deviation to avoid a rough rocky ridge, and as a good and necessary change. In north Orillia about three-quarters of a mile was graded and gravelled from con. 8, northward on this same road.

Monck Road. Repairs were made from lot 5 to lot 11, con. A, Rama, a mile and a half, and on lots 13 and 17, thirty rods on each were graded.

Musquosh Road. Improvements extending over two and a quarter miles from lot 11, con. 10, Wood, to lot 17, con. 8, through a rather rough and broken section.

Neville Road. A road opened about a mile from the east side of lot 15 east, crossing lots 13 and 15, and near the blind line between concessions 2 and 3, McDougall, and thoroughly improved.

Nipissing Road. About six miles of improvements from north Seguin northward to Seguin Falls.

Nipissing 10 Side Line Road. One mile of work between concessions 3 and 4 north, and opened for the general benefit of settlers.

Novar and Ilfracombe Road. Beginning at lot 4, Murrich, and continuing east across lot 4 in Perry, about 2 miles of valuable work was done in repairs.

North Himsworth Road. After beginning operations, owing to continued unfavorable weather it was deemed advisable to discontinue the work after an expenditure of some \$60.00.

Northern Road. A bridge was built over Commanda Creek, having one clear span of 35 feet with abutments, each 10 feet high.

Northwest Road. From con. 9, Carling, northward to Indian Reserve, four and a half miles were repaired and the road very much improved.

North Cardwell Road. Two and a half miles repaired from lot 18, con. 1, near boundary of Cardwell and Monteith to the 10th and 11th side line con. 3, Monteith.

Oakley and Draper Road. Two miles of satisfactory work from lot 32, con. 7, on town line of Oakley and Draper to lot 26, con. 6, Oakley, reaching to Wood lake.

Orange Valley Road. An extension of two miles and a half from last season's operations opening a good highway for settlers.

Oka Road. From near the boundary of Wood and Gibson, between lots 45 and 35, con. 8 of Gibson, a mile and a half of improvements were made by the Indians of the Oka Reservation.

Parry Sound Road. Two miles of general grading and ditching from about a mile east of Parry Sound eastward.

Perry and Chaffey Road. Work was commenced at lot 29, about 10 rods south of the town line and extended west to the town line about centre of lot 26 and again west to the 25th side line, making one mile of excellent new road.

Port Carling Road. From the south line of Watt and Monck at lot 24 to lot 30, con. 2, township of Watt, some good work was done. The season, however, being unfavorable it was deemed advisable to cease operations before the full expenditure of the grant.

Ridout Road. Three and a half miles of general repairs from lot 7, con. 8, McLean, to lot 24, con. 9, Ridout.

Ryde Road. The improvement of a mile and a half from lot 18, con. N, Rama, to lot 2 in the township of Dalton. The road is along the bank of Black River.

Road Carling Township. A mile and a half cut out, graded and drained, from lot 24, con. 3, northwesterly to lot 29, and leading into good agricultural lands in the township of Carling.

Ryerson Road. A new work begun at con. 12, and 6 and 7 side line of Ryerson extending north on said side line a mile and a quarter.

Savage Settlement Road. Repairs of some two miles over the worst sections.

Seguin River Bridge. A cedar bridge consisting of two piers 7 x 14, 9 feet high, and with spans of each 24 and 34 and 16 feet, and situated above Manitowaba lake in the township of McKellar.

Sinclair and Franklin Road. A new highway opened through a heavy hardwood bush from lot 5 at town line between Sinclair and Franklin south easterly to lot 3, con. 13, Franklin, a length of one mile. The right of way was secured through last named lot and over lots 4 and 5 in con. 14.

South Himsworth Road. This work was begun at the blind line between concessions 4 and 5 and extended south to concessions 3 and 4 on the 5th side line a mile and a quarter altogether, one half of which was graded, the balance being chopped out only.

Stephenson and Macaulay T. L. Bridge. Necessary repairs to the piers which had been undermined by a very strong current and now made secure.

Strong Township Road. Between concessions 10 and 11 from lot 5 to lot 4, deviating on lot 5 in con. 11, for 30 rods, to avoid a rocky section, about a mile and a half of road was opened.

Surprise Lake Road. In the township of Laurier, about a mile and a quarter of grading was done over an old trail opened by settlers from lot 6 to lots 8 and 9 in the 5th concession.

Watt and Cardwell Road. This was a mile and a half of new work on lots 14 and 15 of concessions 1 and 2, Cardwell, on the boundary between Watt and Cardwell.

Westphalia Road. About 10 miles of repairs from Trout Creek westward.

Whitestone Road. Six miles of improvements in the township of McKenzie, the work beginning about half a mile from the Northern Road. This main highway is now understood to be in good general condition.

EAST DIVISION.

Addington Road. Four miles of repairs from lot 4, con. 6, Kaladar northward, and from lot 24, con. 9, Lyndoch, five miles were improved northward.

Anstruther Road. Beginning at lot 34, con. 1, Anstruther, and continuing northward to lot 38, con. 13, eight miles were substantially improved.

Alice Roads. Two miles of grading and general improvements from lot 24 west, between concessions 14 and 15, and again between concessions 10 and 11 from lot 24 westward, three-fourths of a mile opened.

On the Barry Bay Road three miles were improved from lot 6, between concessions 3 and 4 west to Appleby. In the same township a bridge over Indian river on lot 7, con. 6, was generally renewed with stringers, abutments and hand railing, its length being 112 feet. Three-fourths of a mile was opened from lot 1, con. 8, southward on the boundary of Alice and Fraser, and a mile and a half of repairs was made between lots 10 and 11 in the 7th, 8th and 9th concessions.

Arden and Harlow Road. About three and a half miles of improvements from lot 20, con. 8, northward to lot 27, con. 7, all in the township of Kennebec.

Bass Lake and Gully Line Road. From lot 22, con. 10, Galway, west to lot 1, con. 10, again on Gully Line crossing lots 15 and 16, concessions 11 and 12 and on the line between concessions 12 and 13, intersecting Bass or Swamp Lake Road, general repairs and improvements were made covering a length of over five miles.

Battersea and Kingston Road. Three-quarters of a mile which, prior to the present work was impassable for general traffic, is now in good condition. It is from lot 1, con. 7, Storrington, northeasterly toward Battersea.

Barry Road. Repairs from lot 31, con. 3, east to lot 28, con. 4, township of Fraser, a length of two miles. Some deviations were made for the improvement of the location.

Bedford Station (Cheese Factory) Road. This road was substantially repaired from lot 10, con. 14, Portland, westerly to lot 16 in the same concession, a length of about three miles.

Bell's Rapids Road. Improvements from lot 18, con. 4, of Jones, westward, about two miles towards Bell's Rapids.

Black Line and Cavendish Road. From lot 7, con. 17, Cavendish, west to lot 10, con. 18, Galway, about eight and a half miles were repaired. This is a main highway through Galway and Cavendish to Buckhorn road.

Bonfield, 13 Con. Road. Almost a mile of road was opened from lot 2, con. 13, Bonfield, to lot 3, concessions 8 and 9, Ferris. Some 32 rods were also opened near the side line between lots 5 and 6, con 11, Bonfield.

Bonfield, 2 Con. Road. A mile of general grading on lots 26 and 27.

Bonfield and Nosbonsing Road. A road in Ferris and more popularly known as the Wisawasa and Callander road. It was repaired over five miles from concessions 3 and 4 towards East Bay and Callander. A bridge was also erected over Depot creek 110 feet long, including approaches and some four miles of road improved.

Black Creek Road. Repairs on 20th concession of Wilberforce, a mile and a quarter between lots 20 and 25.

Bleazard Road. From lot 8, between concessions 4 and 5 of Bleazard, eastward one mile, and thence south to lot 4, con. 2, a length of about four miles was substantially improved.

Brennan's Creek Bridge. A bridge on the Opeongo road, about four miles west of Brudenell village was rebuilt.

Bromley, 4 and 5 Con. Road. Repairs from con. 4, between lots 15 and 16 and being chiefly the building of a large culvert and some 600 yards of filling.

Brougham, 16 Con. Bridge. A bridge constructed entirely of round cedar and costing about \$200, towards which the Government gave \$75.00 and the municipality the balance.

Brougham side Line Road. This work was between lots 10 and 11 in concession 2, the opening of three-quarters of a mile.

Bromley, 5 Con. Road. On the line between concessions 4 and 5 repairs were made across lots 22, 23 and 24, three-quarters of a mile.

Brazeau Road. From lot 5, con. 5, Springer, work was continued east one mile, one-quarter being new work.

Brudenell and Hagarty Road. Repairs from con. 16, Brudenell, between lots 15 and 16, one mile and three-quarters, which includes a diversion of about 40 rods to avoid a steep rocky hill on the side line.

Brudenell and Killaloe Road. Three miles of repairs made from con. 16, Brudenell, southward, several improvements were made in the location of the road by diversions from the otherwise direct line.

Buckhorn Road. From White's Corners (lot 15, con. 18.) half a mile was opened northward and southward. Seven miles of repairs were also made between lot 15, con. 8, Harvey, northward to Ketchecum lake.

Buckhorn and Lake Shore Road. This work consisted in repairing a mile and a quarter of that done last season, and in addition, an equal length of new road was opened from lot 23, con. 16, to con. 15, crossing lot 22. Towards this work the County of Peterborough gave \$150 and the Township of Smith \$50.

Burnt River Bridge. Built at Furnace Falls and having a length of 110 feet and main span of 40 feet. Constructed almost entirely of cedar.

Burleigh, Anstruther and Chandos Roads. This grant of \$500 was used for the improvement of roads in the townships above mentioned leading to cheese factories, and the work was as follows :

1. In Burleigh, lots 9 and 10, con. 1, 1-2 mile; lots 4, 5, 6 and 7, con. 4, 1 1-2 miles; lots 4 and 5, con. 5, 1-2 mile.

2. In Anstruther, lots 27 and 28, con. 1, 1-2 mile; lots 37, 38 and 39, con. 8, 1 mile.

3. In Chandos, lots 26, 27, 28 and 32, con. 17, 1 1-4 miles; lots 10, 13, 15, between concessions 4 and 5, 1 mile; lots 10, 11, 14, 15 and 16, con. 12, 1 1-4 miles, and lots 15, 16, 17, 18, 19 to 23, con. 18, 2 miles; making altogether nine and a half miles of satisfactory and desirable work.

Carden Road. Nearly three-quarters of a mile was gravelled through a low muskeg, between lots 17 and 18, con. 1, Carden.

Cardiff Road. Three miles graded from lot 24, con. 16, Cardiff, east to the boundary of Hastings County.

Carlow and Raglan Road. Repairs from the 4th con. of Carlow, on the town line, working between lots 20 and 21 north, six miles.

Cassimir Township Road. From con. 5, between lots 10 and 11 southward, a mile and three-quarters of substantial improvements were made, three-quarters of which was new work.

Cavendish Roads. Improvements from lot 15, concessions 14 and 15 west, to lot 11. Also from lots 15 and 16, con. 13, south to con. 15; thence west to lot 5, con. 12, and thence north to concessions 14 and 15, and east to Bobcaygeon road; altogether about seven miles of good work.

Calvin, 2 Con. Road. The cutting out, ditching and grading of half a mile from the town line of Calvin east, and another half-mile cleared out to the creek.

Calvin and Bonfield Road. Two miles, well repaired, by grading and ditching, the work being from Calvin and Bonfield town line east.

Caldwell and McPherson Road. A mile and a half improved on the above boundary, between Caldwell and McPherson, from lot 1, con. 1, to the second concession.

Caldwell Roads. In this township a bridge was built between concessions 1 and 2, opposite lot 5, with about 50 feet of filling upon each side, and from lot 4, con. A, north to lot 4, con. 1, two miles of improvements were made. A mile and a half of grading and ditching was also done from lot 8, con. 4, Caldwell, and from lot 8, between concessions 2 and 3, Kirkpatrick, representing altogether nearly five miles of repairs.

Coe Hill Road. Three miles of improvements from lot 29, con. 4, Wolleston, southwesterly to lot 30 and to con. 1. It was previously little more than a settlers' trail, but is now good for general traffic.

Cross Lake Road. Beginning at lot 16, con. 3, Lyall, improvements were extended north to lot 12, con. 2, Murchison.

Chandos Road. A road from Apsley running eastward and known otherwise as Wellington road. The work this year was from lot 34, con. 1, Anstruther, easterly to lot 18, con. 2, Chandos, representing about six miles of repairs.

Clisholm Roads. Three miles were opened in the above township and half a mile graded, done in three sections, namely, half a mile graded from lots 10 and 11 to bridge over Wisawasa creek, three-fourths of a mile opened between lots 20 and 21 from con. 14 southward, and two and a quarter miles cut out from concessions 11 and 12, between lots 10 and 11.

Church and Brudenell Road. Repairs in the township of Brudenell from the village of the same name westward, a mile and a quarter.

Dalhousie, 9 Con. Road. This was chiefly the filling in of heavy approaches to a bridge, the length being 162 feet, depth 9 feet, and 22 feet wide. The work was stone throughout and therefore of a permanent character.

Darling and Lavant Road. From the west boundary of Darling repairs were made eastward on or near the boundary, between Lavant and Darling, for about six miles.

Denbigh-Griffith Road. In the Township of Griffith and about two and a half miles northeast of Denbigh village, repairs were extended towards Griffith about ten miles.

Denbigh and Lyndoch Road. Repairs from the west boundary of Denbigh at lot 25, north about three miles.

Denbigh and Palmer Road. These repairs were from lot 25, con. 8, Raglan, towards Denbigh three miles.

District Line (Wilberforce) Road. This work was from con. 20, Wilberforce, north on the District line, and was chiefly the raising of one mile through a low flat, done largely with a township grading machine.

Dummer, 9 Line Road. Work done in conjunction with grants from the County and Township, and was from lot 1, northward eight miles. Another six miles of repairs were made from lot 26, con. 5, about the southeast shore of Stony lake.

Dunnet and Cassimir Road. A mile and a half of substantial repairs were made from lot 10, concessions 1 and 2, Dunnet east. Two miles and a half were also repaired on the main road.

Dunnet and Kirkpatrick Roads. From the boundary of Ratter to Dunn Creek bridge lot 11, a mile and a half of grading and ditching was done, and from con. 5, south a mile was opened.

Eganville and D'Acre Road. Five miles of repairs from con. 6, Grat-tan, between lots 20 and 21, were made northward between the lots above mentioned.

Ferris and Chisholm Road. On the 18th concession, Chisholm, and 1st concession, Ferris, a mile and a quarter was opened and graded.

Ferris Roads. In this township two miles of repairs were made from concessions 4 and 5, to lots 6 and 7. A mile and a quarter was opened through concessions 13 and 14, and an equal length between concessions 11 and 12. Another mile was ditched and graded between lots 19 and 22, on the 8th and 9th concession road.

Field Roads. Two miles have been opened in this township and two miles repaired in the following manner: Beginning at lot 5, con. 2, and continuing west, two miles were improved and half a mile opened. Again from con. 1, north between lots 1 and 2, three-quarters of a mile were opened for the advantage of several settlers.

Field No. 3 Road. In the township of Bastedo, beginning at concessions 1 and 2 and lots 14 and 15, three-quarters of a mile was opened and made into a good passable highway.

Field and Badgerow Road. From concessions 1 and 2 south, between lots 12 and 13 to Sturgeon river, two and a half miles of an old cadge road were opened and made generally useful for settlers.

Freeman Mill Road. Two and a half miles were improved from lot 18, con. 9, Loughboro, southeastward to lot 22, con. 8.

Gannon's Narrows Road. From lot 8, con. 9, Harvey, southwesterly to Gannon's Narrows, seven miles were generally improved.

Garson Road. This work was between lots 8 and 9, Garson, from con. 1 to con. 2, one mile of good grading.

Garson and Neelon Bridge. A bridge on lot 11, between the townships named, was constructed with a flooring of 60 feet and about 110 feet of permanent approaches.

Hagarty 25 and 26, Side Line Road. Work was begun in this instance at con. 5 and extended north one mile between lots 25 and 26. A new road.

Hagarty 3rd Con. Road. Repairs on this concession from Coughlin's Hill westward, a mile and a half.

Hanmer Township Roads. About half a mile was opened on the 5th concession of Blezard, the township south of Hanmer, and a bridge built 76 feet long, and three-quarters of a mile of road was opened, opposite lots 6 and 7.

Hardwood to German Settlement Road. In the Township of Raglan, from lot 30, con. 7, work was done southeasterly to lot 5, con. 4, amounting to five miles of general repairs.

Head Township Road. A bridge over McKay's Creek on Pembroke and Mattawa road in Head township was repaired. Two and a half miles of the Mattawa road were also improved through the same township.

High Falls Road. Satisfactory repairs were made upon this road between lot 8, con. 12, and lot 1, con. 14, in the township of Portland, four miles.

Hugel and Badgerow Road. This work was chiefly the filling in of a deep gully on lot 1, con. 4, Kirkpatrick.

Hugel Township Road. From con. 5, between lots 2 and 3, Hugel, north to con. 3, some four miles of grading, ditching and crosswaying were done.

Hyde's Chute and Sanson Road. Ten miles of repairs upon this road from Hyde's Chute on the Madawaska river north.

Jones' Falls and Battersea Road. Repairs were made from lot 22, con. 12, Storrington, northeasterly about the east end of Loughboro lake to lot 9, a length of about five miles.

Kaladar and Massanoga Road. Four Miles of repairs from Killaloe station of the C. P. Railway north.

Keenan Road. This work was from lots 2 and 3 Caldwell, south to Salter line, thence west on last named line to lots 3 and 4, thence south to Veuve river, a mile and a quarter. A quarter of a mile was also opened from lot 4, to Larden road.

Kirkpatrick 5 Con. Road. The completion of repairs amounting to two miles and being from lot 7, eastward to the concession mentioned.

Kingston and Perth Road. These improvements were from the north boundary of North Crosby, south towards Westport, some four miles.

Killaloe and Bonnechere Road. Work was commenced between lots 5 and 6, con. 9, Hagarty, and continued north between the two lots mentioned, three-quarters of a mile, opening a new road through a very wet swamp.

Killaloe Station Road. Repairs from South Algona boundary line west to the Forks, between Killaloe and Killaloe station, the distance being two and a half miles.

Lanark Road. A fairly good highway, one mile in length, has been opened from lot 15, con. 8, Darling, northeastward. This distance had been opened roughly by the settlers as a winter road.

Lily Lake and Chemong Lake Road. In the township of Smith from lot 11, con. 3, two miles were opened westerly, chiefly in the interest of the cheese factory and butter industries.

Lafrance Road. A mile and a quarter repaired from Indian Reserve on con. A, between lots 3 and 4, which is about one mile south of Sturgeon Falls. This includes work done between concessions A and B, opposite lot 3 and between lots 1 and 2, con. B.

Loughboro' Central Road. This represents about four miles of work from lot 6, con. 2, northeasterly to lot 13, con. 4.

Lyndoch and Sebastopol Road. Two miles of repairs from lot 5, con. 5, Sebastopol, northward.

McArthur's Mills Road. From lot 15, con. 2, to lot 23, con. 3, Raglan, three miles of repairs were made.

Markstay and Warren Road. This was practically the opening of three miles from lot 12 on concessions 3 and 4, north to concessions 4 and 5 and thence east.

Maley Road. From Harryett's corners on the Peterson road in Brudenell north to the Opeongo road, four miles were improved.

Martland Township Roads. Between lots 7 and 8, two miles were improved north from con. 5, and a mile and a quarter west, between concessions 3 and 4. One mile was also opened from concessions 2 and 3, between lots 7 and 8, and half a mile between concessions 1 and 2. Again from near the line between lots 4 and 5 south to lot 4, con. 4, and thence westerly, between concessions 4 and 5, further work was done, aggregating about five miles.

Marlbank Road. One mile of work from the east boundary of Hungerford, where the 5th concession line intersects the boundary between Hungerford and Sheffield, and extending north on said boundary to con. 1, Hungerford.

Mattawan Township Roads. On the Mattawa and Temiscamingue road in the above township, two miles of repairs were made and a mile and a half improved from the township of Cameron northward; half a mile was also improved between concessions 5 and 6, and concessions 9 and 10, representing altogether four miles of work.

Methuen Road. From Scott road south on this road to the Wellington road, about ten miles of substantial improvements were effected.

Menogue's Road. This work was commenced between lots 12 and 13, con. 13, Chandos, and continued north to con. 12, and thence east to lot 21, opening about two miles.

McGrath Road. From lot 33, con. 13, Grattan, grading was extended northward two miles and a half.

Monteagle 25 and 26 Side Line Road. A mile and a quarter repaired through concessions 15 and 16, on the side line mentioned.

Mud Lake and Germanicus Road. Beginning at con. 14, three-quarters of a mile was opened between lots 30 and 31 in the township of Wilberforce.

Mud Lake Telegraph Road. On the town line between Grattan and South Algona from lot 1, con. 15, S. Algona, repairs were made eastward to and along the town line named, half a mile. A considerable amount of blasting was necessary in order to make the road in any degree passable.

Neelon Road. This work began at lot 9, and continuing east on the 5th and 6th concession line, a mile of road was opened in the township for the accommodation of many settlers.

North Algona Road. A mile and a half, opened from the boundary between North Algona and Wilberforce at con. 6, North Algona, extending lot 5.

North Burleigh Road. Eight miles of repairs from lot 15, con. 7, South Burleigh, north to lot 34, con. 1 Anstruther.

North Harvey Road. This road which is the leading one from Burleigh Falls to Bobcaygeon, but on a portion of which there are no settlers, was repaired about seven miles from lot 2, con. 4, Harvey, west to con. 14.

North Shore Road. In the township of Loughboro from lot 25, con. 8, repairs were made southwesterly on the north shore road to lot 19, con. 5, a length of four miles. It is principally a cheese factory road.

McPherson and Kirkpatrick Road. Two miles of work from lot No. 8 west, half a mile, being new work.

McPherson Road. A mile and a half of new and heavy work from lot 10, con. 5, to lot 12, thence south half a mile, thence west to lot 13, con. 5, to serve a new settlement on the west side of the township of McPherson.

Opeongo Road. Repairs from Brennan's Creek, about four miles west of Brudenell westward, about three and a half miles.

Papineau Roads. A bridge on the Peterson road about four miles east of Maynooth (lot 16, con. 1, Wicklow), 129 feet long with spans of 30 and 18 feet, was erected. Another structure was built between lots 20 and 21, con. 11, Papineau, with two piers 12 by 14, and five-eighths of a mile was opened between lots 25 and 26 with repairs between lots 10 and 11 in concessions 11 and 12.

Papineau River Bridge. A bridge one hundred and sixty feet long, practically renewed and raised four feet and a half.

Paugh Lake Road. This represents a mile of good work from lot 26, con. 10, Sherwood, north towards Paugh Lake.

Pembroke and Eganville Road. Two and a half miles of grading from lot 13, con. 18, Wilberforce, north to lot 6, con. 21.

Pembroke and Mattawa Road. From Bissett's Creek westward in portions of the townships of Buchanan, Maria and Clara, some 12 miles of repairs were made. Chalk River bridge was also renewed.

Perth Road. Repairs from lot 21, con. 11, Loughboro, north towards Bedford Mills in Bedford, about six miles.

Petewawa Road. This work was from lot 26, lake range, in the above township and consisted in the grading and general improvement of one mile.

Portage (con. 5, Eldon) Road. A leading road from Kirkfield to Beaverton, the money spent being from lot 1, con. 1, eastward, representing two and a half miles of improvements.

Proof Line (Wilberforce) Road. From lot 6, being the junction of the Pembroke and Eganville road with con. 24, Wilberforce, work was extended westerly along the said concession to lot 15, altogether three miles of general repairs.

Radeliffe and Raglan Town Line Road. Two miles of improvements were made between the townships mentioned, from lot 26 to lot 33. Some deviations were made for the general improvement of the road.

Railton Road. In th township of Loughboro', on the line between concessions 1 and 2, from lot 4, work was extended eastward half a mile, consisting chiefly in reducing gradients upon heavy and almost impracticable hills for use in general traffic.

Ross Township Roads. From Haley's Station through lot 23 of concessions 1 and 2, between Ross and Admaston, and on lot 23, con. 2, of Ross, westerly, about two miles of grading and repairs were made. Again, from lot 16, con. 5, westerly, a mile and a half of repairs were done along the fifth concession; a quarter of a mile was also opened from con. 1, lots 7 and 8, Ross, to the town line.

Ryan Mountain Road. From Free Grant lot 11, Opeongo road in Sabastopol, improvements were made to lot 9, con. 14, about two and a half miles.

Sandy Point Road. These repairs began at Sandy Lake bridge and were extended westward four miles.

Second 1-4 Line (Carden) Road. From lot 11 east to lot 4 of con. 8, Carden, about a mile and a quarter was more or less improved.

Shamrock and Mt. St. Patrick Road. Five miles of repairs between Mount St. Patrick and Shamrock.

Scott Road. A work beginning at lots 8 and 9, on line between concessions 12 and 13, Chandos, and continuing eastward to the boundary of Wolleston, representing six miles of general repairs.

Sherwood Road. A mile and a half improved from lot 16, con. 4, Sherwood, east to town line at lot 6, con. 4, Hagarty, extending to lot No. 1.

Sherwood and Hagarty Town Line Road. From con. 3, Hagarty, on the town line named, repairs were made westward a mile and a half.

Shipego Lake Road. Repairs from Whitman cheese factory to Lake Shipego, for about five miles and being from lot 6, con. 10, Hinchinbrooke, south to lot 53, con. 8, Camden.

Side Line Nosbonsing Road. This work was between lots 14 and 15, Nosbonsing, from Lake Nosbonsing to Corbaille Station in Ferris, a length of three-quarters of a mile. Several culverts were made and off-take drains opened.

Sixth Concession (Algona) Road. From lot 5 to lot 4, on con. 6, half a mile of grading and levelling was done

Silver Lake Road. Repairs from lot 25 to lot 30, con. 15, South Algona.

Silver Lake and Burnt River Road. Eight miles of improvements from lot 30, con. A, southward.

South Algona Roads. From lot 29, con. 10, at the town line, two miles were improved westward to the west boundary of the township; a mile and a half was also thoroughly improved from lot 24, con. 4, to lot 30, and from lot 25, con. 12, northward three-quarters of a mile was opened. On the line between concessions 10 and 11, from lot 28 westerly, three-quarters of a mile was opened, and on the 3rd concession from lot 26, westward, two miles of improvements were made.

South Burleigh Road. Beginning at lot 7, con. 1, South Burleigh, and continuing north to lot 15, con. 7, some nine miles of general repairs and improvements were made.

Snider Road. Improvements on lot 11, con. 11, Portland, to make passable a road into a cheese factory.

Springer Road. From lot 14, con. 5, south to lot 10, con. 2, Springer, twelve miles were repaired. It is the main road between Cache Bay and Sturgeon River, over which there is a considerable amount of traffic.

Sparks Creek Bridge. A bridge built about twelve years ago on the main road between Bonfield and Mattawa, and having entirely collapsed, its renewal became a necessity. It is 180 feet long and is on lot 31, con. 9, Bonfield.

Sturgeon River Road. From a point about one mile north of Sturgeon Falls north more than three miles of substantial repairs were made.

Sturgeon Falls and Nipissing Lake Road. The opening of five-eighths of a mile from con. A, south between lots 2 and 3 in the township of Springer.

Sturgeon Falls and Springer Road. From Smith's Falls bridge eastward a mile and a quarter was improved and half a mile cut out. Three-quarters of a mile was also opened from about lot 4, con. 4, Springer, north to concession 5.

Sudbury and Chelmsford Road. Work was commenced near the boundary of Snider and McKim and continued east to the corporation line of Sudbury, a length of about four and a half miles, the improvements being of a general character and reported as very satisfactory.

Sudbury and Neelon Road. From lot 4, con. 2, McKim, east into Neelon, five miles of improvements were made.

Temiskaming Roads. In this new district there was opened this season some sixty miles and improvements upon existing roads to the extent of about twenty-five miles. A large amount of ditching and drainage was done in connection with the road work and nearly three thousand feet of bridging with generally satisfactory results. A main highway was extended north into the centre of the township of Eventuel about 30 miles northward from New Liskeard and three miles were opened east through the township, making a trunk road into settlements, and when continued north and westward will open new townships already located and within a short time will doubtless be occupied, as it is the experience of the Department that settlement has followed rapidly to the end of and sometimes beyond any roads opened. Reports of the work in detail are with the Department. A grading machine purchased by the Department was used over 23 miles, doing, the inspector has reported, excellent work.

Tallon and North Bell Rock Road. In the Township of Portland from lot 21, con. 13, to lot 53, con. 8, Camden, and to Whitman's cheese factory, two miles and a half were repaired.

Union Creek Bridge. A bridge about five miles south of Kinmount on the leading road from Bobcaygeon northward. It is 90 feet long, resting upon two piers and two abutments, and entirely renewed from low water line.

Verner and Badgerow Road. Repairs from lot 8, con. 3, Badgerow, north six miles to Sturgeon River.

Veve River Bridge. A bridge at lot 9, con. 6, Dunnet, with a span of 24 feet and covering of 90 feet.

Vansickle Road. In the Township of Belmont an expenditure of \$100 was made in improvements.

Verner Road. Work from lot 8, con. 4, south two and a quarter miles in the township of Caldwell.

Westmeath Road. Improvements between lots 10 and 11 from con. 6 eastward, a mile and a quarter through a low flat. The municipality furnished a grader and gave in addition \$100.

Westport and Maberly Road. Repairs from the boundary line between Leeds and Lanark from lot 1, con. 1, Sherbrooke northerly, to lot 7, con. 3, three miles.

Westplain and Hungerford Road. A mile and a quarter from lot 9, con. 11, eastward on said concession line in the township of Richmond, the work being chiefly a reduction of heavy gradients upon hills.

Widdifield Roads. In this township the following work was accomplished. A mile and a quarter opened between concessions 2 and 3 and between concessions A and I north through lots 15 and 16, with half a mile of repairs, between lots 23 and 24, across concessions C, B, A and I, two miles improved and from lot 19, between concessions C and D, east to Trout Lake, was a mile and a half of grading; another mile of grading was also done from lot 12 east, between concessions A and B, crossing lots 10 and 11; half a mile was also opened from between concessions A and I east, crossing lots 5 and 6.

Wilberforce Roads. The following improvements were made in the above township: Between lots 30 and 31, through the 20th concession, a mile and a quarter, and through the 16th and 18th concessions three-quarters of a mile was opened, and lastly, on the boundary between Bromley and Wilberforce, lot 1, con. 3, Wilberforce, a mile of general grading was done southward on the boundary named.

Wilow Road. About four miles of improvements were made from the Opeonga road in the township of Hagarty north to lot 1, con. 2, of Sterwood.

Wisawasa Road. Half a mile stumped and graded from lot 8 eastward between concessions 2 and 3, Ferris.

Wylie Township Roads. Work between concessions 8 and 9, from lot 6 eastward a mile and a quarter towards Chalk River, and between lots 5 and 6 in concessions 13 and 14; another mile and a quarter was well improved.

MINING ROADS.

The following roads, chiefly for mining purposes, have been opened or improved, namely:

In the township of Grattan from the Grattan mine, lot 16, con. 9, Grattan, north to lot 11, con. 3, and to the Canada Atlantic Railway four miles of road were opened and made good for general traffic.

A second work was a highway from Kashabowie at the Canada Northern Railway, to Tip Top mine, a length of nine miles, two and a half having been cut and graded, the balance being chopped out only.

Two miles were opened through lots 5 to 8, inclusive, in the township of Vanhorn, into "Redeemer" and "Gold Moose" mines, and costing about \$500.00.

On the Cordova road, which is from Cordova mine to Havelock, from lot 7, con. 8, Belmont, eastward to lot 18, con. 1, about ten miles were generally improved.

Another mile and a quarter was opened from lot 9, con. 8, Marmora, westward to Marmora station on the Central Ontario Railway, at lot 8, con. 6, making a very permanent road.

Long Lake road was graded and repaired to location 355 on Long Lake from end of New Klondyke road; and on Manitou Portage road ditching, grading and the repair of bridges and corduroy was done. The inspector says as to this latter road that 1,170 tons of freight passed over it this year and that an annual grant should be given for its maintenance.

Summary of Expenditure on Colonization and Mining Roads in the year 1902 :

Name of Work.	Departmental expenditure.	Name of Work.	Departmental expenditure.
<i>North Division.</i>			
Algoma Mills and Blind River road	\$800 00	Neebing 15 and 16.....road	\$732 87
Atwood and Curran	1,316 12	Nellis and Pattullo....."	416 76
Ansonia (balance) .....bridge	19 53	Oliver township	502 10
Balfour township	253 57	Paipoonge Blake....."	931 66
Birch Lake and Webbwood....."	348 00	Paipoonge O'Connor....."	509 30
Blind River and Iron Bridge....."	300 00	Paipoonge and Neebing	200 00
Bruce Mines and Desert Lake	501 12	Pattullo and Pine River	405 40
Bridge repairs (Algoma).....bridge	581 10	Patton 3rd Con	303 37
"....."	75 80	Patton (bal)....."	10 27
Bruce Mines and Rydal Bank. road	398 86	Prince township....."	300 00
Blind River....."	448 23	Rainy River road and bridges.....	4,968 34
Burriss	200 00	Roddick, Crozier & Miscampbell road	2,612 51
Conmee township	716 03	Rayside....."	250 28
Crozier and Fort Frances....."	2,059 74	Rat Portage....."	519 12
Crozier and Lash	980 00	Seramble Mine	509 54
Crozier, Devlin and Lash	522 74	Sanford township	317 17
Carpenter and Emo	600 01	Scoble	336 40
Carpenter and Lash	995 36	Stanley Corbetts	2,900 07
Carpenter and Dobie....."	1,155 63	".....(balance)....."	103 00
Cockburn Island	297 00	Sanford township	35 32
Carnarvon 12 Con....."	300 00	Salter	350 00
Coffin 4 and 5	190 00	Silver Mountain	503 72
Carpenter and Dobie (balance)	55 97	Shenston and Dobie	1,279 38
Crozier, Devlin and Lash	21 19	Strunge township	149 25
Crozier and Roddick	34 87	Sylvan Valley....."	499 82
Dorion township....."	904 77	St. Joseph Island.....roads	500 00
Dawson	539 75	".....(balance)....."	10 37
Devlin	2,133 01	Tait and Shenston	1,795 00
Devlin and Woodyatt	432 86	Thessalon River	162 10
Day Mills and Dayton	300 00	Thessalon township (balance)	99 25
Dobie	301 41	Vankoughnet	950 00
Desbarats Dock and Bruce (bal)	10 00	Wabigoon and Elm Bay	293 41
Desbarats Dock	16 02	Wabigoon and Dinorwic	506 15
Dilke and Morley	29 55	Whitefish	202 06
Eton township	496 50	Wainwright	480 00
Emo and Lash	498 52	Whitefish and Sudbury	498 55
Elm Bay (balance)....."	8 12	Worthington and Blue....."	1,139 68
Grand Portage	482 59	Winnipeg....."	404 28
Goulais	100 25	Worthington and Victoria	300 93
Gordon Lake (balance)	20 02	Wells	316 50
Grand Portage	15 82	Winter	20 00
Great Northern	500 00	Zealand township	500 98
Gordon Lake and Pt. Lock	300 65		
Hymer	1,405 10		\$65,602 40
Harrow township	400 00	Less refunds—	
Hallam	10 00	Mining trails, 1901	\$30 00
Inspection (bal)	6 86	Jackfish Bay, 1898....."	10 93
Inspection	4,318 62	Harrow township, 1901	2 93
Isbester and Port Finlay	500 00		43 86
Jaffray township....."	416 13		\$65,558 54
Johnson's	282 05	<i>West Division.</i>	
Korah	250 40	Armour and Strong	286 54
Lybster	552 21	Armour, 15 and 16....."	400 41
Little Current & Providence Bay	402 40	Aspdin and Muskoka	295 25
Lash and Aylesworth	500 00	Beaver Lake	408 19
Mather and Dobie	678 50	Bethune, con. 6	301 11
Morley and Shenston....."	696 89	Bethune	302 37
Matheson Bay	261 50	Banbury and Axe Lake (balance)	20 04
Morley township	2,398 69	Black (balance)	9 50
May Con. 1	200 00	Baysville and Huntsville	201 64
Meldrum Bay	410 79	Brünel	400 02
Manitowaning and Sheguinadah	307 55	Baxter township....."	280 00
Marks township	492 40	Buck and Round Lake....."	302 16
Mine Centre	1,284 66	Baysville....."	97 38
McIntyre-Gorham	744 41	Berkendale to Fox Point....."	198 30
McGregor township	852 87	Bridge repairs (Matchedash).....bridge	278 95
McIrvine road	47 00	Christie	203 74
Nairn and Webbwood	507 75		

Summary of Expenditure.—Continued.

Name of Work.	Depart. Expendi- ture.	Name of Work.	Depart. Expendi- ture.
<i>West Division.</i>			
Chaffey road	\$250 06	Port Carling..... road	\$133 36
do bridge	96 70	erry and Chaffey..... "	100 00
Commanda Creek "	300 95	Proudfoot township (balance) ..	36 16
Carling, 20 side line road	299 95	Ryde "	305 86
Christie township "	302 70	Ryerson "	204 50
Croft township..... "	299 98	Road "Carling township."	300 00
Cardwell "	301 49	Ridout "	249 69
Croft and Hagarman..... "	90 00	Surprise Lake "	201 87
Commanda (Pringle) bridge	295 51	South Himsworth "	204 13
Dunchurch..... road	310 68	Savage Settlement "	301 77
Dalton and Washago (balance) ..	74 37	Sinclair and Franklin "	239 55
Eagle Lake "	300 31	Strong township..... "	302 60
Edgington "	276 78	Seguin River..... bridge	205 68
Franklin "	99 82	do (balance)	118 99
Franklin township "	302 03	Stephenson and Macaulay (bal) road	14 61
Foley "	300 25	do do	123 88
Great Northern (Dunchurch)..... "	400 30	Westphalia "	300 92
Golden Valley "	400 80	do (from Trout Creek)	398 70
Great Northern "	69 25	Watt and Cardwell..... "	299 41
Grassmere "	99 98	Whitestone "	399 96
Himsworth "	308 40		
do and Nipissing..... "	300 46		\$ 26,287 93
Indian Peninsula "	140 00	Less refunds :—	
Inspection 1,362 80		McMurrich & Monteith, 1901..... 2 71	
do (balance)	45 00	Inspection, 1901..... 5 00	7 71
Jacks Lake road	194 00		\$ 26,280 22
Joly..... "	198 67		
do bridge	284 98	<i>East Division.</i>	
Leg Lake..... road	201 79	Addington (Lyndock) road	204 60
Lamb Lake bridge	208 40	do (Kaladar)	250 00
Lindsay and St. Edmunds road	750 47	Appleby roads	449 62
Machar "	199 87	Anstruther road	203 75
Monteith "	321 87	Arden and Harlow..... "	300 00
Musquosh "	407 18	Alice..... roads	1,137 46
Muskoka "	100 00	Bonfield, 13 con..... road	500 00
Macaulay "	250 00	do balance..... "	17 99
do and Stephenson (bal)	34 39	Bancroft do	23 95
do do do bridge	15 10	Burnt River, balance..... bridge	11 05
Magnetawan (balance) road	20 60	Blezard, do road	10 00
McMurrich and Monteith "	299 98	Bonfield and Nosbonsing	500 50
Muskoka (N. Orillia)..... "	252 17	Brudenell and Hagarty	258 75
Morrison (deviation)..... "	201 01	Burleigh Anstruther "	528 48
Maple Lake..... "	1,000 00	Blezard "	209 13
Millins bridge	225 25	Black Creek..... "	311 20
Magnetawan and Depot..... road	400 00	Brudenell and Killaloe	265 50
Morrison Lake "	100 10	Brezean "	201 00
Matchedash and Orillia "	350 57	Buckhorn "	261 50
McConkey, 2 con "	301 00	do "	215 01
McKenzie township..... "	199 90	Bass Lake and Gully..... "	330 00
Machar, 5 side line "	100 00	Black Line and Cavendish..... "	415 75
McMurrich, 20 side line..... "	298 35	Brennan Creek bridge	104 36
Machar, 10 side line "	150 00	Bear Creek "	82 95
McMurrich, 12 con "	102 25	Bromley, 4 and 5 road	300 00
Novar and Ilfracombe "	300 12	Bromley, 5 line..... "	224 75
North Himsworth "	120 14	Barry..... "	190 00
do (balance)..... "	34 35	Barrie road..... bridge	50 00
Northern "	355 34	Burnt River "	465 04
Nipissing, 10 side line..... "	298 20	Bonfield, 2 con..... road	190 00
do (balance)..... "	19 90	Bedford station..... "	266 30
North West..... "	406 42	Brougham, 16 con..... bridge	75 00
North Cardwell "	318 60	Buckhorn and Lake Shore..... road	119 70
Nevill "	305 74	Bell's Rapids road	252 15
Nipissing (North)..... "	400 11	Battersea and Kingston..... "	100 50
Orange Valley..... "	301 50	Brougham sideline..... "	220 50
Oakley and Draper..... "	199 69	Cardiff "	297 44
Oka "	300 09	Calvin and Bonfield..... "	300 00
Parry Sound "	304 02	Cavendish roads	410 90

Summary of Expenditure.—Continued.

Name of Work.	Depart. expendi- ture.	Name of Work.	Depart. expendi- ture.
<i>East Division.—Con.</i>		<i>East Division.—Con.</i>	
Chisholm roads	\$800 69	Killaloe and Bonnechere road	\$401 00
Carmichael road	101 13	Kirkpatrick, balance "	50 90
Caldwell and McPherson "	239 51	do do "	2 94
Chandos "	100 62	Killaloe station "	244 44
Caldwell, No. 3 "	248 60	Kirkpatrick, con. 5 "	204 56
Coe Hill "	198 35	Keenan "	199 85
Con. line Eldon "	82 00	Kingston and Perth "	300 00
Calvin, con. 2 "	196 33	Kaladar and Massanoga "	250 00
Carlow and Raglan "	250 01	Lonsdale and Bridgewater (bal)	25 00
Cross Lake "	300 06	Lavant, balance "	9 00
Cassimer township "	200 00	Lanark "	299 78
Church and Brudenell "	104 25	Lyndoch and Sabastopol "	280 00
Caldwell "	101 15	Loughboro Central "	250 00
Calvin bridge	101 48	Lilly Lake and Chemong "	180 00
Carden road	100 00	La France "	50 61
Caldwell, con. 1 and 2 "	54 98	Martland tp. roads	923 87
Carlow and Raglan, balance . . . "	27 00	Mattawa tp. road	390 11
Calvin township, do "	20 73	Methuen "	313 50
Cartier, do "	10 88	do balance "	29 86
Crow Lake, do "	49 39	McPherson, balance "	5 68
Cawley, balance (1895) "	20 06	Minogue "	208 37
Darling and Lavant "	250 00	Maley "	300 65
Dunnett and Cassimer "	312 09	Marlbank "	253 00
do do "	90 00	Monteagle "	314 00
Denbigh and Palmer "	307 60	Mud Lake and Germanicus . . . "	481 00
Dalhousie, 9 con "	400 00	Monck "	250 36
District Line "	280 00	Markstay and Warren "	360 00
Dummer, 9 con "	525 68	McPherson and Kirkpatrick . . . "	300 00
Dunnett and Kirkpatrick "	603 72	McPherson "	320 90
Denbigh and Lyndoch "	150 45	McArthur's Mills "	305 23
Denbigh-Griffith "	150 45	Markstay and Warren "	200 00
Dummer township "	150 08	McGrath "	202 49
Eldon "	208 10	North Harvey "	401 67
Eganville and D'Acre "	303 05	North Burleigh "	280 00
French River Valley "	180 00	North Shore "	277 75
do do balance "	46 58	North Algona "	352 77
Ferris, 6 and 7 "	147 25	Neelon "	200 34
Ferris, lot 14 "	200 00	Opeongo (balance) "	23 05
Feruis and Widdfield "	101 85	Opeongo to Brennan's Creek . . "	315 10
Ferris and Chisholm "	330 00	Perth (balance) "	28 63
Ferris, 8 and 9 "	250 00	Paudash Lake (balance) "	41 85
Field, No. 1 "	258 40	Papineau Creek (balance) bridge	56 21
Ferris, lot 15 "	200 00	Papineau roads	448 05
Freeman Mill "	250 00	do "	457 75
Field and Badgerow "	201 76	Papineau River bridge	447 30
Field, No. 4 "	105 80	Perth "	260 25
Field, No. 3 "	306 85	Pembroke and Eganville "	244 53
Godin Creek, balance bridge	54 81	Pough Lake "	299 75
Graham, do "	19 53	Petewawa "	250 00
Gannons Narrows road	284 11	Pembroke and Mattawa road	490 00
Garson and Neelon "	200 44	do do bridge	201 85
Garson, 1 and 2 "	295 09	Proof Line road	249 25
Hinchinbrook, balance "	49 75	Rockingham (balance) "	4 40
Howe Island, do "	4 62	Ruther Glen do "	1 79
Hardwood Lake "	250 00	Ratter do "	10 70
Hyde chute and Sanson "	200 00	Radcliffe and Raglan "	230 00
Hanmer township "	532 75	Railton "	305 65
Hugel and Badgerow "	301 50	Ross Township roads	590 05
High Falls "	227 67	Ryan Mountain road	302 63
Hagarty, 25 and 26 "	300 00	South Algona (Sebastopol) "	500 35
Head township "	310 29	do Lot 29 "	230 00
Hugel do "	250 62	do "	240 00
Hagarty, 3 con. "	250 00	do (balance) "	32 27
Hanmer roads	655 04	South Burleigh "	305 11
Inspection "	2,985 65	Side Line (Nosbonsing) "	403 73
do balance "	437 90	Second quarter line, Eldon "	161 00
Jones' Falls and Battersea road	405 82	Sudbury and Chelmsford "	306 43
Jacks Lake, balance "	10 00	Sudbury and Neelon "	230 00

Summary of Expenditure.—Continued.

Name of Work.	Depart. expendi- ture.	Name of Work.	Depart. expendi- ture.
<i>East Division.—Con.</i>		<i>Temiskaming District Roads.—Con.</i>	
Shamrock and Mt. St. Patrick road	\$414 44	Dymond and Harley.....road	\$500 00
Sixth Con. Algona	198 60	Grading machinery....."	351 75
South Algona, Con. 10 and 11 ..	140 00	Haileybury and Sharpe....."	107 17
Sherwood....."	239 55	Hudson, con. 5 and 6....."	268 04
Springer....."	300 81	Harley and Kearns	301 26
Sturgeon River	249 60	Harley, con. 3 and 4....."	573 53
Silver Lake and Burnt river....."	411 00	Harris and Dymond....."	302 91
Shepego Lake....."	202 25	Hudson 3 and 4....."	2,280 00
Sparks' Creek.....bridge	575 00	Hilliard and Harley....."	5,816 97
Sauer.....road	25 82	Harris, con. 3 and 4....."	577 10
Scott....."	102 26	Harley and Hilliard....."	2,850 00
Sherwood and Hagarty....."	410 75	Hudson....."	632 40
Snider....."	121 50	Haileybury and Liskeard....."	425 00
Sturgeon Falls and Springer ..	315 90	Harley and White River....."	510 41
Sudbury Junct'n. & Richards' Lake	251 38	Harris and Casey....."	296 74
Silver Lake....."	100 55	Kearns 1 and 2....."	508 11
Sturgeon Falls and Nipissing ..	253 05	Liskeard and Haileybury....."	500 00
Sandy Point....."	140 00	Taylor and Wabis Creek....."	226 95
Tallon and North Bellrock	126 91	do do....."	314 19
Trout Lake....."	254 35	Wrights Creek....."	251 63
Union Creek.....bridge	236 66	West (con. 8)....."	165 03
Verner and Badgerow.....road	298 50	North....."	1,406 91
Venue River.....bridge	110 77	Preliminary survey....."	768 80
Vansickle.....road	100 00	West Dymond....."	1,150 00
Verner....."	200 85	West (Kearns and Armstrong ..	3,622 02
Wahnapiatae (balance)....."	50 09	West (2 and 3)....."	1,672 70
Wilberforce do....."	9 41	Western (Evanturel)....."	5,606 73
Widdifield....."	427 12	West (lot 6 and 7 Kearns)....."	2,039 17
do.....bridge	103 50	Wrights Creek.....bridge	703 07
Wisawasa.....road	259 40	Temiskaming balance.....roads	453 24
Warren....."	100 00		
Wilno....."	300 90	<i>Mining Roads.</i> \$46,996 35	
Wilberforce, lot 16....."	237 95	Bonheur and Sturgeon Lake...road	76 96
Widdifield....."	149 65	Cordova Mine....."	526 37
Wilberforce, 6th line....."	301 00	Delora Mine....."	196 35
Westport and Mabely....."	250 00	Grattan Mining....."	450 00
Westmeath....."	402 50	Gold Moose Mining....."	499 53
Wilberforce, lot 1, con. 3....."	205 70	Kashabowie....."	845 42
Wylie Township.....roads	601 94	Manitou Portage....."	271 40
Westplain and Hungerford.....road	210 88	Long Lake Mining....."	464 42
York River (balance).....bridge	20 00	Tehkummah, 6 con....."	200 62
Less refunds:	\$54,414 30		
Dummer, 9 con., rd, 1901.....	8480 00	<i>Recapitulation.</i> \$8,531 07	
Marmora and Delora, 1901.....	54 41	North Division.....	65,538 54
		West do.....	26,280 22
		East do.....	53,879 89
	\$53,879 89	Temiskaming District.....	46,996 35
		Mining roads.....	3,531 07
<i>Temiskaming District Roads.</i>			
Armstrong Tp. boundary.....road	\$2,300 00	Departmental Expenditure...\$196,246 07	
Armstrong, lot 6 and 7....."	3,901 50	<i>Municipal and other Grants.</i>	
Bucke, con. 5, side line....."	75 07	Smith township to Lilly Lake, road	200 00
Bucke, con. 3....."	696 00	Peterboro County to Buckhorn. "	100 00
Brethour....."	510 64	Smith township to Buckhorn... "	50 00
Beauchamp and Robillard....."	86 00	Peterboro County to Dummer... "	50 00
Bucke, con. 4....."	705 41	Dummer township to Dummer... "	50 00
Bucke township, lot 11....."	300 08	Peterboro County to Cordova... "	200 00
Con. 2 and 3, Harley....."	500 00	Belmont township to Cordova... "	200 00
Con. 1 and 2, Kearns....."	758 55	Shuniah township to Dawson... "	250 00
Casey 3 and 4....."	155 73		
Dymond and Harley boundary ..	1,496 28		
Dymond 1 and 2....."	309 26		
			\$1,100 00

HENRY SMITH,

Superintendent of Colonization Roads.

STATEMENTS
OF THE
ACCOUNTANT
AND
LAW CLERK.

DEPARTMENT OF PUBLIC WORKS, ONTARIO,
TORONTO, JANUARY, 1903.

HON. F. R. LATCHFORD,
Commissioner of Public Works, Ontario.

SIR,—I have the honor to submit the following statements of maintenance and capital expenditure on public buildings, works, roads, aid to railways, etc., and of contracts entered into in connection therewith, being : (1) the expenditure on Maintenance and Repairs account for Government and Departmental Buildings, Institutions, and Works for the year 1902 ; (2) the capital expenditure for public buildings works, roads, railways, etc., for the year 1902 ; (3) the total capital expenditure on public buildings, public works, colonization and mining roads, aid to railways, etc., from the 1st July, 1867, to 31st December, 1902 ; (4) a classified statement shewing (a) the expenditure for four years and six months from 1st July, 1867, to 31st December, 1871 ; (b) the expenditure for thirty-one years from 1st January, 1872, to 31st December, 1902 ; and (c) the grand total of expenditure from 1st July, 1867, to 31st December, 1902 ; and (5) a statement shewing the several contracts and bonds entered into with His Majesty during the year 1902 for the execution of sundry works under the control of the Department.

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

J. P. EDWARDS,
Accountant and Law Clerk.

STATEMENT No. 1.

Being statement of expenditure on maintenance account for fuel, gas and water, repairs, vault fittings, furniture and furnishings, salaries, etc., for the following Departmental Buildings, Institutions and Works during 1902 :

Name of Service.	Amount.
Government House	\$ 7,834 13
New Parliament and Departmental Buildings (including salaries of engineer, firemen, messengers, etc.).....	34,583 27
New Parliament Buildings, exclusive of Departments (furniture and furnishings only) ..	2,188 96
Old Parliament Buildings	805 39
Attorney-General's Department	301 40
Crown Lands Department.....	2,779 34
Department of Public Works	680 86
Treasury Department.....	733 82
Provincial Secretary's Department	1,334 43
Department of Agriculture	511 93
Miscellaneous (Salaries of General Clerk of Works, Carpenter and Plumbers).....	3,750 00
Educational Department, Normal and Model School Buildings, Toronto	9,524 08
Normal and Model Schools Buildings, Ottawa	2,675 42
Normal School, London	1,161 11
School of Practical Science, Toronto	5,154 02
Agricultural College and Experimental Farm, Guelph	7,521 42
Osgoode Hall, Toronto	9,753 60
Superintendent Locks, Dams, etc.....	1,200 00
Lockmasters, bridgetenders and caretakers, salaries	3,820 00
Totals.....	<u>\$96,313 18</u>

DEPARTMENT OF PUBLIC WORKS, ONTARIO.

TORONTO, January, 1903.

J. P. EDWARDS,

Accountant.

STATEMENT No. 2.

Being statement of expenditure on capital account for the year 1902 only, on Public Buildings Public Works, Roads, etc. (See also Statement No. 3.)

Name of Work.	Under the Dept. Public Works.		Under the Inspectors, Etc.		Total for 1902.	
	\$	c.	\$	c.	\$	c.
Asylum for the Insane, Toronto	1,242	61	3,302	34	4,544	95
do do Mimico	1,515	90	3,867	46	5,383	36
do do London.....	24,672	82	3,743	89	28,416	71
do do Hamilton	3,728	99	515	70	4,244	69
do do Kingston	8,727	42	1,159	45	9,886	87
do do Brockville	1,198	55	3,448	72	4,647	27
do Idiots, Orillia	125	55	7,274	77	7,400	32
do Insane, Cobourg	16,771	57	2,240	22	19,011	79
Reformatory for Boys, Penetanguishene	1,343	65	2,407	95	3,751	60
do Oxford						
Andrew Mercer Reformatory for Females, Toronto.....	2,216	65	7,481	30	9,697	95
Institution for Deaf and Dumb, Belleville.....	575	75	3,311	95	3,887	70
Institution for Blind, Brantford	1,600	32	1,015	82	2,616	14
Central Prison, Toronto	1,248	49	7,127	90	8,376	39
Agricultural College, Guelph.....	21,092	43	14,711	73	35,804	16
Educational Buildings and Normal and Model Schools, Toronto						
Normal and Model Schools, Ottawa.....	2,637	57			2,637	57
Normal School, London	1,814	71			1,814	71
School of Practical Science, Toronto.....	8,460	78				
do "New Building"	26,305	64	160	71	34,927	13
New Parliament Buildings (Construction Account).....	142	94			142	94
do Equipments, etc	169	80			169	80
Osgoode Hall, Toronto	1,990	82			1,990	82

STATEMENT No. 2.—Continued.

Name of Work.	Under the Dept. Public Works.		Under the Inspectors, Etc.		Total for 1902.	
	£	c.	£	c.	£	c.
ALGOMA DISTRICT :						
Gcol. Sault Ste. Marie.....	640	00			640	00
Court House, Gore Bay.....	1,014	38			1,014	38
Lock-up, Blind River.....	306	21			306	21
do Chapleau.....	1,038	36			1,038	36
do Wawa.....	394	43			394	43
THUNDER BAY DISTRICT :						
Lock-up, Port Arthur.....	15	00			15	00
do Fort William.....	15	00			15	00
MUSKOKA DISTRICT :						
Registry Office, Bracebridge.....	1,648	23			1,648	23
PARRY SOUND DISTRICT :						
Lock-up, Parry Sound.....	217	49			217	49
do Byng Inlet.....	1,232	35			1,232	35
NIPISSING DISTRICT :						
Lock-up, Mattawa.....	19	97			19	97
do Warren.....	600	00			600	00
Court House, North Bay.....	59	30			59	30
RAINY RIVER DISTRICT :						
Lock-up, Rat Portage.....	610	35			610	35
do Fort Francis.....	37	10			37	10
do Mines Centre.....	6	50			6	50
do Emo.....	301	55			301	55
do Atikokan.....	776	50			776	50
MUSKOKA LAKES WORKS :						
Bridge, etc., Port Carling.....	10,193	06			10,193	06
Works, etc., Bala.....	1	00			1	00
Bridge, etc., Joseph River.....	486	87			486	87
Madawaska River, Bridges, etc.....	908	29			908	29
Petawawa do do.....	624	46			624	46
Sturgeon do do Tp. of Field.....	1,301	71			1,301	71
Magnetawan Swing Bridge.....	5	58			5	58
Marys and Fairy Lakes Works.....	5,976	16			5,976	16
Black River Works.....	1,000	00			1,000	00
Mattawa River, renewal of Bridge.....	500	00			500	00
Wabis River.....	133	07	1,207	44	1,340	51
MUSKOKA RIVER WORKS :						
Bridge, etc., Port Sydney.....	1,000	00			1,000	00
do South Falls.....	1,000	00			1,000	00
Des Joachims River Bridge.....	4,000	00			4,000	00
Canard River.....						
Indian Point Bridge.....	2,596	61			2,596	61
Mississauga River Bridge.....	4,355	94			4,355	94
DRAINAGE. 63 VIC. CAP. 8 :						
Miscellaneous—Drainage.....	27	00			27	00
Tilbury Township, East.....	3,020	00			3,020	00
Cornwall Tp. Beaver Creek Drain.....	750	00			750	00
Peelee Island Drain.....	1,500	00			1,500	00
Bass Lake Dam.....	1,144	19			1,144	19
Squaw River Works, Dam, etc.....	581	56			581	56
Docks on Rainy River.....			2,450	00	2,450	00
Indian River (deepening) Works.....	110	26			110	26
Burnt River Bridge, Kinmount.....						
Dock Landing, Beaudreaults—Wabigoon.....	777	95			777	95
McKenzie Creek—Snake River.....	341	00			341	00
Michipicton River Bridge.....						
Stoney Creek Bridge.....	831	68			831	68
Cashmere Dam 2 Edward VII, Cap. 20.....	1,000	00			1,000	00
Repairs and Maintenance Locks, Dams and Bridges.....	9,934	23			9,934	23
Surveys and Inspections, etc.....	1,831	88			1,831	88
Colonization and Mining Roads.....	196,246	07			196,246	07
Aid to Railways (Cash Expended).....	126,117	11			126,117	11
Temiskaming Railway Survey.....	15,362	48			15,362	48
Totals.....	530,224	84	65,427	35	595,652	19

STATEMENT No. 3.

Being Statement of expenditure on Capital Account for Public Buildings, Public Works, Colonization and Mining Roads, aid to Railways, etc., as follows:—(1) The total of expenditure for four years and six months from the 1st of July, 1867, to the 31st of December, 1871; (2) the total of expenditure for 30 years from the 1st of January, 1872, to the 31st of December, 1901; (3) the total of expenditure for the year 1902, and (4) the grand total of expenditure from the 1st of July, 1867, to the 31st of December, 1902.

Name of work.	Expenditure	Expenditure	Expenditure, 1902.	Total expenditure to 31st December, 1902.
	1st July, 1867, to 31st December, 1871.	1st Jan., 1872, to 31st December, 1901.		
	§	§	§	§
Government House	105,337 77	78,523 09		183,860 86
Old Parliament and Departmental Buildings	52,330 78	32,955 20		85,285 98
New Parliament and Departmental Buildings (construction account)		1,274,157 81	142 94	1,274,300 75
New Parliament and Departmental Buildings (equipment, grounds, roads, plant house, etc.		228,524 57	169 80	228,694 37
Asylum for Insane, Toronto	173,014 71	200,395 18	4,544 95	377,954 84
do Mimico		606,428 17	5,383 36	611,811 53
do Brockville		481,416 39	4,647 27	486,063 66
do London	311,002 82	634,865 38	28,416 71	974,284 91
do Hamilton		895,794 29	4,244 69	900,038 98
do Kingston		459,371 42	9,886 87	469,258 29
do Kingston (Branch)		9,422 82		9,422 82
Asylum for Idiots, Orillia		538,957 21	7,400 32	546,357 53
Asylum for Insane, Cobourg		96,878 27	19,011 79	115,890 06
Institution for Deaf and Dumb, Belleville	90,215 11	234,654 02	3,887 70	328,756 83
Institution for Blind, Brantford	69,318 75	207,267 57	2,616 14	279,202 46
Reformatory for Boys, Penetanguishene	12,080 74	173,579 66	3,751 60	189,412 00
Reformatory for Boys, Oxford		96 00		96 00
Agricultural College, Guelph		511,846 22	35,804 16	547,650 38
Central Prison, Toronto	10,925 96	882,212 18	8,376 39	901,514 53
School of Practical Science—College of Technology	38,509 34	20,590 92		59,100 26
do do Queen's Park		238,886 37	8,621 49	247,507 86
do do New Chemical and Mineralogical Building			26,305 64	26,305 64
Andrew Mercer Reformatory for Females, Toronto		228,986 25	9,697 95	238,684 20
Osgoode Hall, Toronto		145,763 72	1,990 82	147,754 54
Agricultural Hall, Toronto		324 00		324 00
Educational Department and Normal and Model Schools, Toronto	13,613 50	164,978 72		178,592 22
Normal and Model Schools, Ottawa		221,039 29	2,637 57	223,676 86
Normal School, London		96,448 47	1,814 71	98,263 18
Dairy School, Strathroy		14,583 71		14,583 71
do Kingston		7,987 11		7,987 11
School of Mining, Kingston		4,070 00		4,070 00
Government Farm, Mimico	47,350 00	4,296 34		51,646 34
Pioneer Dairy Farm, Algoma		5,178 43		5,178 43
Brock's Monument, Queenstown Heights		4,605 31		4,605 31
Niagara River Fence		8,025 43		8,025 43
<i>Algoma District.</i>				
Court house, gaol and registry office, etc., Sault Ste. Marie	2,469 52	21,015 33	640 00	24,124 85
Grand Manitoulin Island, three lock-ups, (Gore Bay, Little Current and Manitowaning)		20,657 05	1,014 38	21,671 43
Lock-up at Killarney		1,292 97		1,292 97
do Bruce Mines		3,117 48		3,117 48
do Webbwood		1,634 24		1,634 24
do Thessalon		2,221 99		2,221 99

STATEMENT No. 3—Continued.

Name of work.	Expenditure 1st July, 1867, to 31st December, 1871.	Expenditure 1st Jan., 1872, to 31st December, 1901.	Expendi- ture, 1902.	Total expenditure to 31st December, 1902.
	\$	\$	\$	\$
<i>Algoma District.—Con.</i>				
Lock-up at Massie		702 74		702 74
do Blind River		502 59	306 21	808 80
do Chapleau			1,038 36	1,038 36
do Wawa			394 43	394 43
<i>Thunder Bay District.</i>				
Registry office and lock-up, addition to court house, etc., Port Arthur	1,994 85	36,823 72	15 00	38,833 57
Lock-up at Fort William		9,266 40	15 00	9,281 40
do Silver Islet, Lake Superior		2,304 79		2,304 79
<i>Muskoka District.</i>				
Immigration sheds at Gravenhurst		355 00		355 00
Registry office and lock-up at Bracebridge		27,273 53	1,648 23	28,921 76
Lock-up and court room, Huntsville		8,364 85		8,364 85
do do Bayside		300 00		300 00
<i>Parry Sound District.</i>				
Registry office, lock-up, court room, etc., Parry Sound	1,715 20	21,797 89	217 49	23,730 58
Lock-up at Magnetawan		645 56		645 56
do and court room at Burk's Falls		6,432 83		6,432 83
do French River		1,194 12		1,194 12
do Dunchurch		609 00		609 00
do Emsdale		300 00		300 00
do Byng Inlet			1,232 35	1,232 35
<i>Nipissing District.</i>				
Lock-up at Mattawa		13,682 11	19 97	13,702 08
do court house and registry office at North Bay		27,646 40	50 30	27,696 70
Lock-up at Sudbury		12,082 58		12,082 58
do Sturgeon Falls		1,730 34		1,730 34
do Liskeard (now Thornloe)		657 00		657 00
do Warren			600 00	600 00
<i>Rainy River District.</i>				
Lock-up, court room and gaoler's residence, new registry office, etc., at Rat Portage		33,884 29	610 35	34,494 64
Lock-up at Fort Francis		2,839 31	37 10	2,876 41
do Mines Centre		777 28	6 50	783 78
do Emo			301 55	301 55
do Atikokan			776 50	776 50
County of Haliburton—Registry office, Minden		5,918 42		5,918 42
Young's Point lock	30,035 07	1,157 65		31,192 72
Balsam and Cameron lakes, locks	15,715 20	8,243 82		23,959 02
Mary's and Fairy lakes, locks and works, bridge over Muskoka River at Huntsville		73,867 96	5,976 16	79,844 12
Magnetawan works—Lock, dam and river im- provements, and dam and slide at Deer Lake, swing bridge, etc		65,737 35	5 58	65,742 93
High Falls, Pigeon River—Slide, dam, etc.(C.L.D.)		9,706 07		9,706 07
Georgian Bay works		7,149 97		7,149 97
Landing pier at Port Elgin		2,750 00		2,750 00

STATEMENT No. 3—Continued.

Name of work.	Expenditure 1st July, 1867, to 31st December, 1871.	Expenditure 1st Jan., 1872, to 31st December, 1901.	Expendi- ture, 1902.	Total expenditure to 31st December, 1902.
	\$	\$	\$	\$
Landing pier at Southampton		2,022 63		2,022 63
Docks at Saugeen River, Southampton		750 00		750 00
Docks on the Rainy River			2,450 00	2,450 00
Docks (landing) at Beaudreault's, Wabigoon			777 95	777 95
Muskoka Lakes works		21,915 30		21,915 30
do locks and bridges at Port Carling	34,542 54	9,669 42	10,193 06	54,405 02
do cut and bridges at Port Sandfield	9,761 80	7,081 06		16,842 86
do Muskoss Falls, works and bridges at Bala				
do Joseph River works (less contri- bution)		8,578 37	1 00	8,579 37
Nipissing Lake works		9,182 17	486 87	9,182 17
Couchiching Lake works		427 82		427 82
Mud Lake works (Township of Dalton)		1,502 32		1,502 32
Kushog Lake dam		300 00		300 00
Mississicua Lake dam		4,989 84		4,989 84
Star Lake works		412 22		412 22
Manitowishong dam—Rainy River District		520 59		520 59
Inkerman dam, removal of, (County Dundas)		1,000 00		1,000 00
Bottle Lake dam and Mississicua Creek dam		4,068 72		4,068 72
Shoal Lake and Lake of the Woods improvements; Ash Rapids		5,998 25		5,998 25
Mill Creek improvement (County Prescott)		1,000 00		1,000 00
Lake of the Byas, dredging the mouth of the river at outlet of		581 82		581 82
Peninsula Creek improvements, bridge, etc		34,993 02		34,993 02
Stony Creek works (Township of Ops)		4,828 25		4,828 25
Union Creek improvements		1,050 63		1,050 63
Bear Creek works—dam and slide		1,617 52		1,617 52
Seugog Lake works—dredging at Port Perry		977 53		977 53
Lake Seugog flats road		1,500 00		1,500 00
Cobbs Lake outlet		1,102 08		1,102 08
Gull and Burnt Rivers works—dams, slides, bridges, etc		100,716 60		100,716 60
Muskoka River works		42,670 53		42,670 53
do bridge at South Falls			1,000 00	1,000 00
do bridge at Port Sydney			1,000 00	1,000 00
Sydenham River works	374 76	1,781 50		2,156 26
Nottawasaga do	1,708 82	4,206 27		5,915 09
Kaministiquia River works	197 10	22,667 92		22,865 02
Seugog River works (including Lindsay lock and swing bridge)	27,760 34	68,496 48		96,256 82
Pigeon River works (Co. of Victoria)	1,527 40	3,472 22		4,999 62
Otonabee do		9,162 91		9,162 91
Balsam do		16,585 11		16,585 11
Wye do		5,176 98		5,176 98
Squaw do		1,688 16		1,688 16
Moose do (Co. of Stormont)		1,000 00		1,000 00
Black River works, (Lake Simcoe)			1,000 00	1,000 00
Mattawa River works <i>re</i> bridge			500 00	500 00
Wabis River works, Dymond & Harris and Kearns			1,340 51	1,340 51
Squaw River works dam at Harvey			581 56	581 56
Indian River works, deepening			110 26	110 26
McKenzie Creek improvements			200 35	200 35
Snake River improvements			140 65	140 65
Madawaska River—Swing bridge at Cumbermere, bridge at Burnstown and bridge at Tp. Raglan		7,384 63	908 20	8,292 92
Nation River works		13,877 23		13,877 23
do bridge		2,000 00		2,000 00
do contribution		4,000 00		4,000 00
Patewawa River bridge		3,254 79	624 46	3,879 25

STATEMENT No. 3.—Continued.

Name of work.	Expenditure, 1st July, 1867, to 31st December, 1871.	Expenditure 1st Jan., 1872, to 31st December, 1901.	Expenditure, 1902.	Total expenditure to 31st December, 1902.
	§ c.	§ c.	§ c.	§ c.
Sturgeon River bridge. (Tp. of Field).....		2,314 37	1,301 71	3,616 08
Chemong Lake bridge		3,500 00		3,500 00
Beaudette River (to aid in dredging, etc.).....		3,000 00		3,000 00
Mississippi River improvements (below Carleton Place).....		4,730 71		4,730 71
Head River improvements (Tp. Laxton & Carden.)		976 82		976 82
Moirs River improvements (Tp. of Thurlow.)....		2,135 32		2,135 32
Muskkrat River improvements.....		893 76		893 76
Payne River works		4,000 00		4,000 00
Otonabee River bridge		2,500 00		2,500 00
Trent River		2,000 00		2,000 00
Bridge—Tp. of Cambridge.....		1,000 00		1,000 00
Indian Point bridge. (Manitou Island.)			2,596 61	2,596 61
Mississigua River bridge, repairs.....			4,355 94	4,355 94
Stoney Creek bridge—Ryerson.....			831 68	831 68
Damages by raising waters, near Rat Portage....		800 00		800 00
Washago and Gravenhurst road	25,188 69	7,603 43		32,792 12
Washago wharf		489 22		489 22
Portage du Fort bridges, Ottawa River.....		10,747 99		10,747 99
Des Joachims rapids, bridges and approaches....		5,937 72	4,000 00	9,937 72
Surveys, inspections, arbitrations and awards, etc.	1,137 34	47,741 80	1,831 88	50,711 02
Deer Lake works, dam and slide (Tp. Anstruther, County of Peterboro		1,420 17		1,420 17
Nogies Creek works		1,662 72		1,662 72
Cashmere dam (obstructions) Middlesex.....			1,144 19	1,144 19
Bass Lake dam—Tp. Galway, Peterboro.....			1,000 00	1,000 00
To remove obstructions from navigable streams.		513 02		513 02
Bonnechere River works.....		338 50		338 50
Talbot do		605 95		605 95
Repairs and maintenance of locks, dams, slides, bridges, etc		165,027 60	9,934 23	174,961 83
Tilbury East—Outlet drain.....			3,020 00	3,020 00
Cornwall Township—Beaver Creek drain.....			750 00	750 00
Pelee Island drainage, 63 Vic., Chap. VIII			1,500 00	1,500 00
Miscellaneous—Drainage			27 00	27 00
Drainage works (Tp. of Elma.)		4,000 00		4,000 00
Big Creek drain (Tps. of West & North Tilbury.)		4,567 30		4,567 30
Roads in Township of Ryerson.....	1,409 04	5,886 02		7,295 06
Clearing and log houses on free grant lands (Settlers' Homestead Fund.).....	3,682 03	13,098 72		16,780 75
Surveys and drainage of swamp lands (Prov. acct.)	25,489 17	11,111 34		36,600 51
Aldborough drainage works		7,199 02		
Brooke do	15,218 95	19,528 78		
Delaware do		5,740 93		
Dunwich do	6,339 30	3,766 56		
Ekfrid, Caradoc and Metcalfe drainage works....	11,308 75	2,358 91		
Grey drainage works.....	6,127 55	2,047 92		
Moore do	194 80	16,896 78		
Mosa do	9,005 41	3,709 34		
Nissouri, west do		8,178 50		329,980 93
Raleigh do	25,191 15	12,818 49		
Russell do		11,543 77		
Sarnia do		40,540 55		
Sombra do		53,169 04		
Tilbury, east do	17,757 50	17,540 12		
Tilbury, west do		31,577 06		
Williams, east do		2,221 75		

STATEMENT No. 3.—Continued.

Name of work.	Expenditure, 1st July, 1867, to 31st December, 1871.	Expenditure 1st Jan., 1872, to 31st December, 1901.	Expenditure, 1902.	Total expenditure to 31st December, 1902.
	\$ c.	\$ c.	\$ c.	\$ c.
Colonization and mining roads.....	189,595 91	3,338,743 28	196,246 07	3,724,585 26
Aid to railways.....		7,097,051 12	126,177 11	7,223,228 23
Temiskaming railway survey.....		9,461 10	15,362 48	24,823 58
NOTE :—				
Certificates issued to railways. \$9,481,685 25				
Cash paid direct to railways... 1,782,942 42				
Aid granted, 2,386.336 miles \$11,264,627 67				
Certificates outstanding..... 4,041,399 44				
Actual cash expended to 31st December, 1902..... \$7,223,228 23				
Totals.....	1,389,147 67	20,574,658 54	595,652 19	22,559,458 40

J. P. EDWARDS,

Accountant.

DEPARTMENT OF PUBLIC WORKS, ONTARIO,
TORONTO, January, 1903.

STATEMENT No. 4.

Being classified Statement showing the expenditure on capital account for Public Buildings, Public Works, Roads, Railways, etc.:—(1) The total expenditure for 4 years and 6 months, from the 1st of July, 1867, to the 31st December, 1871. (2) The total expenditure for 31 years, from the 1st of January, 1872, to the 31st of December, 1902 and (3) The grand total of expenditure from the 1st of July, 1867, to the 31st of December, 1902.

Name of Work.	Expenditure 1st July, 1867, to 31st December, 1871.		Expenditure 1st January, 1872, to 31st December, 1902.		Total expenditure to 31st December, 1902.	
	§	c.	§	c.	§	c.
1. Asylums for the Insane, etc., at Mimico, Toronto, London, Hamilton, Kingston, Brockville, Orillia and Cobourg	484,017	53	4,007,065	09	4,491,082	62
2. Penal Institutions, viz.:—Reformatory for Females, Reformatory for Boys and Central Prison	23,006	70	1,306,700	03	1,329,706	73
3. Educational Institutions, viz.:—Institution for Deaf and Dumb, Institution for Blind, School of Practical Science, Normal and Model Schools, Toronto, Ottawa and London	211,656	70	1,233,818	61	1,445,475	31
4. Agricultural Institutions, viz.:—Agricultural College, Guelph, Dairy Schools, Kingston and Strathroy, Dairy Farms, Mimico and Algoma..	47,350	00	580,019	97	627,369	97
5. Buildings for Administration of Justice, being Osgoode Hall, and Court Rooms, Lock-ups, etc. in the Districts of Algoma, Thunder Bay, Muskoka, Parry Sound, Nipissing, Rainy River, etc.	6,179	57	422,353	07	428,532	64
6. Parliament and Departmental Buildings, and Government House	157,668	55	1,614,473	41	1,772,141	96
7. Works for the Improvement of Navigation, such as locks, dams, slides, etc.	122,760	37	849,497	98	972,258	35
8. Works for the Improvement of Transportation, such as bridges, piers, roads, etc.	26,597	73	83,333	53	109,931	26
9. Drainage Works, expenditures and advances of Municipalities	116,632	58	263,923	42	380,556	00
10. Miscellaneous Expenditure, viz.:—Brock's Monument, Niagara River Fence and clearing of log houses, Township of Ryerson	3,682	03	26,084	46	29,766	49
11. Colonization and Mining Roads	189,595	91	3,534,989	35	3,724,585	26
12. Aid to Railways (actual cash expended)			7,223,228	23	7,223,228	23
13. Temiskaming Railway Survey			24,823	58	24,823	58
Grand total	1,389,147	67	21,170,310	73	22,559,458	40

STATEMENT No. 5.

Being Statement of Contracts, Bonds, etc., entered into with His Majesty in 1902.

Date.	Service.	Subject of Contract.	Contractor.	Sureties.	Description of Contract.	Amount.
Feb. 21.	Agricultural College, Guelph.	Supply and erection of a fan heating and ventilating system in the physical and biological laboratories and museum.	Purdy, Mansell & Company, of the city of Toronto.	None		\$ 2,173 00
Mar. 13.	Muskoka Lake Works.	Supply of timber for reconstruction of the swing bridge at Port Carling.	Thomas Burgess, of town of Bala, Muskoka.	None	White pine timber, dressed, per thousand ft. B.M. White pine timber, undressed, per M. ft. B.M.	25 00 20 00
Mar. 4.	Agricultural College, Guelph.	Plumbing work in connection with the physical and biological laboratories and museum.	Purdy, Mansell & Company, of the city of Toronto.	None		1,200 00
Mar. 15.	Maintenance of locks, and dams, etc.	Supply of timber for repairs to bridge at Port Sandfield.	The Rathburn Company, Gravenhurst.	None	White pine, hemlock and red oak timber	853 83
May 26.	School of Practical Science.	Excavating works in connection with the erection of additional buildings.	John Albridge, of the city of Toronto.	James Robertson Company, Limited, and Duncan Robertson, both of Toronto.		2,900 00
May 26.	Tennis-skimming and Northern Ontario Railway.	Clearing the right of way	Patrick Furlong of the town of Eganville.	None	Clearing, per acre Trees, each Fence posts, each Telegraph poles	15 00 15 01 35

June 6.	Agricultural College, Guelph.	Installation of wiring for electric light for buildings and grounds.	The Keith and Fitzsimons Company, Limited, of the city of Toronto.	None	2,125 00
June 16.	Agricultural College, Guelph.	Engines, dynamos, switch-board and apparatus for the installation of an electrical plant.	The Canadian General Electric Company, of the city of Toronto.	None	5,200 00
July 7.	School of Practical Science, Toronto.	Masonry, cut stone and brickwork in connection with new chemical and mineralogical building.	John Aldridge, of the city of Toronto.	Robert Davies and Thomas Christie, both of Toronto.	107,762 00
July 7.	School of Practical Science, Toronto.	Painting and glazing works at new chemical and mineralogical building.	Ross Brothers, of the city of Hamilton.	James Dixon and Charles Shields, both of Hamilton.	8,700 00
July 7.	School of Practical Science, Toronto.	Carpentry work in connection with the erection of the new chemical and mineralogical building.	Alexander J. Brown, of the city of Toronto.	James J. Brown and Charles Meech, both of Toronto.	39,980 00
July 7.	School of Practical Science, Toronto.	Plasterers work in connection with the new chemical and mineralogical building.	William J. Hynes, of the city of Toronto.	Edward Gearing and Thomas E. Aikenhead, both of the city of Toronto.	4,332 00
July 7.	School of Practical Science, Toronto.	Ironwork, etc., in connection with the new chemical and mineralogical building.	The Dominion Bridge Company, Limited, of the city of Montreal.	Arthur R. Boswell and Sidney Small, both of Toronto.	11,415 00
July 7.	School of Practical Science, Toronto.	Galvanized ironwork in connection with the new chemical and mineralogical building.	G. Duthie & Sons, of the city of Toronto.	George Moir and Harry Hutson, both of Toronto.	4,498 00
July 9.	Normal and Model Schools, Ottawa.	Supply of wood for the season 1902-3.	John Hency & Son, of the city of Ottawa.	John Black and Theo. W. Germain, both of Ottawa.	5 00 2 00

STATEMENT No. 5.—Continued.

Date.	Service.	Subject of Contract.	Contractor.	Sureties.	Description of Contract.	Amount.
July 9.	Normal and Model Schools, Ottawa.	Supply of hard coal for the season of 1902-3.	C. C. Ray, of the city of Ottawa.	James M. Hurcomb and Charles E. Russell, both of Ottawa.	Egg hard coal, per ton.....	\$ 7 20
July 9.	Departmental Buildings, and institutions, Toronto.	Supply of hard coal, hard wood and pine wood for season 1902-3.	William McGill & Company, of the city of Toronto.	John Colgan and George N. Williamson, both of the city of Toronto.	Hard wood, per cord..... Pine wood, "..... Egg, stove and nut coal, per ton..... Grate coal, per ton..... Pea coal, per ton..... Charcoal, per bbl.....	6 25 4 75 6 20 6 00 5 00 75
July 9.	Departmental Buildings and Osgoode Hall, Toronto.	Supply of soft coal and pine slabs for season 1902-3.	James H. Milnes & Company, of the city of Toronto.	James McKittrick and Giles S. Ransom, both of the city of Toronto.	Soft coal, per ton..... Pine slabs, per cord.....	4 75 3 75
July 25.	Asylum for the Insane, Kingston.	Supply and erection of two horizontal and multitubular boilers.	Selby & Youlden, of the city of Kingston.	None	.....	2,162 00
July 24.	Reformatory for Boys, Penetanguishene.	Slating roof of main portion of the main building.	Douglas Brothers, of the city of Toronto.	None	.....	1,049 00
July 22.	Ottawa Normal and Model Schools.	Alterations and enlargement of the chimney to boiler house.	Richard Lester, of the city of Ottawa.	None	.....	589 00
July 15.	Asylum for the Insane, London.	Sheet steel ceilings in the infirmary buildings.	William Stevely & Son, of the city of London.	None	.....	1,410 00

July 15.	Asylum for the Insane, London.	Plastering work in the infirmary building.	Anthony Irwin, of the city of London.	None	3,325 00
July 15.	Asylum for the Insane, London.	Interior fittings, finishing main stairs, external floors, etc., at the infirmary building.	John Pardom, of the city of London.	None	3,785 00
July 26.	Asylum for the Insane, London.	Wiring for electric light in the infirmary building.	The Electrical Construction Company, Limited, of the city of London.	None	1,295 00
Sept. 9.	Asylum for the Insane, London.	Plumbing and gas piping and hot water heating apparatus in the infirmary building.	Elliott Brothers, of the city of Kingston.	None	8,990 00
Sept. 11.	Agricultural College, Guelph.	Construction of a stock judging pavilion.	Alexander J. Brown, of the city of Toronto.	None	4,236 00
Nov. 1.	Asylum for the Insane, Toronto.	Construction of an addition to the bake shop.	George Henry & Son, of the city of Toronto.	None	1,140 00

J. EDWARDS, Law Clerk,
Public Works Department.

DEPARTMENT OF PUBLIC WORKS, ONTARIO,
Toronto, January, 1903.

FIFTEENTH ANNUAL REPORTS
OF THE
INSPECTORS OF FACTORIES

FOR THE
PROVINCE OF ONTARIO.

1902.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

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T O R O N T O .

REPORTS

OF THE

INSPECTORS OF FACTORIES

EASTERN AND WESTERN DISTRICTS

To the Honorable the Minister of Agriculture:

SIR,—I have the honor to submit the following report in connection with the discharge of my duties as Inspector of Factories for the Province of Ontario.

During the year 1902 the investments of capital were large, the out-puts of manufacturers were unprecedented, and agricultural yields exceptionally good, and as a result skilled and unskilled labor shared the prosperity and were in great demand. Application was made to me very frequently from manufacturers for extra help, but in all cases I could not meet the wishes of the employers on account of the scarcity in the labor market.

Renewal applications for overtime permits during the year 1902 have been received from a number of employers, but the Act does not allow renewals in certain cases and I therefore refused such applications. I granted seventy overtime permits in accordance with the requirements of Sections 11, 12 and 40 of the Ontario Factories Act.

INSPECTION OF FACTORY BUILDINGS.

The Municipal Act empowers the corporations of each city, town and village to appoint building inspectors, which has not been very satisfactory to this department, owing to the fact in certain cases that the buildings used for factories do not receive inspection, as provided for under the Municipal Act; therefore a great portion of our time has been given to work of this character which is very important.

BAKE SHOPS.

The present is an age of sanitary reform. Physicians, Boards of Health and sanitary Engineers have succeeded in arousing the public conscience and stimulating its understanding with very beneficial results.

Methods of living and working which would be tolerated some years ago are frowned upon to-day. Some of the proprietors of the leading hotels, as well as the bakers, invite guests and patrons to visit their kitchens and bake-shops at any time, knowing that they can do so without the injury to their appetites or physical senses that would formerly have followed upon such an expedition.

While much improvement has taken place in bake-shops, yet we find that outside cities, towns and villages are still without a modern system of sewage disposal, and in those cases it is somewhat difficult to enforce the Law. A clean shop means better conditions, more business than can be obtained from a carelessly kept bake-shop. Modern drainage, a liberal use of whitewashing, and the occasional use of a broom to remove cobwebs, and the floors and windows kept clean, will add greatly to the appearance of a bake-shop. Good heating and ventilation, also proper sleeping, washing, dressing, and eating rooms, are very requisite in bake-shops. The dressing rooms should be so arranged that the clothes may receive a certain amount of ventilation. These rooms, as well as the lavatories, should be separate from bake-shops, as now required by law. It is most unfortunate that water-closets and urinals should have been erected in bake-shops, and we are determined that the law shall be carried out in this as well as in other respects.

I find that machinery is being introduced largely, and therefore safety appliances should be adopted for bake-shop machinery, including dough-break, dough-roller, and dough mixer machines, etc. This would reduce the possibility of employees losing fingers, hands, and sometimes the arms, when operating those machines.

FIRE-ESCAPES.

Past history contains the record of many disasters caused by that devouring element, fire; and many valuable lives were lost that might have been saved had the proper care been exercised in providing sufficient fire-escapes for use in times of emergency. Under The Amended Factories Act this Department has been successful in having orders carried out requiring owners of factories to erect fire-escapes, and at the present time nearly all factories have been equipped. In some cases we encounter strong opposition from agents and owners, who claim that fire-escapes were unnecessary, as there was no danger of fire, etc.; also objection was made to fire-escapes defacing the appearance of their buildings. At the present time there seems to be no particular rule laid down for the erection and manufacture of fire-escapes, but this department undertakes to see that a satisfactory fire-escape is erected, notwithstanding the reports made by the owners that the inspectors are in collusion with the builders of fire-escapes. In connection with the erection of fire-escapes I have had occasion to visit buildings from three to six times before I could pronounce the fire-escape satisfactory.

CHILD LABOR.

While the law governing the employment of child labor is plain, and the manufacturers generally manifest a disposition to respect the law, yet we very often find cases of violation accounted for by furnishing the employer with false birth certificates, which in some cases were secured from the parent or guardian, and in other cases, notably in Hamilton, the child signing the certificate himself. In order to guard against a recurrence of the latter I have arranged with the employers to witness personally the parent's or guardian's signature, which, if not authentic, can be traced through the agency of the Registrar-General's department for the Province. We frequently find it trying to investigate the accuracy of ages in some cases, as a child being born outside the Province of Ontario; and although a question of doubt may arise in our minds, as well as that of others, yet, without proof, we cannot hope to win a prosecution in these circumstances. Moreover the employment of children is not a wise or economical expenditure of labor force, except to perhaps both employer and parent. But the legal course is plain. Society must protect itself, and cannot afford to permit the employment of its children at the expense of such education and physical development as will fit them for their future duties in life.

PROTECTION FOR ELEVATOR OPENINGS.

The present era of hustle and bustle has made the elevator a machine that is a necessity in manufacturing establishments. With the aid of working automatic safety gates, hatch doors and covers, the approaches to elevator openings have been guarded; nevertheless fifteen accidents have been reported during the year, and it is incumbent that guards, cables, shives, safety clutches, etc., should be examined frequently to ascertain if the elevator is in good working order as required by section 20 of The Ontario Factories Act.

WOOD-WORKING MACHINERY.

The wood shaper and wood jointer are classed among the most dangerous machines in the catalogue of wood-working machinery, yet the number of acci-

dents reported during the year have been fewer in number, which indicates that the owners of this class of machinery have been more careful in conforming with the law and complying with the orders of the inspectors relative to guarding such machinery. There can be no excuse for not providing guards for this class of machinery such as will insure at least reasonable safety to the operator.

CIRCULAR SAWS.

The circular rip-saw is one of the most convenient pieces of wood-working machinery in use, and is classed among the most dangerous, particularly when operated without saw-guards. At present there are a number of different styles of saw-guards manufactured and extensively used in factories throughout the Province, and they are giving entire satisfaction. Moreover, we feel that all saws should be guarded.

GEARING AND COG-WHEELS.

Gearing and cog-wheels, particularly when meshing inwardly, should be substantially covered and guarded; that is, the exposed parts which persons are liable to come in contact with and receive injury. This guard should be made secure so as to preclude all possibility of an accident. Guards can be made of metal casing, etc., and be so adjusted as to be removed when necessary for oiling and cleaning.

FRICTION CLUTCH PULLEYS AND CLUTCH COUPLINGS.

It is astonishing how little attention has been given towards providing friction clutch pulleys in large mills and factories where there is no direct communication with the engine or power room. I consider it most imperative that there should be on each flat of a mill or factory a friction-pulley, which would enable employees in the event of an accident to stop machinery on that flat instantaneously, thus saving time and perhaps life. The present system is uncertain, and engineers are frequently found engaged at other work and do not hear the emergency alarm gong which is not always found in good condition. Quite recently I had an experiment test made where about ten minutes were lost before the warning reached the engine room, which in itself is sufficient time to annihilate the entire staff.

EXPOSED SET SCREWS AND PROJECTING SHAFTS.

The few accidents reported as occurring on shafing is evidence that the dangerous protruding set-screw is being covered, countersunk or replaced with a headless screw. In causing the removal of this dangerous device this department has been the means of preventing many accidents. Projecting shafts with key-way slot should be also guarded.

EMERY WHEELS.

The inhalation of the atmosphere of a metal-polishing or grinding-room, laden with dust that is composed of mineral and metallic substances combined, caused by the operation of emery, grinding, polishing, or buffing wheels, is under the present law being rapidly remedied by the introduction of a modern fan-system in a great many factories to remove dust, etc., which is injurious to the health of the operators.

BOILER INSPECTION.

Thorough boiler inspection is only possible under Government supervision ; while we have some powers under Section 20 (g) of The Ontario Factories Act, yet we occasionally receive reports of boiler explosions which do not apply under the Act. A boiler explosion usually carries with it a loss of life, as well as destruction of property, and I would recommend that the law be so amended that all boilers in the Province of Ontario be inspected and tested by some authorized representative persons, who will follow the modern practice of ascertaining whether boilers are safe in places which do not come under Section 20 of the Factories Act or the Boiler Inspection Company of the Province.

Boiler inspection is usually regulated under the following order :—

No. 1. Hydrostatic tests.

No. 2. External inspection.

No. 3. Internal inspection.

The hydrostatic tests consist in applying a cold water pressure to a boiler that is completely filled with water, after which the inspector looks the boiler carefully over in all parts to see if there are any signs of leakage, or distress of any kind. This test is usually applied to new boilers or boilers that have undergone extensive repairs. This test is not considered to be injurious to a boiler when it is applied by a man with good judgment. The hammer test is recommended also when it can be applied.

External boiler inspection is made by looking the boiler over from outside to make sure that the attendants are not running it at a higher pressure than is allowed, that he is carrying plenty of water in the boiler, that the safety valve will blow off freely and at the pressure it is allowed, that the water gauges are in safe condition, that the boiler is not showing any signs of leakage or any bulges over the fire sheet, or signs of distress of any kind.

Internal boiler inspection, or hammer tests, as they are sometimes called, is made by the inspector entering the boiler through the manhole and looking the inside over carefully as well as the outside of the boiler. Among the things that he has to look out for are these: A deposit of sediment or muddy matter, hard incrustation or scale on the tubes and plates, corrosion of any part of the boiler, both inside and outside fractures of the plates, heads, headers, etc., leakage around the tube-ends, seams, and all other places where such leakage is possible, defective bracing of the flat parts of the boiler, grooving of the plates or heads, burned or blistered parts, defective accessories of all kinds, water gauges, feed pipes, blow pipes, steam pressure gauges and safety valves.

We frequently find that a steam gauge has not been tested for several months, which is wrong on account of the delicacy of its construction ; a great deal depends upon its accuracy. Moreover, safety valves are sometimes found weighed down with scrap material, and they occasionally stick, when it is difficult to tell whether the gauge or pop is correct. Such incidents as these help to explain some of the unaccountable boiler explosions, which upon subsequent investigation have shown neither low-water nor bad stay bolts. Owners should purchase the very best steam pressure gauges which is the general practice, and they should be tested frequently while in use. With the gauge correct, the safety pop valves should be frequently set, and any sticking should receive prompt attention.

SUGAR INDUSTRY.

Beet sugar factories have been erected and are now in operation in the towns of Wallaceburg, Dresden, Berlin and Warton. The condition of the sugar market has made it imperative that economic ways of production should be studied.

For this reason these plants have been equipped with the best possible machinery. During the beet season outside help was very scarce and hard to obtain.

CEMENT FACTORIES.

Cement factories have been operating in Owen Sound, Shallow Lake, Hanover, Durham and Strathcona, and are giving splendid results. The old style bachelor-kilns are being displaced by the modern rotaries, which will reduce to a great extent the possibility of accidents when unloading ovens.

SANITARY CONDITIONS.

The sanitary conditions of a great many factories and work-shops have been vastly improved by the enforcement of the Factories and Shops Regulation Act; nevertheless, there is still room for improvement. Sanitation includes lighting, heating, ventilation, sanitary draining, and plumbing, together with overcrowding of inmates in some of our factories and work-shops.

Lighting: A proper lighted factory or work-shop is one of the most essential requirements to both employer and employees in this progressive age of competition; and the following rule for lighting has been recommended in remodelling and also in the construction of factories and work-shops, viz.: The square root of the cubic space in a room should equal the area of glass required.

Heating: Different mechanical appliances have been supplied to effectually heat work-shops and factories. The subject of heating is closely allied with the subject of ventilation, and the best authorities on both these subjects say it is impossible to properly heat a work-shop or factory unless the ventilation is almost perfect.

Draining and Sanitary Plumbing: We find it almost impossible to force owners of buildings used for factories and work-shops to introduce a modern system of sanitary plumbing which affiliates with the construction of a modern system of public sewerage, which we regret to say has been neglected in some cities, towns and villages, and we desire to urge upon those who are officially responsible the great necessity for immediate action. The proper question of the day is: What can be done to ameliorate the conditions of the industrial classes employed in work-shops and factories, unless there is a proper sewerage system in each city, town or village in the province of Ontario. In recommending immediate action we are governed both by experience and conversation with owners of factories, who insist that it is almost impossible to modernize their buildings so as to conform with the requirements of the Factories and Shops Regulation Act, unless proper sewerage can be arranged. Moreover, we are frequently invited to agitate for the introduction of a modern sewerage system, which with scientific plumbing appliances, would eradicate a great many evils which now effect the health and comfort of a large percentage of the workers engaged in factories and work-shops in this Province.

Overcrowding. The effect upon the health, morals, and mentality of working people employed in overcrowded work-rooms; and the basis both as to cause and effect of the problem of overcrowding work-rooms, lies in the immigration competition and massing of population in our cities. The condition is that to keep a room pure, from two to three thousand feet of air should be allowed to pass into the work-room or factory for each person employed. If one foot of carbonic acid to one thousand feet of pure air vitiates the atmosphere of a dwelling house, it stands doubly true of a work-room: and if, according to eminent physiologists, each person should be furnished with 20,000 litres of fresh air every hour in order to make the air fairly wholesome, because in one hour, draw-

ing seventeen breaths a minute, he loads 2000 litres of air with one per cent. of carbon dioxide, surely this is more significant in an overcrowded work-shop than in an ordinary dwelling. The whole tendency of the present scientific enquiry regarding the germ theory of diseases raises the matter of overcrowding in work-shops into a new and vital matter of importance. According to the authorities, anything which reduces the vital energies of man or woman, even mental or physical weariness, as well as bad air containing noxious gases and impurities in overcrowded work-shops bringing about infectious diseases, may be attributed to defective hygienic arrangements.

In a paper on "Public Health, Industrial Wealth, and National Education," speaking on overcrowding and ventilation, the Right Hon. Sir Lyon Playfair says, it is a fact that vitiated atmospheres are the most fruitful of all sources of disease.

MECHANICAL VENTILATION.

Mechanical ventilation of a modern type is very essential to the best interests of those engaged in factories and work-shops. Public opinion within the last few years has given ample evidence of the desires for good ventilation in public or industrial buildings. Some people think that necessarily fresh air must be cold, and can only be obtained by opening windows or doors, and that fowl air must be drawn off by the introduction of vent tubes, but there are many ways of ventilating buildings and good results are obtained by means of fans on account of their uniformity. In the pressure system the fresh air is drawn from the outside and forced by fans into the rooms to be ventilated and escapes again through the flues provided for the purpose. In the exhaust system, ducts are provided for the inlet of the air, but the fans are connected to the outlet and circulation is maintained by drawing out the vitiated air and allowing fresh air to take its place. In connection with the subject owners of factories and work-shops do not give the question of proper ventilation and heating their earnest attention, which is much regretted.

ACCIDENTS.

The number of accidents reported as having occurred during the year total one hundred and ninety-eight, of which thirteen were fatal. Twelve persons were injured by falls, seventeen by burns and scalds, five by staying machines, seven by jointer machine, seven by buzz-planers, three by explosions, twenty-three by circulars and rip-saws, six by piling and handling lumber, six by pulleys, four by drill machines, seven by looms in card room, four by power press machines, twenty by wheels and gears, four struck by steam hammers, three by wool picker machine, fifteen by elevators, three by feed press dies, two by ventilator fan, and thirty-seven by miscellaneous minor causes.

The fatal accidents and causes were as follows :—

James Colville was killed by the bursting of a chopper. It was supposed that the mill became empty. This happened at McGowan's Flour Mill, Durham, on the 3rd of March.

Frank Billings, an employee of the Messrs. Semmens & Evil, Hamilton, had three fingers of left hand cut by knives of jointer machine, on February 18th. He was around for a week after the accident and expected to resume work; but eczema began to effect his arm, which was quickly followed by inflammation of the lymphatic glands in the arm and which developed congestion of the lungs, causing death on the 12th of March.

Edward Fromm, an employee of the Berlin Furniture Co., Berlin, while engaged in operating wood working shaper machine, the knives broke, driving a

piece of wood against the abdomen, causing injuries from which he died on December 27th.

Wm. Chapman, an employee of the Toronto Paper Manufacturing Co., Cornwall, was struck in the stomach while adjusting a belt, on August 11th; died next day from the effects of a rupture caused by the accident.

G. Devane and A. Everett, employees of Messrs. Walter Stayzer Saw Mill Company, Forks Road, were killed by a boiler explosion, on the 12th of May.

John May, an employee of Messrs. A. R. Williams Machine Shop, Toronto, was injured on May 5th and died next day. This was caused by taking a light into a tank.

Angus Campbell, an employee of the Stratford Mill Building Company, was injured by a wooden beam falling from supports overhead, on him, resulting in death ten hours after the accident. This accident occurred April 22nd.

James Alexander, an employee of the M. Miles Sash and Door Factory, Toronto, was killed October 2nd, being struck by end of a board while taking lumber through an opening in the floor.

W. J. Reid, an employee of the American Abell Engine Co., Toronto, was killed September 1st, being struck in the abdomen by a piece of bass-wood thrown from a circular saw.

Geroge Nahrgang, an employee of the S. Knetchel Furniture Co., Southampton, was killed on August 18th, while repairing an empty tank that formerly contained methylated spirits; the tank exploded.

A. McLean, an employee of the Portland Cement Company, Shallow Lake, died August 9th, from burns received by top arch of bachelor kiln falling on him.

Dr. Horsey, M. P., was killed on July 23rd by the bursting of a pulley in the works of the Sun Portland Cement Company, Limited, Owen Sound.

In connection with the last named accident I received instructions to respond to an application received by the interested parties from the Government for an expert mechanical representative to visit the works, and, with other experts, to examine into the causes which killed the late Dr. Horsey. After spending several days in Owen Sound I returned to Toronto, and it was extremely difficult to place the responsibility on one cause more than another. However, a satisfactory settlement was arranged between all parties concerned. Moreover, as the strength of different class manufactured pulleys received very great attention at this investigation, I beg herewith to submit for the guidance of all interested in the strength of different pulleys, a report of tests made by Professor C. H. Benjamin, at Case School of Science, Cleveland. This will be of some benefit to those engaged in operating manufacturing industries:—

TESTS ON SMALL CAST IRON FLYWHEELS.

During the past few years a series of novel experiments has been conducted at Case School of Applied Science, Cleveland, Ohio, under the direction of Prof. C. H. Benjamin. These have consisted of bursting small fly wheels built upon different lines, by rotating them at high speeds. By comparing the results of these tests much valuable information has been obtained upon fly wheel design and the relative merits of different forms of construction. In November, 1898, Prof. Benjamin, read a paper before the American Society of Mechanical Engineers, detailing some of the results of these tests. From suggestions offered during the discussion of the paper, and at other times since, he has been lead to continue these experiments, resulting in another paper which was read before the Society at the annual meeting held this month. These later experiments have been for the most part upon wheels of peculiar design, and as the subject is of peculiar interest, the paper is being reproduced, almost in its entirety.

The wheels numbered 1 to 9, inclusive, were all of cast iron, 24 inches in diameter, with proportions copied from existing wheels.

Former tests had shown the insecurity of a wooden shield or cage for the bursting wheels. Fig. 1 shows the form of shield used in the later experiments. A cast-steel ring, 36 inches in diameter inside, and having a rim section 4 inches by 6 inches, was enclosed and supported by a wooden frame work, the front and back being of oak plank, three inches thick. To absorb the energy of the flying fragments a sectional lining of Norway pine was used, as this could be easily repaired and renewed after each test. Fig 2 shows the usual appearance after an explosion. During the sixteen experiments recorded but one wheel managed to escape from the shield, and this was due to the breaking of the bolts confining the side planking.

TABLE 1.—DIMENSIONS.

No.	Rim.			Arms.			Weight of Wheel. Pounds.
	Diam. Inches.	Breadth Inches.	Depth Inches.	Area Sq. Inch.	Number.	Area Sq. Inch.	
1.....	24	4.06	0.85	3.95	6	1.08	97.2
2.....	24	4.10	0.80	3.65	6	1.08	94.7
3.....	44	4.00	0.84	3.73	6	0.95	94.0
4.....	24	4.00	0.84	3.73	6	0.95	91.7
5.....	24	4.00	0.84	3.73	6	0.95	95.0
6.....	24	4.00	0.84	3.73	6	0.95	96.0
7.....	24	2.22	2.23	4.43	8	1.67	123.0
8.....	24	3.00	2.50	2.46	24	0.049	60.5
9.....	24	3.00	2.50	2.46	24	0.049	60.5
10.....	24	4.03	0.80	3.67	6	0.98	96.5
11.....	24	4.02	0.80	3.59	6	0.92	97.0
12.....	24	4.02	0.80	3.59	6	0.92	95.7
13.....	24	4.06	0.83	4.08	6	0.92	114.5
14.....	24	4.06	0.82	4.08	6	0.92	116.0
15.....	24	4.10	0.86	2.90	6	0.95	88.0
16.....	24	4.09	0.87	2.92	6	0.95	87.0

The wheels were keyed to the overhanging end of a steel shaft, 17 x 16 inches in diameter, running in a long bronze bushing and coupled loosely to a Dow steam turbine. Fig. 2 shows clearly the rear of the shield and the connections. As may be seen from the cut, the speed was measured by means of a countershaft and belt tachometre, the speed being reduced in the ratio of one to ten. Belts made of two thicknesses of adhesive electric tape stitched together were found to be satisfactory at the speeds used, being free from slip.

TABLE 2.—FLANGES AND BOLTS.

No.	Flanges.			Bolts.		
	Thickness.	Net Breadth.	Net Area.	No. in Joint.	Diam.	Total Tensile.
	Inches.	Inches.	Sq. Inch.				In.	Strength.
3.....	1.0	2.4	2.4	4	375	20,000
4.....	1.0	2.4	2.4	4	375	20,000
5.....	1.0	2.4	2.4	4	375	20,000
6.....	1.0	2.4	2.4	4	375	20,000
10.....	1.0	2.4	2.4	4	375	20,000
11.....	1.0	2.4	2.4	4	375	20,000
12.....	1.0	2.4	2.4	4	375	20,000
15.....	1.0	1.9	1.2	2	500	18,000
16.....	20/35	1.9	1.2	2	500	18,000

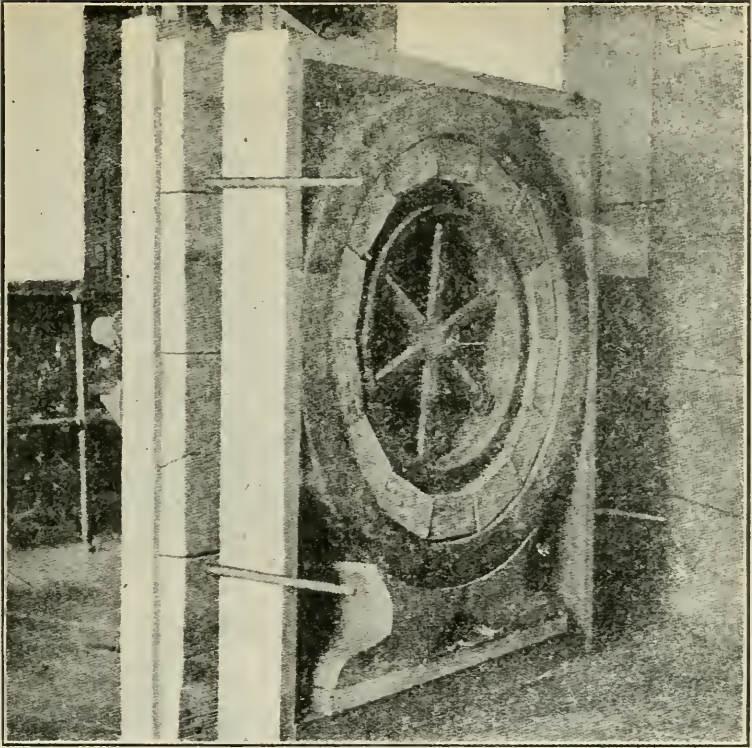


Fig. 1. Casing for wheels. The outer ring is cast steel 36 inches in diameter ; sectional lining Norway pine.

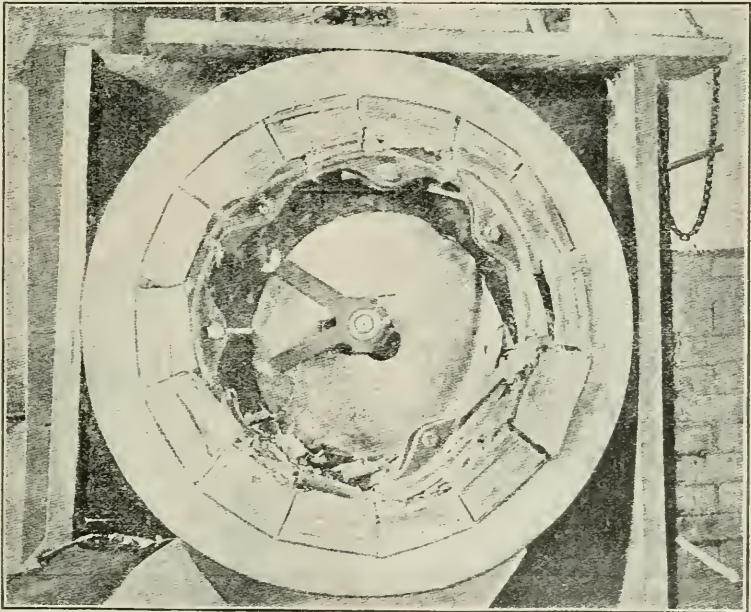


Fig. 2. The usual appearance after an explosion.

Wheels, Figs. 1 and 2, were cast with solid rims, and were modelled closely from a fly-wheel 10 feet in diameter on an Allis engine. These wheels were tested to furnish a standard of comparison for the other wheels. Fig 4 shows the shape and proportions of this class, and table gives the dimensions. These two wheels failed at 3,700 and 3,850 revolutions per minute respectively, or at an average rim speed of 395 feet per second. This corresponds to a centrifugal tension of about 15,600 pounds per square inch. The fracture showed clear iron of a uniform quality.

The four wheels numbered from 3 to 6 each, had two flanged joints in the rim, as shown in Fig. 5. These were of the same general proportions as those described in the previous paper as may be seen by reference to Table 2. At the suggestion of Mr. James B. Stanwood, of the A.S.M.E., they were located at points one-quarter of the distance from one arm to the next, these being approximately the points of least bending moment. As shown in Table 3, these wheels burst at from 1,800 to 1,900 revolutions per minute, or an average rim speed of 194 feet per second. This corresponds to a centrifugal tension of about 3,750 pounds per square inch. These wheels were then only one-quarter as strong as similar wheels with solid rims, and burst at one-half of the speed. Comparing these with wheels of similar construction tested in 1898, we find that moving the joint from the centre to the quarter point has made no appreciable difference in the strength. This is doubtless due to the fact that the heavy mass of the flanges and bolts locates the bending moment at or near them "Where McGregor sits there is the head of the table."

TABLE 3.—BURSTING SPEEDS.

No.	Bursting Speed.		Centrifugal Tension.	
	Revolutions per minute.	Feet per second.	Pounds per square inch.	Total on Rim.
1	3,700	387	14,980	59,000
2	3,850	403	16,240	59,000
3	1,800	188 5	3,570	13,560
4	1,850	193 6	3,750	14,000
5	1,900	199	3,950	14,780
6	1,850	193 6	3,750	14,000
7	2,450	256.5	6,600	29,400
8	4,050	424	17,970	44,000
9	4 050	424	17,970	44,000
10 ..	1,570	164	2,700	9,920
11 ..	2,100	220	4,800	17,200
12 ..	2,200	230	5,300	19,000
13 ..	3,650	382	14,600	59,600
14 ..	3,850	403	16,300	66,500
15 ..	2,080	218	4,800	13,900
16 ..	2,175	228	5,200	15,200

Fig. 5 shows the general manner of fracture of these wheels. Strange to say the joints usually remained intact the belts being slightly stretched, and the rim broke closely to the joint, as shown in the cut. The combined tensile strength of the bolts in the flange joints was about 20,000 pounds, or less than one-third the strength of the solid rim, which is about the maximum ratio possible with this style of joint.

The practically instantaneous character of the explosion is illustrated in Fig. 6, which shows the appearance of Wheel No. 6 after rupture. With but one exception each piece of the rim was imbedded in the wood lining in its

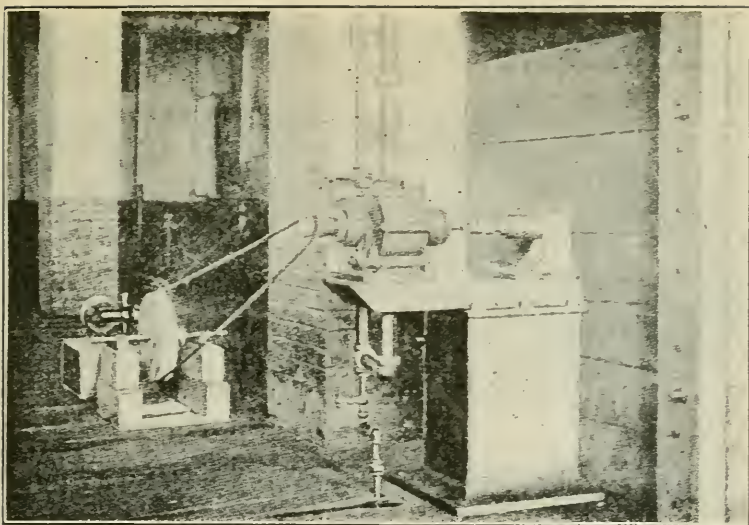


Fig. 3. Dow turbine apparatus for speeding wheels.

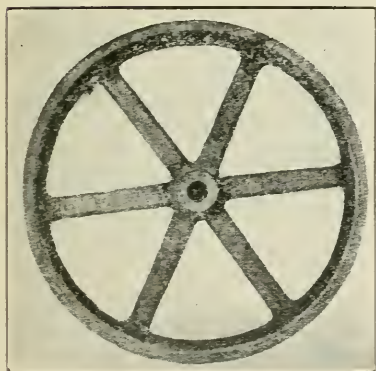


Fig. 4.

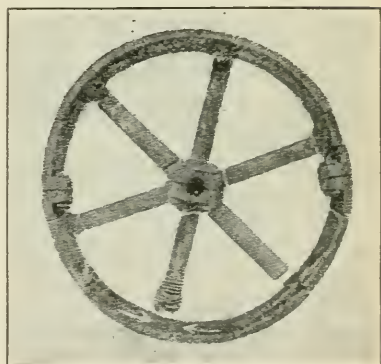


Fig. 5.

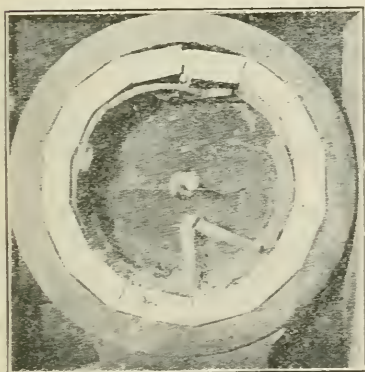


Fig. 6.

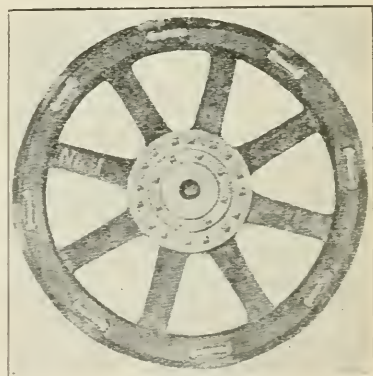


Fig. 7.

proper place, and remained there, indicating a nearly simultaneous movement of the fragments. The lining was rotated in the steel ring through a considerable angle.

Wheel No. 7 was a complete working model of a fly-wheel for a blowing engine, and was copied from drawings furnished by a well-known firm of engine builders. The construction is clearly shown in Fig. 7, and the dimensions are given in Table 1. The joints in the rim were carefully fitted and the links shrunk in. This wheel burst at 2,450 revolutions a minute, and a rim speed of 256 feet per second, which indicates a centrifugal tension of about 6,600 pounds per square inch, and shows that this wheel is nearly twice as strong as those just described. As may be seen by reference to Fig. 8, the wheel broke in every instance through the smallest section of the rim near the joint, the links remaining intact. It is interesting to note that every bolt in the hub was shaved off clean as by a knife, each arm pulling out in this way.

Soon after the publication of this paper the writer had correspondence with Prof. Archibald Sharp, of London, England, which resulted in the latter's sending to this country two model wheels to be tested, which are numbered 8 and 9 in the tables, and were constructed as shown in Fig. 9. The rims were solid, and were made of a close grained cast iron, having a high tensile strength.

Each wheel had 24 spokes of steel wire, 12 on each side of the centre plane. A pair of spokes constituted a loop, fastened at each end to the rim with a thread and nut, and passing spirally round the hub in a groove cut for that purpose. By tightening up the nuts at the rim the wheel could be accurately centred and sufficient friction caused at the hub to prevent slipping.

The two wheels failed at precisely the same speed, 4,050 revolutions per minute, or a rim speed of 424 feet per second. This would correspond to a centrifugal tension of nearly 18,000 pounds per square inch, and is probably the maximum speed attainable with a cast iron rim. The appearance after rupture is shown in Fig. 10. The rims usually broke through the holes where the spokes were fastened, and the spokes themselves broke at one or both ends where threaded.

The spokes had been adjusted to a uniform tension before the test by tuning them the same pitch. This uniformity of tension, and the large number of spokes, must have prevented any serious bending of the rims, so that the latter failed by direct tension.

The speed given is the highest attained in any of the experiments. One fact in connection with the last experiment deserves mention. It was found impossible at first to bring these wheels up to the desired speed. At about 3,000 revolutions per minute the speed would remain constant, and no increase of steam pressure would avail to change it. Becoming convinced that this was due to air resistance on the spokes and cross flanges of the rim, the writer had the wheels inclosed by disk of Russian iron, wired together and revolving with the wheels. No further difficulty was experienced, and the bursting speed was attained within two minutes of the time of opening the throttle. Similar devices had to be used with wheels numbered 13 to 16 inclusive.

Wheels numbered 10, 11 and 12 had their usual flanged joints, located midway between the arms and fastened with four three-eighth inch bolts. The joints in wheel No. 10 were unsupported, while those in wheels No. 11 and 12 were strengthened by steel tie rods running from hub to joints and bolted at each end as shown in Fig. 11. The net tensile strength of each tie rod was about 5,000 pounds. The two rods connected to each joint had then a combined tensile strength about two-thirds that of one arm. Wheel No. 10 burst at 1,170 revolutions per minute, a rim speed of 164 feet per second, which is only about

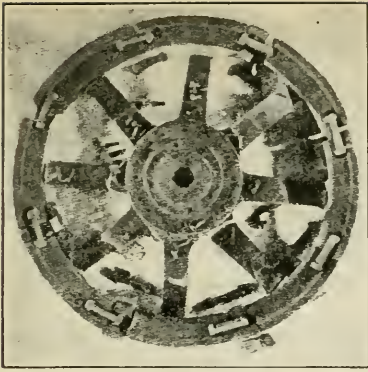


Fig. 8.

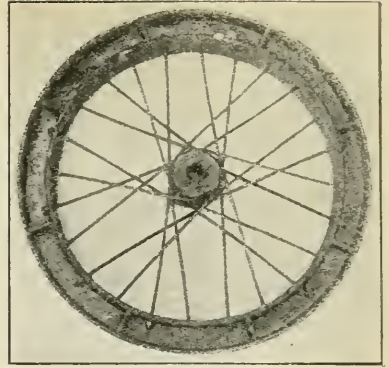


Fig. 9.

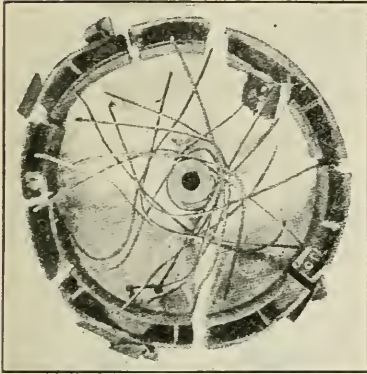


Fig. 10.

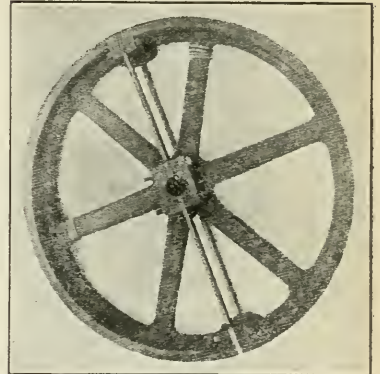


Fig. 11.

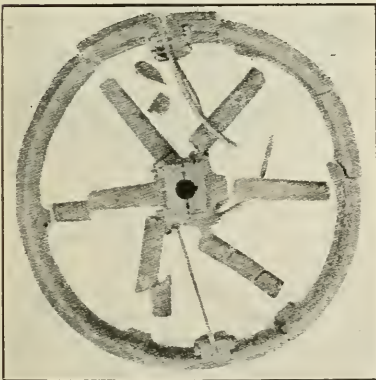


Fig. 12.

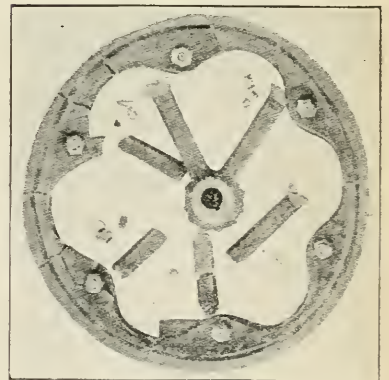


Fig. 13.

five-sixths of the speed usually attained by this class of wheel. The break was in the rim just beside the flange, and the low speed would indicate a poor quality of iron.

Wheels Nos. 11 and 12 broke at 2,100 and 2,200 revolutions per minute respectively, or at an average rim speed of 225 feet per second. Comparing those with wheel No. 10, as the three wheels were of the same iron, and identical in every respect save the tie rods, we find an increase of from 34 to 40 per cent. in the bursting speed due to the use of the tie rods. This corresponds to an increase of nearly 100 per cent in the strength of the joint. If the tie rods had been more carefully designed and constructed a greater speed could have been attained.

Fig. 12 shows the appearance of wheel No. 12 after rupture. The tie broke through the bolt holes at one or both ends, the bolts remaining intact with but one exception.

Wheels Nos. 13 and 14 were of peculiar construction, as may be seen from Fig. 13. The rim of each was cast in one piece, while the hub and arms formed a spider, also in one casting. The arms were joined to the internal flanges of the rim by five-eighth steel bolts, giving one degree of freedom. The object of this construction was two-fold:—First, to relieve the bending moment at the junction of the arm and rim. Second, by concentrating more weight near the arms to stretch these latter and thus relieve the bending moments in the rim midway between the arms.

These two wheels burst at 3,650 and 3,850 revolutions per minute, or an average rim speed of 392 feet per second. Comparing these figures with those given from wheels Nos. 1 and 2, we find that the speeds are practically the same. There is no apparent advantage in the special construction just described over the ordinary method of casting the spokes and hub with the rim.

Fig. 13 shows the appearance of wheel No. 13 after rupture. The arms all broke on the eye near the rim, the bolts not being injured. Only one web was fractured. Fig. 2 shows the wheel immediately after the explosion, the front of the shield and cover plate being removed. The embedding of the rim fragments in the wood-lining in their proper order is clearly shown, the same as in Fig. 6. The absence of any tearing or rending sound and the single sharp report, like a small cannon also evidenced the practically instantaneous character of the explosion.

Wheel No. 14 was the one which escaped from the shield, as has already been noted. The wood-lining was reduced to fine splinters. The cast steel ring, weighing over 800 pounds, was rotated through an arc of 12 inches, a $\frac{3}{4}$ -inch bolt was broken off short, and the three-inch oak planking split and torn.

Wheels Nos. 15 and 16 were also of special construction, as seen in Fig. 15. The hub and the arms were cast together as a spider and bolted to pads on the rim. The two joints on the rim came over the arms and the rim between the arms was reinforced by elliptic webs. The construction is a slight modification of that suggested by Mr. A. Frith. This construction is intended to stretch the arms more and bend the rim less than the common form.

These two wheels burst at 2,080 and 2,175 revolutions per minute, respectively, or an average rim speed of 223 feet per second. Fig. 14 shows the

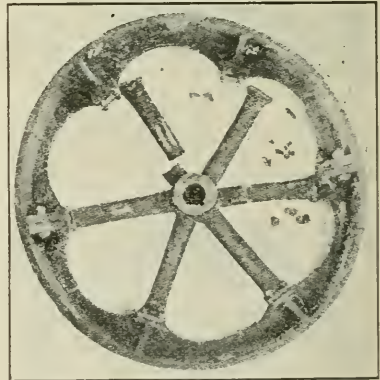


Fig. 14.

manner of failure. The ends of the arm failed in several different ways: sometimes it was the screws that broke, sometimes the lugs on the arm, and sometimes the pads on the wheel. The rim usually broke at points midway between the arms. In wheel No. 16 the joints remained intact. It will be seen that Nos. 15 and 16 were practically the same strength as Nos. 11 and 12, but only about one-third as strong as wheels with solid rims.

The conclusions of the previous paper are confirmed by these further experiments. For wheels of moderate size correctly proportioned the solid rim is by far the safest form, and will require a speed of from 350 to 400 feet per second to produce rupture. The stress due to bending is so small as to be negligible. Jointing the arms at the rim and bracing the rim by internal webs have no important effects on the strength.

Joints in the rims are the principal source of weakness, especially if located between the arms. Probably no joint can be made for a rim of solid cross section which will be more than one-third as strong as the rim itself.

Hollow rims will permit of a much more efficient joint, as has previously been shown by Mr. John Frith. In his wheel the joints are practically as strong as the rest of the rim. This construction is hardly possible in wide-faced band wheels such as are used on most shop engines. Joints similar to those shown in Fig. 14 are probably the best that can be devised for this type of wheel. If joints are located midway between the arms they should be reinforced by tie rods leading to the hub.

The English wheels, Nos. 8 and 9, show clearly the advantage of numerous arms on any type of wheel. Even if the rim were jointed, such wheels would prove their superiority to those with the ordinary arms in maintaining their shape at high speed.—(*Steam Engineering*, New York, December, 1901.)

During the year 1902 I made about nine hundred trips of inspection. A list of accidents is herewith appended.

JAS. T. BURKE.
Inspector of Factories.

CENTRAL DISTRICT.

To the Honorable the Minister of Agriculture :

SIR,—I have the honor to submit to you a report of the work of inspection of factories, workshops, and mercantile establishments in Ontario for the year 1902.

In nearly all industries business was reported as being very good. In many places complaint was made that sufficient help could not be obtained in order to supply the demand for certain goods, more especially was this the case where females were employed.

It is much to be regretted that the number of accidents reported still continues high; but as accidents occurring in factories, from whatever cause, are now required to be reported, whereas formerly only those caused by machinery were reported, accounts for the great increase.

AGE OF CHILDREN.

There have been fewer complaints in regard to children working in factories under age, but complaints will likely continue until a more satisfactory system is obtained for verifying the ages, as no reliance can be placed on the majority of certificates given by parents.

COMPLAINTS.

In some cases complaints have been made which, on investigation, were found to be greatly exaggerated as to the conditions complained of. In one case where an alteration was being made the piping from the forges was temporarily left disconnected with the chimney, owing to the absence of the tin-smiths, and which, as stated would have been replaced in a day or two, was complained of as having been for an indefinite length of time in such condition and likely to remain so; the employer in this case felt hurt to think that any of his men should have complained to the Factory Inspection Department rather than to him. He thought in such cases the complainant's name should be given, but having been notified when appointed that communications regarding complaints should be treated confidentially, and the name of the complainant withheld, the request could not be complied with. I may state that the late Hon. C. F. Fraser, who had control of the Factory Inspection Department when inaugurated, pointed out that unless complaints were made confidential the workers could not be expected to aid the inspectors in carrying out the provisions of the Act by making known any infraction to them. He also stated that the Labor Unions, who had asked for the legislation, were to aid in carrying it out, and I understood him to say that the labor representatives with whom he had discussed the legislation had promised to do so.

In many cases anonymous complaints have been made, but they are investigated and dealt with equally as well as those in which the names are given.

ACCIDENTS.

The number of accidents reported and ascertained as having occurred during the year were one hundred and eighty-six; of these six were fatal, forty-three were injured by circular saws, seventeen by power presses, and six by gears.

William Corbett was working in a factory underneath where a vat for boiling soap was situated; the soap when boiling splashed on the wall; there being quite an amount of soap attached to the wall, a large portion of this had

become detached and fell a distance of about thirty feet; a large piece of oak had fallen also; either of these had struck the deceased. An inquest was held and a verdict of accidental death returned.

Fritz Hoffman was scalded by hot beer. The coroner decided it was not necessary to hold an inquest.

Wellington Lawrence was on the elevator and carelessly crossed over to look out of the shipping door. His head was caught between the floor of the elevator and the doorway causing death. He had only started to work in the factory a few hours previous to the accident. He had given his age as fourteen, and, as was customary, had been given a blank certificate to get his parents to fill in as to his age. It was afterwards learned that he was not fourteen. It was stated that his parents did not know that he had gone to work in the factory. I pointed out to the superintendent that he had better have certificates of ages filled in and signed by the parent before any boy is allowed to work, otherwise the employer would be held liable.

George Webster's and H. Campbell's deaths were caused by a boiler explosion. From the report of an expert who investigated the cause of the explosion I learned that there were eight steam boilers in the boiler house fitted in pairs: that is one furnace served two boilers. Numbers 7 and 8 had been separated from the other six, by the valves being closed on the steam pipes. Steam was wanted to run a small engine in the shop, and as a pipe led from No. 8 boiler to this engine, it was decided to get up steam on No. 8. Fire was started in the furnace, and kept up as much as possible under No. 8, but the heat passed under No. 7, and gradually raised steam in it. The man in charge must have failed to notice this, and as the safety valve was on the main steam pipe and the boiler was shut off from the pipe, there was no outlet for the steam. Suddenly the flues collapsed and the contents of the boiler were violently discharged and the flues broken, but the main shell of the boiler was but very little injured. The two men happened to be in the line of discharge from the boiler and were killed. The boiler was all sound for the comparatively low pressure used to run the engine, but no person knows what pressure had been raised in the boiler which gave way. The flues of all the boilers have been strengthened, and safety valves have been placed directly on the boilers.

The accidents occurring to the workers, or the "Butcher Bill" as it is termed in England, show the penalty paid for the increased productive power of labor in the use of machinery. Can it be that nature resents the use of machinery, as an attempt to save man from the curse "that in the sweat of thy face shalt thou eat bread?" It would appear that those operating machinery should not be required to work long hours; more especially should this be the case where extra dangerous machinery is being operated. Where the mind is kept in a state of tension, for a length of time in operating a machine it is easy to see that the operator, because of becoming fagged, renders himself more liable to accident, and carelessness is frequently given as the cause of accidents, when too often the great strain of the mind of the operator would be a more satisfactory explanation, and which shorter hours would remedy.

FIRE-ESCAPES.

There are still a few factories requiring fire-escapes. The owners not being in the Province, the buildings being mortgaged, and the mortgagee drawing the rents, a change should be made authorizing tenants to erect fire-escapes and deduct the cost from the rent. Owing to contractors of ready-made clothing moving so frequently, and neglecting to comply with the requirements in notifying the inspector, as required by Section 51 of the Amended Factories Act, it is

difficult to keep track of them, notwithstanding they are aware that fire escapes are required. Contractors of foreign origin, too often neglect to see that the safety and health of their workers is provided for, before beginning to occupy other premises. It will be necessary to resort to prosecutions for future contraventions of the Act.

INSPECTION OF BOILERS.

With reference to the inspection of boilers in factories, where the boilers are not insured, it is seldom that a certificate has been obtained as required, and in consequence thereof an additional visit is necessary. In one case complaint was made that a pressure of 120 lbs. was carried on a boiler which, it was stated, was considered unsafe, as 80 lbs. was what had been formerly carried. A certificate was asked for, as to the pressure it would be safe for the boiler to carry. An expert who inspected the boiler stated that certain repairs having been made, the boiler would be allowed to carry a pressure of 90 lbs., showing that there was cause for the complaint, and that the safety of the workers was endangered by carrying a pressure of 120 lbs.

VENTILATION.

The ventilation in factories is not satisfactory in winter, and there appears to be the same conditions complained of in Britain, as the following taken from the *Scientific American* shows: "Dr. A. Wynter Blyth, Medical Officer of Health, for Marylebone, President of the Incorporated Society of Medical Officers of Health, in his presidential address, in discussing ventilation, says if some of the great expert talent now employed in the investigation and discussion of problems relating to sewage and sewage disposal were diverted to the study of ventilation, our factories and workshops would put out more work in a given time, and the duration of human life would be appreciably lengthened." Were the cubic space to be allowed for each employee in factories and workshops, stated in the Act, it would aid in preventing overcrowding.

PROSECUTIONS.

There was only one prosecution during the year in the Central District, which resulted from a contravention of the Shops' Act. In March, G. Marrison, Baker, Ottawa, allowed his employee to work on Sunday, and was fined \$20 for the same.

OVERTIME.

Eleven permits for overtime were granted in factories during the year.

A list of accidents reported during this year, which occurred in the Central district, is appended herewith.

I have the honor to be, Sir, yours very respectfully,

JAMES R. BROWN,
Inspector of Factories.

EASTERN DISTRICT.

To the Honorable the Minister of Agriculture for Ontario.

SIR,—I beg herewith to submit my report of inspection of factories for the year 1902.

The principal factories in the district allotted to me this year are saw-mills, and to these I have paid particular attention, as for sometime there occurred some slight accidents which from the circumstances appeared to be due to negligence on the part of either the victim or employer, and showed danger of more serious accidents. I have investigated the circumstances in each case and I have found, I regret to say, that most of them were due to the negligence to place protection to machinery which had been previously ordered but which had, for some purpose or other, been removed. In several of these instances very serious accidents might have occurred owing to the machinery, devoid of and left without their usual protection.

I have had occasion this year at two different places, once at Rockland and the other at Hawkesbury, to notice the danger of stopping machinery and re-starting them or connecting the power with them without giving proper warning. In one case at the Hawkesbury mill, in the department of laths and pickets, the young men were playing and amusing themselves when the machinery was suddenly put in operation, causing imminent danger of accidents of a very serious character. Considering the very serious and fatal accidents which have occurred in the past, and the danger of accidents arising from such practice, it would be advisable that the Act would make it obligatory in all such cases that a proper warning be given to all employees working around machinery before connecting the power with them, and that a notice of the obligation of such warning be kept permanently posted at such place as to be seen when starting the power. I feel convinced that this would have the effect of preventing very sad accidents.

CHILD LABOR.

In two of the saw-mills in my district, I regret to say, children under the age fixed by the Act have been employed this year. It is very difficult to obtain positive and sufficient information to enable the inspector to succeed in a prosecution. In both of these mills the proprietors attempted to relieve themselves of the responsibility of the violation of the Act in this respect by stating that these children were employed by some persons who were carrying out some departments of the mill by contract and were supplying their own employees; but in both instances I observed that under this pretext the principal employers themselves were employing some children. In one case, through the assistance of some parties who interested themselves in matters of education, and who were anxious to see all young children attending school, I have succeeded in securing such evidence as would permit me to prosecute with chances of success; but the necessity under clause 39 of the Act to bring the action before, and have it heard by two Justices of the Peace creates a difficulty which cannot always be overcome. In this instance I had the papers for prosecution prepared, but the limit for prosecution had elapsed before I could secure the two magistrates to attend to the case, as one was living at a considerable distance and for several reasons, and the pretext of weather and bad roads, delayed till too late. Without being desirous to cast any reflections on the character of any persons, I must say that we have sometimes to face sympathy for the employer who is considered a benefactor, which prevents us presenting a case sufficiently strong to secure a conviction. I

feel that the Act should give the inspectors authority to have their prosecution for violation of the Act brought before and heard by one Justice of the Peace in the district. In the year 1899 I was requested by the Honorable the Minister of Agriculture, owing to complaints presented, to investigate the construction and management of a saw-mill and factory at Casselman. The complaints were, "its close proximity to large buildings in the centre of the village and its construction and careless management, which may cause fire." As to its location, as reported at the time, it was a matter which could only be regulated by the Municipal Council; with regard to its management, the difficulty is that there is not a sufficient number of persons employed in the mill to permit interference of the Factory Inspector although every year when in Casselman I make an inspection of the premises.

The mill is sufficiently large and of such capacity as to enable the employment of several hands, but only three persons are employed, and only one department is put in operation at one time, so that the same persons operate it and the other departments in the meantime are closed. I have, however, year after year inspected the mill and made several suggestions of improvements to afford more and better protection to the neighbors against the danger of fire. I must say that one of the proprietors has always received these suggestions very courteously, and with the determination to carry them out, and this year I have noticed much improvements in that respect; but they are not fully what I would obtain if I had jurisdiction to enforce my suggestions. In this mill the boiler is very old and not perfectly safe, and the boiler room is small and not sufficiently fire proof and not well lighted. The other mills in that locality are fully protected, and no children are employed.

VENTILATION.

In all these mills, which are run only during the summer season, there is no necessity of providing more and better ventilation as they are almost all open, but in other factories means of ventilation are required. I have found in the Riordon Paper Mills in Hawkesbury a large room where some four or five hands are employed, without proper ventilation, and the heat and steam were almost unbearable and became dangerous, from the fact that the adjoining room was very cool in summer and very cold in winter as there were no means of heating it and was used only for store or packing-room. As they were constructing extensions to this department and others, they promised to provide at the same time sufficient fans and other means to fully and properly ventilate all these rooms. I expect to find these rooms more comfortable at my next visit. The working hours in the saw mills are generally longer than in other factories, especially where they work at night; most of the mills run without interruption in order to be able to cut all their logs during the short season of the summer. At this night work very often young men between the ages of fourteen and eighteen are employed, and at the end of the season their constitution is so affected as to be almost unfit for any work, and they require to rest during the winter to be able to resume their work the following summer. No person under twenty-one years of age should be employed in those saw-mills between seven o'clock in the evening and six in the morning, as their constitution is not sufficiently strong to dispense with their sleep at the proper hours of the night.

The Inspector very often experiences some difficulties in making his inspection of all places to be inspected for want of knowledge of the existence of these factories. This year late in the summer I was informed of the existence of a saw-mill employing several hands at L'Orignal, although I had previously passed there when there was no such mill. I have also been informed of the ex-

tension to other places which I had previously visited when a sufficient number of hands were not employed to place them under the effect of the Factories Act. These informations I have received too late to permit me to make an inspection at the proper time. It also happened that I have been at places for the purpose of making inspection when the factories were temporarily closed for a few days. It would be advisable that all owners of factories coming under the Act be informed through the newspapers, that notices be given to the inspectors of time of commencing and closing operations. I have noticed in mostly all places where children were employed in violation of the Act that the employer had yielded to the importunities of the parents, who give some certificate that their children are of proper age. These certificates are of little value as they are mere statements in writing supposed to be signed by the parents, but without any persons witnessing their signature, which would enable the inspector to prosecute the parents in case of fraudulent statement or certificate.

ACCIDENTS.

Very few accidents have been reported to me during the year, although I have learned on making inspections that several had occurred; but of these none were of a serious character and very few had prevented the victims working more than one week. I suppose the employers considered that as they were so mild there was no necessity to report them: in all cases I have given instructions to send me a list of them, but this has been neglected.

The following were those received:

Dennis Larivière, finger smashed in pulp mills at the Riordon Paper Mills, Hawkesbury, on the 24th of May.

Another accident was reported to me from Carleton Place, Canada Woollen Mills, which is not now in my district.

Thomas Craig had his finger cut on the 19th December, 1902.

I have noticed an increased activity in all the mills and factories during the year, and therefore a tendency to work longer hours in order to meet the demands of trade. In several instances arrangements are being made for extension and increased powers to manufacture for the year 1903, and in every case the manufacturers cheerfully acknowledge very encouraging prospects of increased trade.

Isidore Monette had his hand caught in the rods of the paper-drying machine in the Riordon Paper Mills at Hawkesbury on the 30th day of May. The bones of the hand were broken.

All of which is respectfully submitted.

O. A. ROCQUE,
Inspector of Factories for Eastern Division.

FEMALE INSPECTOR OF FACTORIES.

To the Honorable the Minister of Agriculture.

SIR:—I have the honor to submit to you a report of the work of inspection of factories, workshops, and mercantile establishments in Ontario for the year 1902.

The close of the year 1902 brings with it the duty of reviewing the work accomplished, and giving a report of the same to you. Much of the work of the Inspector does not appear on the surface, and you can easily understand how difficult it is to give an adequate idea of the actual work. A great deal of work is frequently done that apparently bears no immediate fruit and of which no formal report can be made. It has been impossible for me to inspect the different workshops and factories very often during the year, but my time has been devoted to those places which require the most careful attention. Experience has shown me that where we are able to revisit factories frequently, our suggestions are more promptly complied with. There is a wide contrast between the best condition of factory life and the worst. The best cannot be reached in all cases, but where there is an effort made towards improvement we must be satisfied to procure the necessary alterations, one by one. The inspection of small places is very important, as the sanitary and safety precautions are likely to be disregarded, and the idea seems to prevail that anything will do where so few are employed. My duties have taken me into almost every city and town in the Province where females are employed in workshops, factories or mercantile establishments.

During the year I have inspected 1835 establishments which come under the operation of the Factories' and Shops' Acts; of these 520 have been shops where clothing is manufactured.

In going over the work of the year there is no change of any radical nature to comment upon, although a very general progress has been made, and many important improvements have been adopted. We factories inspectors have abundant opportunity to note the harmony and united good feeling that prevails, where employers conduct their business on principles of humanity. The enforcement of the factory laws has educated many employers on the sound theory that good surroundings are conducive to good work, good sanitation to good health, and that protected machinery is a safeguard against damage suits. It is a pleasing duty to record the readiness on the part of employers, generally speaking, to do whatever should be conducive to the welfare of the workers without any unnecessary delay. Of course, a few objectors are always to be found to unaccustomed ways, some of these believing the Act to be a mere form, which should not be enforced. However, such notions are soon dispelled. A very pleasant feature of factory inspection is its double nature; it is very pleasing for us to receive a cordial greeting from the members of the firms, and at the same time pleasant smiles from the faithful employees, who, in us, recognize friends looking after their safety and interest.

The wave of prosperity has continued with unabated force, until not only have the unemployed found employment at remunerative wages, but it has caused an actual dearth of mechanics and laborers in nearly all the trades. Manufacturers are crowded with orders, and sufficient help cannot be secured to operate the machinery now in position. I am pleased to inform you that I found scarcely an idle shop, and many new ones are now under construction or have commenced operation. Old factory buildings which have been abandoned for years as worthless, are being repaired, filled with new machinery, and put in working

order. Not only has the number of factories increased but there has been a marked increase in the number of employees.

HOURS OF LABOR.

The factories which work the full sixty hours a week are principally cotton, woollen, and knitting factories. They commence at 6.30 a. m., and quit at 6.15 p. m., taking one hour at noon, thus making 10 $\frac{3}{4}$ hours each day, in order to have a shorter day on Saturday. There is a very strong manifestation on the part of the employees, in manufacturing and mercantile establishments, to work a shorter time on Saturday than on the other days of the week, and to obtain this end they will petition this department to exercise its discretion in granting them the right to use part of the time allowed for noon day meal by working in advance for Saturday, thus shortening the hours for that day; but we have no power to grant such permission. Such a permit would be injurious to young girls and women, who would hurriedly partake of the noon day meal and rush back again to the loom and spindle for six days in the week in order that they might quit earlier on Saturday. There seems to me to be only one practical remedy, and that is, to make a Saturday half holiday a permanent and lawful right of every employee, without abridging the privileges they enjoy during the week.

The hours of employment for females are shorter in cities than elsewhere. In almost every industry, a very large percentage of workers leave work at twelve o'clock, beginning at 7.30 and 8 o'clock, a. m., having one hour at noon, quitting at 5.30 and 6 o'clock, p. m., thus working from forty-five to fifty hours a week.

The system of piece-work is becoming more generally adopted as a result of the small pay given by the hundreds or thousands according to the different industries, which stimulates the eagerness of the workers to the highest possible pitch. I have seen girls working so rapidly that I was very painfully impressed, and I have asked myself how long their nervous system would resist the great strain of the excessive fatigue resulting therefrom? Piece-workers earn more money; every move they make counts, and the weary looks and pale faces tell the continued strain put forth to earn better pay. A shorter working day for this class of operators seems an imperative necessity. Women employed in boot and shoe, tobacco and cigar, woollen and knitting factories receive better pay than those working in other industries. In the many branches of the wearing apparel the rates of wages vary so materially that it would be impossible to venture on an average wage which would not be liable to contradiction.

In most of our mercantile houses seats are provided for the use of females when not necessarily engaged in the work or duties for which she is employed. It frequently occurs to me, in going about, that the practice exists in name only, as it has been proved that the cost of a women's position has been her desire to use the seat when wearied from over-exertion.

OVERTIME.

I wish to draw attention again to the subject of overtime. Any overtime after sixty hours per week is injurious to the health of young girls and women employed in the factories or workshops and unnecessary to the successful management of a business. Many women have expressed a wish that the number of nights in which overtime is allowed could be decreased, and I also find workers keeping a private record of their own time. They eagerly look forward to the completion of the thirty-six nights of overtime allowed in the year. Some of the firms exhaust their allowance in a short time by working each week four or

five nights and then make an application for a second permit. There are employers who deny the advantage of the overtime exemption, and who refuse to claim it, and nevertheless, they successfully compete with others in the same line of business as those who declare it to be necessary. Many employers without making use of the overtime permit have been able to satisfy the demands of a thoughtless public, and at the same time guard the health of their employees, which should remove the seeming conflict of interests between the gratification of some few hundreds of inconsiderate people on the one hand, and the health of several thousands of girls and women on the other hand. I have been struck by the frequently expressed opinion of employers, as well as of employees, that overtime is injurious alike to the best interests of both. I share this view very strongly myself and am convinced that the amount of overtime sanctioned under the Act is excess of the necessities, and even of the desires of those who have the best claim for consideration on the question of overtime. Then, there is the evil that arises from women employed in workshops who take work home after having worked the full time in the factory. This evasion of the law we cannot touch, and I think there should be some way of putting a stop to what is practically a regular system of overtime.

COMPLAINTS.

There is not a single item in all the transactions of the department which occasions so much waste of valuable time as this matter of complaints.

Many complaints, specific or correct information not having been given, upon investigation are often found to be pure malice, and no complaint should be sent to our department which is based on malice or spite as we have nothing to do with personalities; facts are what we need. Some complaints are made implicating every person in the locality engaged in this particular calling or trade. I do not mean to say that all complaints are such, as many which have reached me are fully justified and have been immediately investigated. There still remains a certain proportion of complaint which is impossible to deal with, because the matter was one that could not be remedied under our law, or in the desire to avoid all detection, the information was too vague to enable any satisfactory investigation to be made. A number of complaints has been anonymous as in previous years, but we hope that this proportion may diminish with the growing confidence of the employees. It would be more satisfactory to be able to reply to a complaint, or at least acknowledge the receipt of it, and frequently it would be advantageous and save time by receiving the details of the complaint. Complainants should realize the entirely confidential treatment of all complaints that are received, and the advantage it would be to place themselves in direct communication with the inspectors. It need hardly be added that they are thoroughly investigated and followed up in every case. Some of the matters complained of do not come under our jurisdiction, and when possible these were sent to the proper place for investigation. Complaints are received of female employees suffering from the vibration of rooms caused by heavy machinery. They describe it as being similar to sea-sickness, while others complained of nervous ailments caused by working all day, and day after day, under such conditions. This must be injurious to the health as well as very unpleasant. Complaints are made of the absence of any room where the workers can take their meals, which show that it is generally regarded as an illegal omission, and it is to be hoped that in the near future, all employers will see their way clear to provide a decent room where lunches can be comfortably taken. The dining rooms in some places are beyond praise, and in some are very good: not only every convenience, but some are supplied with hot tea or coffee, milk and sugar, free of

charge. It seems a pity that those employers who do provide a room for meals, would not go a step further to make the room comfortable; the slight cost would be amply repaid by the great comfort and contentment of the workers. I have received complaints from females having to work in the same room as those afflicted with tuberculosis. I think there should be a medical examination made from time to time among the employees, or at least those upon whom suspicion falls. For this purpose the medical health officer should be utilized, as he is a public officer, and it is for the benefit of the public that the examination is made and should be at there expense. If tubercular patients are allowed to work in factories and shops, and we very much question the desirability of permission being granted, it should only be in special cases and under specified rules; above all there should be no spitting except in vessels provided which should contain a disinfectant solution.

Complaints are received regarding no cloak room provided for the employees clothes, and I think it would be a great improvement to factories to have a cloak room as in many cases nothing is provided, and the workers emerge from the factories covered with fluff and dust, their outer garments being exposed to the mill dust during the working hours. I must say that a great many manufacturers are ready and willing to carry out any suggestions of the inspectors, whether it can be enforced by law or not.

Complaints of the doors of the factories being locked during the time the operators are at work in the building, are made, and the explanation given when reminded of this fact is generally to the effect that the doors are locked to keep out visitors who disturb the workers, or that some would take advantage of the open door to carry off valuable property. Where it will not interfere with the purposes of the law, nor endanger the lives of the employees, spring locks are allowed which can be easily opened by any person inside, but not from the outside.

I continue to receive complaints that the employers charge the employees with the thread, buttons, and machine needles, which they use in manufacturing clothing and underwear, and the employees feel it quite as unjust to make a separate payment for them as to submit to a deduction of wages.

Unrestricted employment of waitresses, after the full days' work in the shop, to go outside to work at supper parties, is a complaint which I frequently receive, but upon investigating can do nothing, as the question does not come under the Factories or Shops' Act.

As to the condition of offices where females are employed, generally speaking, no provision is made for separate water-closets, which, I think, is an imperative necessity in all buildings.

I deeply regret to state again that I received complaints that the foremen in factories make use of abusive language to young girls in their department. I fail to understand how any person calling himself a man could be guilty of such conduct.

CHILDREN.

The law prohibiting the employment of children under the age of fourteen years, is generally observed. Manufacturers are very careful, regarding the age, to procure the necessary birth certificate, signed by the parent, before they enter the factory to work. I have found but little child labor employed, and, drawing the attention of the proprietor to the law, find no difficulty in having the children under age removed. In some sections the school authorities have rendered me valuable assistance in securing the ages of children. I am convinced that the enforcement of this section of the law has operated in the interests of the rising generation, especially in these years of great activity and scarcity of

labor; as many children, who now attend school, would go into the factories and workshops, were it not for the wise provisions of this Act. Some parents do not regard their children's welfare as a matter of sufficient importance to influence them in observing the law. It is from this class that the inspectors experience the most trouble. Parents will freely give certificates that their children are of age, in order to get them into the factory or workshop. It is very difficult, as every person knows, to judge the right age of a child from appearance, and the certificates must be accepted as true by the inspector, until he is in a position to prove them otherwise.

In the practical operations of the law relating to child labor, occasional instances of hardship have been discovered, such as the loss to a widowed mother of the small amount which her child might earn. It has been repeatedly stated that some discretion should be allowed the inspectors, which would enable them to nullify the law in exceptional cases, such as the one named. A vast amount of theorizing has been indulged in to attempt to show that such Laws are an unwarranted interference with the rights of parents to control the time and receive the earnings of their children. The welfare of the child cannot be sacrificed to the short-sighted demands of parents, who, for their own apparent benefit, would doom their children to lives of toil and ignorance. I think our duty, as it regards the enforcement of this or any other law, is that while good judgment and discretion should be used, the whole fabric of legal protection to child labor would be undermined if the enforcement of our laws were left to the discretion of the inspectors. Taking a larger view of the subject, individual cases of hardship must be dealt with as they occur, by suitable measures which do not involve the nullification of the law. The high standing at present existing must be maintained, not only for the safety of our child workers, but because Ontario is leading in industrial reform. Apparently, many people suppose that the factory laws reach all places where children are employed. Many children are employed in places other than factories. Our laws draw a distinction between children in manufacturing and mercantile houses. We have never been able to explain satisfactorily to the manufacturers, when questioned upon the subject, why the law did not restrict the employment of children in the mercantile houses as well as in the workshops and factories. We believe that if the law is beneficial in the one instance, it would be equally so in the other. The children employed as cash boys and cash girls in some of the stores have duties fully as arduous as if they were employed in mills and factories, and their hours are just as long, and in the busy seasons longer.

CLOTHING.

The year just closed has witnessed no new phases in the system of clothing manufacturing. There is but little in the method of doing the work by contracts to comment upon, except the competition which invites contracts for very low wages. While the law, as we have it, has cured many of the evils of manufacturing clothing, yet there is much to be done to bring the conditions to a point that may be called proper. Great competition at present exists in the business world for the manufacture of clothing at the lowest possible rate, and there is the merchant who must have his supply of wearing apparel for the now well-established "bargain counter" From my observation I fear that the workers have to pay for the bargains which are so eagerly sought for.

The ready-made clothing workshops are not all in as good condition as could be desired, but they are improving gradually, and there is a great improvement of the conditions under which the work was formerly done. I have noticed that many contractors have secured better and cleaner shops; but the

difficulty is that when a shop is vacated by one it is generally occupied by another of the same kind, and he in turn must be instructed and compelled to observe the law ; thus the work continues. There is a continual changing of owners in these places, a moving from place to place, which makes the inspection a difficult task.

The enforcement of the law in relation to sanitary appliances, and the proper maintenance, is very difficult in these places, and in order that the law may be observed, frequent visits are required to be made. The condition of the water-closets in some tailor shops has been a constant source of irritation to the inspectors, and where closets are placed in the entry-way and used in common by the occupants of two or more shops, it is a difficult task to place the responsibility for cleanliness upon the proper person. I have worked hard and persistently to secure a better standard of cleanliness in this respect. Notwithstanding all this, I firmly believe that no State has its clothing manufactured under better or healthier conditions than Ontario.

The law regulating the hours of labor for women or girls requires close attention, as the supply of labor in the ready-made clothing trade is not at present equal to the demand and the temptation to violate its provisions is therefore apparent. We find in some places a number of independent masters caused by the renting of part of a shop to persons wanting seat room, the practice being for one party to hire a large room and sub-let in small portions to others who make their own contracts, hire their own help, thus dividing the responsibility from violations of the law.

SANITARY.

Sanitary conditions are much better than formerly, and are gradually improving. Cleanliness prevails to a happy extent in many establishments, and even among the most backward there is a marked improvement. It is one of deep importance to all, and next to the moral welfare of a community is its physical well being. There are some conditions, however, that are far from ideal which I would like carried to a greater degree of perfection; one is the lavatory in places where both sexes are employed, so that stricter privacy might be secured, especially where there are young people. Certain employers in different parts have complained to me bitterly of the abuse of sanitary arrangements provided for the employees, and on the other hand there has been no complaint whatever. I am told by forewomen on these matters they have no trouble at all, not even the vexed question of time wasted. No person can visit factories as we do without being struck with the enormous influence for good affected by the presence of forewomen of high moral character. The whole atmosphere of a factory seems to be affected by it, and in these instances I have never heard a complaint of the character to which I have alluded. The most of our manufacturing establishments are in a fairly good sanitary condition, but there is still room for improvement, and some are not as clean as they should be. It is true that from the nature of some of the business cleanliness is next to impossible, but most factories can be kept clean if there is an effort to do so. There is nothing so commendable or more necessary about a factory than cleanliness, and an employer does not exist who through choice would not prefer an employee who is neat in work and person; yet we frequently find no provision made for the cleanliness of the employees. It should be considered an absolute necessity in the construction of a factory to provide an available place on each floor with proper facilities for washing, and no employee should be compelled to leave a factory in an untidy condition. It is pleasant to record that the provisions for washing appliances are steadily growing, and in a number of factories the arrangements are really good, and display great consideration on the part of employers for the comfort and convenience of employees. Whenever, in the course

of inspection, I find unsanitary conditions which come within the jurisdiction of the Health Officers, I report the same to them. In some towns we have been compelled to accept sanitary arrangements which are far from satisfactory owing to lack of sewerage system. In some cigar workshops we find the workers guilty of using the lips, teeth and tongue instead of the hands or knives in forming and finishing cigars. This matter seems to me to be sufficiently important to warrant the specific prohibition of the practice.

VENTILATION.

The subject of ventilation as it relates to the workshop is one of the most important in the whole range of matters which may probably be considered in this report. On the whole it may be said that factories and workshops are kept fairly clean, very little over-crowded, but many are not well ventilated. One of the definitions of the word ventilation is to furnish a supply of fresh air, but in the supplying of fresh air there must be the removal of foul air at the same time, and having the supply of fresh air of proper temperature, moisture and purity. The necessity for the removal of air in a room comes principally from the vitiation of the air by the breath and exhalations from the body and clothes, which in a room containing a large number of persons is made apparent. In a very short time with proper ventilation not only is the fresh air to be supplied, but the foul air must be removed; and with proper construction the removal of vitiated air and the supply of fresh air has become a simple matter. In all systems of ventilation it is essential that a constant current of air should be maintained by keeping the inlets and outlets always open, and when a change of temperature is desired it should be effected by increasing or diminishing the amount of cold air supplied. It is very important that pure air should be admitted to a workroom which is not cold air without blowing upon the workers. I am convinced that much of the headaches and colds are due to the lack of ventilation or the cold air blowing upon them by an effort to secure pure air by opening the doors and windows. Some employers have never stopped to consider whether their employees have sufficient air space in their rooms; the policy they pursue is to economize space by packing as many people in one room as the nature of the business will allow. These workrooms are not only crowded with people, but they are the places that usually have no means of ventilation except through the windows and doors, which are not often open in the winter on account of the draughts. These rooms are sometimes heated by stoves or steampipes which run the temperature up as high as eighty or eighty-five degrees, further adding to the discomforts of the inmates. In mild weather this is different. I think it is poor policy, bad economy, for employers not to take into consideration the well-being and physical comfort of the employees. The money invested in this respect is not thrown away, but returned many fold, in better work and a greater production for the same length of time. There should be a maintenance of reasonable temperature, and measures taken to secure it which should not interfere with the purity of the air. I do not say that all the factories and workshops are deficient in the matter of pure air supply, but far from it; there are hundreds of factories where the air is better than in the homes of the operators. Many factories are well lighted, ventilated and heated, and as far as atmospheric conditions are concerned, as healthy as any workroom can be. It is the industries carried on in places never intended for workrooms, that will come under this indictment for insufficient air supply.

Even a reduction of the hours of labor does not diminish or remove the evils resulting from bad air or drainage, in buildings where hundreds are employed.

I am satisfied that manufacturers are beginning to learn that ventilating fans are really an economy, and result in healthy looks and increased activity of employees.

The substitution of electric light for gas is giving an excellent effect on the air conditions of work rooms, which when lighted by gas were hot and stuffy, but are now cool and healthy with electric light. After a long days' work the atmosphere does not have that close and disagreeable feeling experienced when entering a room lighted by ordinary gas.

NEW FACTORIES AND CHANGES IN LOCATION OF OLD FACTORIES.

Section 51 of the Ontario Factories Act states that the owner, proprietor or manager shall not begin operations until he shall have received from the Factories Inspector, a certificate of inspection of the factory and a permit to operate the same and any such person violating the provisions of this section shall be liable to the penalties of prosecution. This section is not fully complied with, and I am continually coming across workshops and factories, which have been existing in some cases for several months, yet no notice of occupation had been sent to our department. Ignorance of the existence of such law is the excuse offered, but this state of affairs seems strange on the part of men who are wide awake to all political, social as well as business questions of the day. To extend leniency to persons who persist in evading the provisions of the law is unjust to the law abiding, and only serves to bring the law into disrepute.

In connection with the special risks to which female employees are exposed in operating machinery, or in proximity with moving machinery, I may say that I have taken every suitable opportunity to urge females to dress their hair and wear clothes in a way likely to reduce the number of accidents. Only a few weeks ago an accident occurred in one of our factories in which a young girl lost her hand and part of her arm, and I believe wearing loose garments was claimed as the cause.

Very often the question is asked: how many females are employed in the various industries in Ontario? which is difficult to answer definitely; but in going over the record for 1902 I find there are upwards of 50,000 females employed in the Province of Ontario.

I would say that a great deal more has been accomplished than is contained in this report, and there are many important details, the results of which will be productive of much good. One of the most encouraging features of factory inspection is the almost complete disappearance of the spirit of resistance. It is undeniably true that the owners and managers of our manufacturing and mercantile establishments take a more direct and active interest in the welfare of their employees.

I may say that the work increases yearly as the new factories come into existence, which they have done very rapidly this year: others are undergoing changes and improvements. The inspector seldom calls but what he finds something to be remedied, the reason being not far to seek, as competition in trade compels the manufacturer to add all improved appliances to keep up with the times. At the same time the manufacturers are becoming familiar with the law and realize its aim; therefore, the more calls for the inspector the more time is consumed.

I have had a copy of Abstract, with the Inspector's address, posted in every factory and workshop, as far as possible, in which females are employed, who are affected by the provisions of the Act.

Courteous and respectful treatment has been accorded me wherever my duties called, and every facility afforded me in the performance of the same.

I have the honor to be, yours respectfully,

MARGARET CARLYLE,

Inspector of Factories and Shops.

ACCIDENTS REPORTED DURING THE YEAR 1902.—EASTERN AND WESTERN DISTRICTS.

No.	Date.	Employer.	Place.	Business.	Person injured.	Age.	Particulars.
1	Jan. 6.	The Hamilton Steel and Iron Co.	Hamilton	Rolling mills.	M. Coller	37	Eye-ball burned, being struck by a cinder.
2	" 6.	The Gibbard Furniture Co.	Napanee	Furniture	Geo. Grass	28	Left little finger of left hand with buzz planer.
3	" 9.	The Guelph Iron and Steel Co.	Guelph	Iron and steel	Thos. O'Rourke	28	Toe of right foot injured by billet falling on it.
4	" 4	Pratt & Letchworth.	Brantford	Iron castings.	Frank Scanlan	29	Instep of left foot bruised stepping into a ladder.
5	" 13.	The Telfer Mfg. Co.	Toronto	Paper boxes	W. Hoffner	45	First finger of left hand crushed by staying machine.
6	" 16.	The Hamilton Steel and Iron Co.	Hamilton	Castings	Wm. Bushee	45	Broke right arm falling a distance of 15 feet.
7	" 21.	The National Table Co.	Owen Sound	Furniture	Hugh McEachren	23	Second finger an putated, material split while passing machine.
8	" 22.	The Telfer Co.	Toronto	Paper boxes	George Chapman	18	First finger left hand caught in staying machine.
9	" 24.	The Goodson Thresher Co.	Sarnia	Foundry	Robt. Brydges	20	Tops of 2nd and 3rd fingers of left hand an putated, operating jointer.
10	" 24.	The Bell Organ Co.	Guelph	Organs	Ernest Harrison	18	Tips of little finger of left hand cut off on embossing machine.
11	" 24.	"	"	"	Jonathan Oakes	45	Two forefingers of left hand lacerated by buzz planer.
12	" 27.	The Stratford Mill Co.	Stratford	Machinery	C. E. Erony	20	Eye burned slightly with roller metal.
13	" 27.	"	"	"	Isaac McNab	20	Injured stomach by trips w/throwing board against it.
14	" 30.	A. R. Woodyatt.	Guelph	"	Albert Wendling	25	Caught fingers in level car in moulding shop.
15	Feb. 15.	Pratt & Letchworth Co.	Brantford	Iron and steel	A. Buike	25	Fell on wheelbarrow, injuring back.
16	" 18.	Hamilton Steel and Iron Co.	Hamilton	Rolling mill	Jas. Conlon	45	Broke collar bone, leg bruised and hip dislocated.
17	Jan. 28.	Langmuir Mfg. Co.	Toronto	Trunks	A. Hodge	45	Broke collar bone, leg bruised and hip dislocated.
18	" 31.	Massey-Harris Co.	"	Implement	G. K. Smith	20	Broke two fingers by a piece of lumber.
19	Feb. 4.	J. W. Mann Mfg. Co.	Brockville	Machinery	Jos. Xerden	16	Two fingers badly cut by saw.
20	" 6.	"	Cornwall	Cotton mill	J. Laplante	16	Hand bruised by drop hammer.
21	" 5.	"	"	"	A. x. Gaines	25	Left index finger by w-e-picker.
22	" 8.	W. Gray & Sons Co.	Chatham	Carriages	J. Labombard	18	Left four fingers by ventilator fan.
23	" 11.	G. H. Hees, Son & Co.	Toronto	Shades	J. Karf	18	Face cut and bruised by elevator.
24	" 19.	Toronto Silver Plate Co.	"	Silverware	G. Fenson	20	End of finger crushed by stamping press.
25	" 17.	J. Abell Engine Works.	"	Machinery	W. Livingston	20	Hand caught in roll and badly crushed.
26	" 17.	"	"	"	J. Sprigale	20	Hand crushed between plate and shear jaw.
27	" 17.	Massey-Harris Co.	"	Imp'ements	J. O'Malley	20	Foot crushed by bar of iron.
28	" 4.	Brantford Carriage Co.	Brantford	Carriages	G. S. Schwindt	20	Index finger lost feeding shaper.
29	" 10.	Knechtel Furniture Co.	Hanover	Furniture	Jno. Daniels	20	Scalp wounded while adjusting a belt.
30	" 18.	Hay & Co.	Woodstock	Woodwork	E. Ryan	20	Three fingers lacerated with a saw.
31	" 18.	Cowan & Britton	Gananoque	Nails, etc	A. McLeod	20	Lost four fingers in a gear.
32	" 22.	National Table Co.	Owen Sound	Tables	E. Todd	20	Struck by a stick that caught in pulley.
33	" 22.	Gurney Foundry Co.	Toronto	Stoves	E. Hollingsworth	17	Arm and neck slightly lamed by acid.
34	Mar. 4.	Canada Wollen Mills Co.	"	Cotton	H. Lock	21	Wrist injured; shuttle flew from loom.
35	" 6.	Massey-Harris Co.	"	Implement	"	21	Back burned with molten iron.
36	Feb. 27.	"	"	"	"	21	Back of right hand injured by punching machine.

37	"	"	Toronto	Implementers	A. Ryan	Allowed wheel to drop on his foot crushing great toe.
38	Mar.	McGowan Flour Mill	Durham	Flour	*J. S. Colville	Bursting of clothes; supposed that mill ran empty.
39	"	Sennens & Ebel	Hamilton	Undertakers	*Frank Billings	Lost tops of three fingers of left hand in jointer, congestion of lungs followed.
40	"	Goold, Shapley, Muir & Co.	Brantford	Windmills	Fred. Armitage	Index finger partly taken off in operating iron drill.
41	"	Canada Woollen Mills Co.	Hespeler	Woollen mills	Fred. Jackson	Second finger amputated at 2nd joint; caused by gear on cards
42	"	J. W. Mann Mfg Co., Ltd.	Breckville	Iron	Richard Monahan	Lost thumb and one finger on right hand, caught in gear of welding machine
43	"	Canada Woollen Mills	Waterloo	Woollen mills	Maggie Brugeman	Gash in forehead; shuttle flying from loom.
44	"	Canadian C ^o Red Cotton Mills Co.	Cornwall	Cotton mills	Wm. Brisson	Lost 2nd finger; put hand in revolving beater.
45	"	A. & C. Borhmer	Berlin	Paper boxes	Lena Snider	Index finger partly cut off while working on ending machine.
46	"	Goold, Shapley, Muir & Co.	Brantford	Windmills	Albert Calbert	First finger cut and one bruised by jointer.
47	"	Ottawa Saw Co., Ltd.	Ottawa	Sawmill	Zavier Chartand	Fingers cut while polishing a saw.
48	"	Anderson Furniture Factory	Woodstock	Furniture	Ambrose Moffatt	Two fingers partly cut off of left hand while piling material on saw-table.
49	"	Norton Mfg Co.	Hamilton	Tin cans	John Bambrick	Skull slightly injured; severe shock.
50	Jan.	Laidlaw-Watson Shoe Co.	Aylmer	Boots and shoes	C. Sherrill	Four fingers of right hand crushed, causing amputation of two fingers.
51	Mar.	Gilles Mill	Carleton Place	Woollen mills	Wm. Robertson	Left leg fractured and left hand injured by press.
52	April	Hespeler Furniture Co.	Hespeler	Furniture	Harvey Traub	Four fingers of left hand taken off in jointing machine.
53	Mar.	Massey-Harris Co.	Toronto	Implementers	W. Thrush	First finger had hole drilled through with drill machine.
54	April	Imperial Cotton Co.	Hamilton	Cotton	Robert Somerville	Two fingers smashed; one will lose 1st joint.
55	"	Massey-Harris Co.	Toronto	Implementers	R. Hutcheson	First and second finger of left hand cut on rip-saw.
56	"	Sennens & Ebel	Hamilton	Undertakers	Geo. Mills	Fell from lumber pile fracturing right leg.
57	"	Telfer Mfg Co.	Toronto	Paper boxes	Dora Lafontaine	Index finger of left hand crushed by machine.
58	"	Goold, Shapley, Muir & Co.	Brantford	Windmills	Robert Punier	Index finger of left hand cut slightly while drilling.
59	"	Stevens, Hepner & Co.	Port Elgin	Brushes and brooms	Fred. Green	Left hand cut on friction wheel.
60	"	"	"	"	Alex. McDougall	Right hand struck by a chain.
61	"	"	"	"	John Kelly	Fell head first into the cellar, dislocating his neck.
62	"	Norton Mfg Co.	Hamilton	Tin cans	H. Royce	Fingers bruised on shaper machine.
63	"	United Factories, Ltd.	Toronto	Brushes, etc.	Hugh McGilvray	Thumb partly cut off on rip-saw.
64	"	Massey-Harris Co.	"	Implementers	W. Stahl	Head slightly cut; attempted to board the elevator while in motion.
65	"	"	"	"	Moses Wilson	"
66	"	London Carriage Works	London	Carriages	"	"
67	"	Canada Furniture Co.	Stratford	Furniture	Hamilton Wilson	Struck hand with hammer, breaking flesh.
68	"	Stratford Mill Building Co.	"	Mill	*Angus Campbell	Beam falling from tie-beams overhead struck him on head; died ten hours after.
69	"	Pratt & Letchworth Co.	Brantford	Malleable iron	Wm. Bishop	Great toe of left foot crushed while unpacking of an annealing pot; fell on foot.
70	"	Massey-Harris Co., Ltd.	Toronto	Implementers	George Perkins	Foot and ankle bruised; caught between hoist and floor.
71	"	"	"	"	W. J. Moore	Foot bruised while filing binder frames.
72	"	Jas. Orr Furniture Co.	Stratford	Furniture	Wm. G. McLatchey	Left hand wounded while operating circular saw.

* Fatal.

ACCIDENTS REPORTED DURING THE YEAR 1902.—EASTERN AND WESTERN DISTRICTS.—Continued.

No.	Date.	Employer.	Place.	Business.	Person injured.	Age.	Particulars.
73	April 21	Pratt & Letchworth Co	Brantford	Malleable iron	Arthur Hawley	29	Arm and body burned while tapping furnace; iron flew out.
74	" 26	A. R. Woodyatt & Co	Guelph	Implement	A. Burnett	21	Fingers on right hand bruised while sharpening a drill on grinding machine.
75	" 23	Pratt & Letchworth Co	Brantford	Malleable iron	Norman Koantree	25	Right arm burned while carrying a ladle of iron.
76	" 29	Masey-Harris Co	"	Machines	Gordon Butler	30	Lost first finger on left hand while operating a drop hammer.
77	May 2	Sykes & Ainley Woollen Co	Glen Williams	Rugs, etc	Horland Graham	40	Blush taken off right hand.
78	" 6	Massey-Harris Co	Brantford	Implement	Thos. Ritchie	40	Struck on the cheek by a sledge, cutting a vein in cheek.
79	" 5	Sutherland Innes Co	Chatham	Lumber	— Turrer	....	End of finger taken off while cutting staves.
80	" 10	A. R. Woodyatt & Co	Guelph	Implement	John Piefar	....	Burned his foot while moulding.
81	" 10	"	"	"	Frank Deignan	....	Cut thumb on left hand by machine.
82	" 10	Knetchel Furniture Co	Hanover	Furniture	J. Rosenberger	16	Slipped, causing his left foot to be caught in a planer, cutting it.
83	" 5	A. R. Williams	Toronto	Machinery	*John May	23	Fatal accident in boiler shop; injured from fire in boiler shop; died the following day.
84	April 11	Cornwall Mfg Co, Ltd	Cornwall	Woollen goods	J. J. Tackaborry	73	Ribs broken and forehead cut by falling from a scaffold.
85	May 12	Hamilton Steel and Iron Co	Hamilton	Iron, etc	Jos. McPhie	27	Legs badly burned with hot iron.
86	" 10	"	"	"	Chas Lee	60	Gash on wrist, severing an artery, caught between gauge and shears.
87	" 14	Massey-Harris Co, Ltd	Toronto	Implement	J. J. Flannagan	....	Instep of foot crushed; foot slipped in moulding room.
88	" 20	Can. Cotton Mills Co, Ltd	Hamilton	Cotton	Wilbert Hodgson	20	Lost nail of 2nd finger on right hand and back of hand scraped by lap roller.
89	" 21	"	"	Cotton mills	L. Miller	....	Two fingers of right hand injured by fan in dye-house.
90	" 19	Imperial Cotton Co	"	Cotton	Arthur Lambert	....	Finger injured in carding room, causing ten stitches in the same.
91	" 23	Goold, Shapley, Muir & Co	Brantford	Windmills	Isaac Rozall	45	Two fingers cut off with saw while removing sawdust.
92	" 26	Canada Woollen Mills Co	Hespeler	Woollen mills	Wm. Baker	15	Arm badly bruised, elbow out of joint and flesh cut open; caught in sizing machine.
93	" 30	Parisian Steam Laundry	London	Laundry	Walter Anderson	27	Leg cut with waster machine.
94	" 29	Dominion Paper Box Co	Toronto	Folding boxes	Harry Russin	....	Foot bruised by stepping on elevator while in motion.
95	June 4	Massey-Harris Co, Ltd	"	Implement	A. Speedis	....	Caught foot between hoist and floor as hoist was ascending, losing great toe.
96	" 9	"	"	"	W. Gibbs	....	Right knee dislocated; elevator upset while taking up wood, which fell on knee.
97	" 11	Telfer Mfg Co	"	Paper boxes	Bella Houghnet	18	Finger crushed while operating machine.

98	"	12	McCormick Mfg Co.	London	Biscuits	Thomas Stewart	Lost one finger in grinding machine.
99	"	12	"	"	"	George Murdoch	Struck by a board rebounding off circular saw.
100	"	19	Toronto Paper Mfg Co	Cornwall	Paper mills.	John Glasgow	Right hand cut off in guillotine, and ends of fingers on left hand cut.
101	"	25	Bell Piano and Organ Co.	Guelph.	Organs and pianos.	Leonard Reading	Foot caught in elevator; badly bruised.
102	"	23	Imperial Cotton Co.	Hamilton	Cotton mill.	Royal Potter	Hand caught between pulley and frame, inflicting a deep cut in hand.
103	"	25	Goderich Organ Co.	Goderich	Organs	Herbert Everett	Two middle fingers crushed in planer.
104	"	19	Canada Woolen Mills	Hespeler	Woolen mills	John Moore	Scalp and back wounded by elevator giving way while in motion.
105	"	26	Norton Mfg Co.	Hamilton	Tin cans.	Amos Skinner	Finger crushed between knuckle and 2nd joint in ending machine.
106	"	26	Anderson Furniture Co	Woodstock	Furniture	Henry Douglas	First two fingers on left hand cut off by rip saw.
107	"	26	Norton Mfg Co.	Hamilton	Tin cans.	James Jones	Index finger stripped of nail in power-press.
108	July	2	Massey-Harris Co., Ltd.	Toronto	Implements	Clarke Pritchard	Heel bruised, left foot caught between platform of elevator and floor.
109	"	4	Messrs. Stauntons, Ltd	"	Wall paper	Benjamin Pigeon	Elbow injured by falling against a gear wheel.
110	"	5	Win. Gray & Sons Co., Ltd.	Chaham.	Carriages.	Preston Fardo	Muscles of left hand lacerated on buzz-planer.
111	May	12	Walter Stayzer	Forks Road.	Sawmill	*Gas Devane	Killed by boiler explosion in sawmill.
112	"	12	"	"	"	*Andrew Everett	"
113	"	12	"	"	"	Win. Gillman	"
114	July	11	Campbell Fanning Mill Co.	Chatham	Fanning mills	John Pool	Injured by boiler explosion.
115	"	17	Dominion Cotton Mill Co	Kingston	Cotton mill.	Archie Hendrie	Wrist cut on piece of zinc while handling zinc in factory.
116	"	21	Stornont Cotton Mills	Cornwall	"	Lily Stacey	Back of hand lacerated; caught in card-mill.
117	"	24	Stratford Mill Building Co.	Stratford	Machinery	Frank Simmons	Scalp torn from head; hair caught in shaft of drawing frames.
118	"	28	Imperial Cotton Co.	Hamilton	Cotton mill.	Mary Freeman	Ends of fingers cut off while at work in wood department.
119	"	30	Joseph Beaumont.	Gleo Williams.	Knitted goods	Chas. Kelso	Four fingers of hand cut and bruised while cleaning rolls; caught in sprocket chain.
120	Aug.	1	Norton Mfg Co	Hamilton	Tin cans.	A. Halstead	Hand lacerated in carding-mill.
121	July	16	Telfer Mfg Co	Toronto	Paper boxes	Sidney Windler	Hand cut while taking can from trough which was fed by idlering machine.
122	Aug.	1	Thomas' Organ Co.	Woodstock	Organs	Gordon Sutherland	Badly bruised, being caught by pulley on shaft while in motion.
123	"	9	Imperial Cotton Co.	Hamilton	Cotton mill.	Mabel Harrison	Palm of hand cut on circular saw.
124	"	9	National Table Co.	Owen Sound	Tables	Wm. Roy	End of fingers partly cut off in driving shaft while cleaning it.
125	"	12	Massey-Harris Co	Toronto	Implements	William Geare	Part of thumb and three fingers taken off by rip-saw.
126	"	11	Toronto Paper Mfg Co.	Cornwall	Envelopes, etc	*William Chapman	Index finger of left hand cut off, second finger cut off at 2nd joint and thumb badly cut with rip-saw.
127	"	8	Canadian Colored Cotton Mill.	"	Cotton mill.	Geo. Partridge	Struck in the stomach by end of a stick while putting on a belt; died next day from effect of blow.
128	"	16	Goderich Organ Co.	Goderich	Organs	Frank Stogdill	Lost nail on great toe of right foot by box falling on it.
129	"	9	Portland Cement Co.	Owen Sound	Cement	*Alex. McLean	Knuckles of right hand laid open by rip-saw.

* Fatal.

ACCIDENTS REPORTED DURING THE YEAR 1902.—EASTERN AND WESTERN DISTRICTS.—Continued.

No.	Date.	Employer.	Place.	Business.	Person injured.	Age.	Particulars.
130	Aug. 9	Thomas' Organ and Piano Co	Woodstock	Organs and pianos	J. Carney	...	First joint of second finger on left hand taken off, caught in steam engine rod
131	" 18	"	"	"	Way	...	Back of right hand cut by a chisel.
132	" 13	Massey-Harris Co	Toronto	Implements	Wm. Sheriff	...	Foot burned by molten metal; while pouring off spilled from ladle.
133	" 14	Canadian Colored Cotton Mills	Merritton	Cotton mills	James Johnston	46	Small bone above ankle broken while unloading cotton; a bale fell on him.
134	" 21	Imperial Cotton Co.	Hamilton	"	Wilbert Wood	...	Leg bruised on the freight elevator.
135	" 20	Can. Colored Cotton Mills Co.	Cornwall	"	Jerry Persian	15	Two fingers cut and bruised while turning crank on hand-power rope machine.
136	" 18	S. Knechtel Furniture Co.	Southampton	Furniture	*George Nabgang	43	Both legs broken and one crushed by explosion of empty methylated spirits tank; died six hours after.
137	" 23	McCormick Mfg Co.	London	Biscuits	R. Clarke	...	Two fingers cut with circular saw.
138	" 8	Gutta Percha Rubber Mfg Co.	Toronto	Rubber goods	Fred. Allison	...	Left hand cut while lifting a roll of rubber to a rack.
139	" 21	Bertram Engine Works	"	Engines, etc.	Edward Shae	24	Left eye cut by a piece of steel flying from hammer.
140	" 26	Massey-Harris Co	"	Implements	A. Armstrong	...	Cut middle finger of left hand off at 2nd joint with shearing machine.
141	Sept. 10	Toronto Paper Mfg Co.	Cornwall	Paper, etc.	Wm. Garlow	14	First and 2nd finger of right hand crushed in cogs of pulp mill.
142	" 2	Dominion Paper Box Co	Toronto	Paper boxes	Ernest Burke	...	Tip of one finger cut and nail removed by gear of machine.
143	" 29	Valley City Seating Co	Dundas	Furniture	Alonzo Smith	16	Lost part of four fingers of left hand while working on jointer.
144	" 9	Bell Organ and Piano Co., Ltd.	Guelph	Organs and pianos	Thos. Cotton	26	Arm and face scalded by steam pipe breaking.
145	" 9	Telfer Mfg Co	Toronto	Paper boxes	David Prentice	15	Forefinger cut off while working a corner cutter.
146	" 1	American Abell Engine Co.	"	Threshers	*W. J. Reid	54	Struck in the abdomen by a piece of basswood board thrown from a circular saw in the wood-working shop.
147	" 15	T. H. Taylor Co., Ltd	Chatham	Woollen mills	Mamie Pritchard	16	Hand torn by card-mill; clothing caught between cylinder and stripper.
148	Sept. 13	McCormick Mfg Co.	London	Biscuits	Walter Taylor	...	Four fingers crushed while cleaning roll in a biscuit brake.
149	" 17	Telfer Mfg Co	Toronto	Paper boxes	J. Norton	...	Nail cut off first finger with corner staying machine.
150	" 10	"	"	"	Jennie Bennett	...	First three fingers of right hand cut while feeding folding box machine.
151	" 16	A. R. Woodvatt & Co.	Guelph	Machines	Angus McGillivray	...	Left foot burnt by a splash of hot iron.
152	" 24	Norton Mfg Co	Hamilton	Tin cans	Archie Coulls	24	Tip of middle finger of right hand cut off; caught between dies and power press.
153	" 17	Pratt & Letchworth Co.	Brantford	Iron works	James Condon	50	Left eye burned while filling ladle; iron splashed on it.

154	Oct.	2	Bell Organ & Piano Co.	Guelph	Pianos and organs	George Brown	15	Middle finger of right hand cut off at first joint in sanding machine.
155	"	2	A. Miles	Toronto	Sash and doors	*James Alexander		Struck by a board while passing where lumber was being taken up, from the bottom of shop.
156	"	2	Sennens & Evel	Hamilton	Undertakers	R. Buscombe		Arm hurt by a piece of wood which flew from a saw.
157	"	13	Canada Woollen Mills	Toronto	Woollen mill	Willie Brewster	23	Whirls against elevator it fell hitting scalp wound.
158	"	13	"	"	Woollen mills	Thomas Traplin	50	Elevator fell while riding on it causing concussion of spine.
159	"	12	Union Furniture Co.	Wingham	Furniture	Wm. Monk		Palm of hand struck spout of oil can, going through fleshy part of it.
160	Sept.	9	Canada Furniture Co.	"	"	Wm. Carr		Lost second finger of left hand on cut-off saw.
161	Oct.	14	The Telfer Mfg Co.	Toronto	Paper boxes	Helen McSayer		First finger of right hand crushed in corner of staying machine.
162	"	13	Canadian Colored Cotton Mills	Hamilton	Cotton mills	Joseph Bonner	14	End of first finger of left hand; cut off while cleaning gears of drawing frame.
163	"	9	Gatica Percha Rubber Mfg Co.	Toronto	Rubber goods	George Pinches		One finger of left hand cut and bone fractured by rolls on mill.
164	"	18	Waterloo Mfg Co., Ltd.	Waterloo	Engines	J. L. Krupp		Badly squeezed between engine and separator while backing the engine on car.
165	"	23	McCormick Mfg Co.	London	Biscuits	W. Proctor		Arm scalded by falling while carrying a kettle of boiling candy.
166	"	28	Massey-Harris Co., Ltd.	Toronto	Implementments	Thomas Marshall		Struck in the abdomen while grinding castings; wheel burst.
167	"	25	R. Forbes Co., Ltd.	Hespeler	Woollen goods	Dan Jiggins	25	Index finger taken off below the first joint, second finger fractured and small finger amputated by revolving fan in yarn dry room.
168	"	13	J. W. Mann Mfg Co.	Brookville	Machinery	William Quinn		Three fingers of left hand injured while removing casting on dies in forging room.
169	"	7	D. W. Thompson Co.	Toronto	Factory	J. Kerr	16	Middle finger of left hand cut off and two other fingers injured by machine.
170	Nov.	3	Dominion Paper Box Co.	"	Folding boxes	Samuel Priestly		Foot bruised; caught in elevator.
171	Oct.	21	Pratt & Leitchworth Co.	Brantford	Iron and steel	John Abjoudan	58	Instep of right foot bruised; amending pot fell on it.
172	"	21	"	"	"	George Howey	19	Left eye burned with iron while carrying a ladle of iron.
173	Nov.	17	Thomas' Organ & Piano Co.	Woodstock	Organs and pianos	Thomas Langenfeller	21	Point of thumb lacerated while running circular saw.
174	"	27	Jacob Shantz & Son Co.	Berlin	Button factory	Brun Huchneogard		Arm broken by reaching through a belt on machine he was operating.
175	"	22	Canadian Colored Cotton Co.	Hamilton	Cotton mill	Kate Irwin	15	Flesh and nail torn from end of thumb; caught between two gears on drawing frame.
176	"	24	D. L. Ferrin Co., Ltd	London	Biscuits	Russell Cavanagh	21	Nails taken off second and third fingers while running chocolate dipping machine.
177	"	27	Sennens & Evel	Hamilton	Undertakers	Charles Wilson		Cut side of little finger on right hand; by a saw.
178	Dec.	4	Canadian Colored Cotton Co.	Cornwall	Cotton mill	George Watlie	18	Flesh scraped from back of hand while cylinder was in motion in card room.
179	Sept.	10	S. Myers & Sons	St. Mary's	Woollen mill	Ida Massey	15	Foot went through a hole in floor; not seriously hurt.
180	Dec.	12	McCormick Mfg Co.	London	Biscuits	Archie McDougall		Forearm bruised and cut while dropping down the elevator shaft; fell to the ceiling.
181	"	12	United Factories	Toronto	Brushes, etc	Wm. Proud		Leg burnt; slipped into barrel of water.

*Fatal.

ACCIDENTS REPORTED DURING THE YEAR 1902.—EASTERN AND WESTERN DISTRICTS.—Continued.

No.	Date.	Employer.	Place.	Business.	Person injured.	Age.	Particulars.
182	Dec. 11	Massey Harris Co	Toronto	Implements	Wm. Robison	60	Right foot burned while carrying a ladle of hot iron.
183	" 15	Canadian Colored Cotton Co.	Stormont	Cotton mills	Jos. Burnham	60	First finger of right hand cut off at second joint with waste picker.
184	" 18	Knaichel Furniture Co	Hanover	Furniture	E. Bock		Lost two fingers of left hand while working at shaper.
185	" 19	Toronto Paper Mfg Co	Cornwall	Paper mill	F. McDonald		Shoulder dislocated; sleeve caught in gearing while oiling it.
186	" 18	H. Krug Furniture Co.	Berlin	Office chairs	A. Hoffman		Two fingers of left hand taken off in buzz planer.
187	" 22	United Factories	Toronto	Brushes, etc	Fred Conway		Leg bruised by falling against a sand wheel.
188	" 19	Canadian Colored Cotton Co.	Hamilton	Cotton mill	John Skelly	14	Heel of left foot bruised, being caught in elevator.
189	Nov. 27	Krug Bros & Co	Chesley	Furniture	Wm. Stevens		Eye injured while working on the surface; plaver.
190	" 14	Palmerson Carriage Co.	Palmerston	Carriages	Harry Hess		Hand cut about two inches, with cut-off saw.
191	Dec. 18	"	"	"	Ernest Gallagher		End of finger taken off by a band saw.
192	" 27	Walkerton Binder Twine Co.	Walkerton	Binder twine	M. Kuennaman		Thumb injured; slipped under chain while oiling.
193	" 27	Massey Harris Co	Toronto	Implements	J. W. Miller		Foot injured while lifting a binder platform; fell on it.
194	Oct. 23	American Abell Engine Co	"	Threshers	Wm. Sutherland		End of finger on left hand cut by wrench.
195	Dec. 30	Canadian Locomotive Co., Ltd.	Kingston	Locomotive	Joseph Metzler		Arm broken while putting a belt on a pulley; it caught in shafting.
196	" 22	R. Forbes Co., Ltd.	Hespeler	Woollen goods	John Fiehl	55	Two fingers amputated at first joint, caught in cylinder of wool picker.

ACCIDENTS REPORTED DURING THE YEAR 1902.—CENTRAL DISTRICT.

1	Jan. 4	Kemp Mfg Co.	Toronto	Metal ware	Thomas Golding	25	Small cut over left eye while notching hoops in power press.
2	" 6	"	"	"	Forest Hale	19	First two fingers on right hand bruised in die of power press.
3	" 6	The Rathbun Co.	Deseronto	Lumber	Morley Clark	25	Index finger of right hand cut off at second joint on circular saw.
4	" 6	The Cork Co'y of Canada, Ltd.	Toronto	Corks	Miss L. Hayes	19	Index finger of left hand cut on a cork cutting machine.
5	" 13	John Taylor & Co.	"	Soap	*William Corbett	38	Some hard substance falling on his head which rendered him unconscious; he was removed in the ambulance to his home. He died same day between 4 and 5 p. m.
6	" 17	The Rathbun Co.	Deseronto	Car shop	Wm. P. B. Asseltine	19	Castling fell on left leg badly bruising knee and ankle.

7	Jan. 21	The Firstbrook Box Co.	Toronto	Boxes	Geo. Burtch	45	First finger on right hand cut off at second joint; thumb also cut on rip saw.
8	"	Canada Cycle & Motor Co	Toronto Junct.	Bicycles, etc.	F. Roberts	24	While adjusting spoke threading machine, right thumb crushed in cogs.
9	"	The Rathbun Co.	Deseronto	Shingles	Herts Luffman	19	Two fingers on left hand cut on circular saw. (Shingle machine).
10	"	Canadian Pacific Railway Co.	Toronto Junct.	Breeding shop	John Bunt	40	Adjusting bar of punching machine, caught his head between bar and plate. Head bruised.
11	"	Kemp Mfg Co.	Toronto	Metal ware	Joseph Welsh	19	Crushed half of nail off on second finger of left hand, in die of press.
12	"	J. K. Booth	Ottawa	Lumber, etc.	Candido Girourard	45	Three fingers taken off at first joint on a circular jointing saw.
13	"	"	"	"	Eli Grotian	15	Hand cut on circular jointing saw.
14	"	The Polson Iron Works	Toronto	General machinery	A. E. Luck	40	While lowering crane he began to turn the gearing with his hands; first and second finger of right hand badly mangled.
15	"	The Rathbun Co.	Deseronto	Shingle mill	Ira Bassotto	18	While packing shingles, in placing them in the machine, he cut his finger on the band iron.
16	"	"	"	"	Duncan Fraser	65	While piling wood a block was thrown over conveyor. Leg injured between knee and ankle.
17	Feb. 3	Gendron Mfg Co.	Toronto	Reed furniture	H. Townsend	29	End of thumb on right hand cut off on band saw.
18	"	Kemp Mfg Co.	"	Metal ware	James Cobbin	19	Second joint on first finger of left hand crushed in die of press.
19	"	"	"	"	James Walsh	27	Nail on second finger of left hand cut off on turning lathe.
20	"	John Taylor & Co.	"	Soup	Andrew Murray	20	Middle finger of right hand crushed in soap press.
21	"	Gilmour & Co.	Trenton	Sash and door	John Campbell	25	While trying to change belt from tight to loose pulley, pulley burst, and a piece struck his right hand; knuckles were put out of joint. No bones broken.
22	"	The Rathbun Co.	Deseronto	Match factory	Francis Allore	17	Cut two fingers on knives of match split machine.
23	"	"	"	Shingle mill	Arthur Wilkins	16	Little finger of right hand cut off on shingle machine. (Circular saw.)
24	"	"	"	"	Thomas Howard	20	End of thumb on left hand cut off on circular saw.
25	March 3	"	"	"	Joseph Sager	19	Little finger of left hand cut off on circular saw.
26	"	"	"	"	Robert Blake	28	While jointing with circular saw a shingle in pieces, a piece pierced his finger.
27	"	"	"	Machine shop	Arthur Wauanaker	25	A 600 lb. wheel which he was rolling fell on right ankle, bruising it badly.
28	Jan. 30	The Riordan Paper Mills, Ltd.	Merritton	Pulp and paper	Geo. Wills	33	Left hand crushed while unloading wood from car.
29	Feb. 13	"	"	"	Geo. Dennis	22	Face slightly burned by steam while dumping one of the digesters
30	March 5	The Rathbun Co.	Deseronto	Machine shop	William Close	35	Fell from beam while oiling shafting; small bone of right hand broken.
31	Feb. 24	Standard Woollen Mills	Toronto	Blankets, etc.	Ethel Highfield	20	Second finger of right hand lacerated in knitting machine.
32	March 13	McKinnon Dash Metal Works	St. Catharines	Carriage hardware	B. Clark	30	Third finger and part of right hand cut off on circular saw.
33	"	Frost & Wood Co.	Smith's Falls	Agricultural mach.	E. Gemill	..	End of thumb on right hand taken off in gear of small drill press.

*Fatal.

ACCIDENTS REPORTED DURING THE YEAR 1902.—CENTRAL DISTRICT.—Continued.

No.	Date.	Employer.	Place.	Business.	Persons injured.	Age.	Particulars.
34	March 18...	Kemp Mfg Co	Toronto	Metal ware, etc.	Thomas Kirby	28	While moving scrap from circular shears struck his right hand against a pile of blanks; hand cut between second and third fingers.
35	" 19...	The Rathbun Co	Deseronto	Cedar mills	Oscar Cones	16	End of little finger on left hand cut off on jointing saw; while jointing a shingle it slipped.
36	" 13...	Lincoln Paper Mills Co	St. Catharines	Paper	Edmund Bradley	60	Plug flew out of boiler and allowed steam to escape and fill boiler room. Hands and feet burned, not seriously.
37	" 25...	Kemp Mfg Co	Toronto	Metal ware	James Harper	17	Left hand bruised at first joint, while forming enamel tea kettle ears.
38	" 28...	Kemp Mfg Co	"	"	Joshua McMahon	38	Nail on second finger left hand crushed off while lifting a dye from drill.
39	April 8...	The Rathbun Co	Deseronto	Cedar mill	William Cole	20	Finger caught between two gears; end of fingers smashed.
40	" 9...	A. R. Clarke Co, Limited	Toronto	Leather mfr	Miss Edith Collins	16	Hand crushed in glove machine through carelessness.
41	" 8...	The Rathbun Co	Deseronto	Cedar mill	Norman Bennett	16	Some molten brass flew in his face, burning the skin of left eye.
42	" 8...	Canadian General Electric Co	Peterboro	Electricity	James Hauna	35	Index finger of left hand taken off at second joint, in planer.
43	" 12...	The Rathbun Co	Deseronto	Blacksmith	Henry Kimmerly	35	Small piece of steel flew and cut a small artery in left forearm.
44	" 14...	"	"	"	Wm McKee	23	Piece of steel flew and cut artery in left arm near shoulder.
45	" 16...	W. W. Chown Co, Ltd.	Belleville	Tinware	George Moxam	...	The ends of first three fingers on left hand taken off in a cutting press.
46	" 18...	Firstbrook Box Co	Toronto	Boxes	Thomas Holt	16	The end of thumb on left hand slightly injured while running a rip saw.
47	" 15	Rathbun Co	Strathcons	Mill	Wm. J. Watkins	30	Jammed and bruised thumb while lifting a box.
48	" 21	A. R. Clarke & Co., Ltd	Toronto	Leather	Theodore Olson	35	Crushed hand in machine through carelessness.
49	" 22	The Rathbun Co	Deseronto	Shingle mill	Philip Blake	35	Ends of two fingers cut off while cleaning saw.
50	" 23	"	"	Match factory	Gordon Thomas	18	Right thumb cut off at 1st joint with saw.
51	" 20	J. R. Booth	Ottawa	Lumber	Mr. McIsaac	50	Two of his finger tips cut in a planer.
52	" 24	Sills-Eddy Mica Co	"	Mica	Margaret Hudson	15	1st, 2nd and 3rd fingers cut at 2nd joint; fell asleep at machine.
53	" 28	Gilmour Co, Ltd	Trenton	Lumber	Edward Wilson	25	Least ends of three fingers on left hand in jointing machine.
54	May 5	Anchor Knitting Co, Ltd	Almonte	Knitting	Peter Miller	55	Right arm taken off below elbow while taking stock from machine when in motion.
55	" 7	Firstbrook Box Co, Ltd	Toronto	Boxes	Robert Brenner	20	Thumb of left hand cut with rip-saw.
56	" 7	Standard Woollen Mills Co	"	Woolens	G. Heyward	45	Hands and arms burnt by fire in our picker-house.

57	"	6	Reinhardt & Co.	"	"	Brewery	*Fritz Hoffman	27	Death caused by scalding accidentally in brewery.
58	"	10	The Polson Iron Works	"	"	Shipbuilders	D. Clark	35	Second and 3rd fingers of right hand cut badly in jointer machine.
59	"	10	John Taylor & Co.	"	"	Soap works	Miss A. Lafontaine	17	First finger and thumb crushed while working on staying machine.
60	"	10	Riordan Paper Mills	Merrittton	"	Paper	Tom Davidson	55	Side of face and left hand scalded by blow-off pipe.
61	"	10	"	"	"	"	George Doherty	23	Right side bruised in paper machine.
62	"	12	Firstbrook Box Co., Ltd.	Toronto	"	Boxes	Robert Bronnan	16	While moving a truck fell and wheel passed over right hand, splitting fingers.
63	"	14	Pugsley, Dingman & Co.	"	"	Soap	Ira Robinson	23	Bolling lye splashed on body, scalding arms, feet and body.
64	"	14	Canadian Pacific Railway Co.	"	June	Car shops	Wm. Brennan	42	Right hand cut off from thumb to 2nd finger across the palm with rip-saw.
65	"	13	Kingston Hosiery Co., Ltd.	Kingston	"	Knitted goods	Maclida Smith	15	Hand injured in brushing machine in feed rolls.
66	"	21	The Rathbun Co.	Deseronto	"	Sash and doors	Paul Losee	15	Flesh wound on palm of hand; cut on jointer.
67	"	19	Christie, Brown & Co.	Toronto	"	Biscuits	Walter Drohan	15	Left hand torn between two fingers in bake shop while playing with another employe.
68	"	16	J. R. Booth	Ottawa	"	Lumber	Hermidus Loucher	22	Index finger of right hand cut at the end in planer.
69	"	20	"	"	"	"	Robert Burns	60	Right index finger tip cut in planer.
70	"	5	"	"	"	"	Calisto Lafrance	16	Some lumber fell on him outside the mill.
71	"	30	Kemp Mfg Co.	Toronto	"	Metal ware	Willie Harger	16	Caught right foot in elevator while taking up copper to the 4th floor, bruising foot.
72	"	25	Ontario Malleable Iron Co., Ltd.	Oshawa	"	Iron	Frank Blanchard	14	One finger jammed in a drop hammer, or press, not saved which.
73	April	28	Canada Cycle-Motor Co.	Toronto	June	Bicycles	*Wlling'tn Lawrence	14	The boy crossed over, looked out of the shipping door; his head caught between floor of elevator and doorway, causing death.
74	June	3	The Rathbun Co.	Deseronto	"	Locomotives	Arthur Joyce	18	Stepped on a nail, ran into foot about an inch.
75	"	5	Cork Co. of Canada, Ltd.	Toronto	"	Corks	Miss McElroy	18	Cut the 1st finger on left hand on a hand-knife.
76	"	2	Sylvester Bros. Mfg Co.	Lindsay	"	Machinery	Chas. Rodman	15	Broke his leg while changing an oil cup; he got up on one of machines instead of ladder and fell.
77	"	6	Dominion Cotton Mills Co.	Kingston	"	Cotton mills	Alfred Lundman	22	Leg bruised and lacerated below the knee.
78	"	12	Canadian General Electric Co.	Peterboro	"	Electrical machinery	D. G. Cameron	22	Knuckle bones of left thumb smashed and flesh bruised; caught thumb between planer and casting.
79	"	14	Christie Brown & Co.	Toronto	"	Biscuits	Isaac Hoover	38	Broke bone of right hip joint; missed his footing and fell through to cellar.
80	"	13	Firstbrook Box Co., Ltd.	"	"	Boxes	H. Peppay	15	Right hand cut with rip-saw, causing three fingers to be amputated—2nd, 3rd and 4th.
81	May	5	The Rathbun Co.	Lindsay	"	Mills	Samuel Walker	28	Bad cut in face and cheek bone broken; edge of board flew back from edger.
82	June	19	Firstbrook Box Co., Ltd.	Toronto	"	Boxes	W. VanEvery	16	Thumb on left hand jammed in nailing machine.
83	"	13	Ottawa Car Co., Ltd.	Ottawa	"	Cars	Henry Howell	60	Fell from a scaffold about 8 ft. from floor, hurting back, also internal.
84	"	23	Kemp Mfg Co.	Toronto	"	Metalware	Albert Heighington	20	Second finger on right hand cut; half nail off with press.
85	"	25	Standard Woollen Mills	"	"	Blankets, etc.	Mary Callaghan	24	Right hand bruised in loom while in motion.
86	"	17	Brown & Wigle Co.	Kingsville	"	"	Delbert Bertrand	24	Left hand caught in feed-roll; had two fingers amputated at first joint.

*Fatal.

ACCIDENTS REPORTED DURING THE YEAR 1902.—CENTRAL DISTRICT.—Continued.

No.	Date.	Employer.	Place.	Business.	Person injured.	Age	Particulars.
87	" 26....	Mason, Gordon & Co.	Ottawa	Lumber	James Polvin	12	Foot caught in sawdust carriers; leg broken badly, causing amputation below the knee.
88	" 30....	Strathcona Cement Works.	Strathcona	Cement	John T. Smy	17	Jammed finger with car of dry cement.
89	July 7....	Auburn Woollen Co.	Peterboro	Woollens	Maggie Record	17	Caught right hand in cylinders in card room; middle finger amputated.
90	" 7....	Kemp M'fg. Co.	Toronto	Metal ware	Albert Hoskin	23	First finger on left hand cut below nail while cutting pail bottoms in press.
91	June 5....	Rathbun Co. Mill	Fenelon Falls	Shingle mill	Walter Corbett	..	Little finger on right hand cut off while jointing shingles.
92	" 14....	"	"	"	Thomas Northey	..	Top cut off thumb on right hand; stick flew from saw and struck thumb.
93	" 25....	"	"	"	Joseph Leatro	..	Top cut off little finger on right hand with rip saw.
94	" 14....	Ontario Lumber Co.	French River	Saw mill	*George Webster	..	Boiler explosion.
95	" 14....	"	"	"	*H. Campbell	..	do
96	July 7....	Huron Lumber Co.	Spanish River	Lumber	*William Abons	32	A plank from top of lumber pile fell, struck him on head and threw him into the water, and he was drowned.
97	June 27....	W. C. Edwards & Co.	Ottawa	"	Wm. Curtis	60	Had foot cut off between ankle and knee with butting saw. He walked along butting cable just as saw was raised with lever.
98	July 16....	Rathbun Co.	Deseronto	Car works	Patrick Hart	65	Right hip bone fractured by falling about 7 feet from ladder.
99	" 15....	Gilmour & Co., Limited)	Frenton	Lumber	George Benham	17	Third finger on left hand cut off, 1st and 2nd fingers badly cut on cut off saw.
100	" 17....	W. W. Chown & Co.	Belleville	Tinware	John Caniff	..	End of two middle fingers of left hand cut off in drop press.
101	" 10....	Wm. Hamilton Mfg. Co.	Peterboro	Mill machinery	John Mathieson	..	Piece of steel flew off the edge of his hammer, striking him, and cutting through into the bowel cavity while working on sarrup irons.
102	" 21....	Kemp Mfg. Co.	Toronto	Metal ware	Lewis Blake	14	Cut on right hand over 2nd knuckle by a pile of blanks.
103	" 18....	Rathbun Co.	Deseronto	Cedar mill	George Kimmerly	39	Ends cut off 1st and 2nd fingers while sawing shingles on automatic machin e.
104	" 18....	"	Fenelon Falls	Lumber	Wesley Marks	26	Fleshy part of thumb on right hand cut two inches with lath saw.
105	" 22....	"	"	"	Charles Clarke	17	Elbow on right arm cut slightly on drag saw.
106	" 29....	Christie, Brown & Co.	Toronto	Biscuits	Maurice Cohen	14	Crust on wound knocked off his arm while fooling with another employee, causing blood poisoning.
107	" 30....	Rathbun Co.	Deseronto	Shingle mill	Fred. Doxtator	18	One finger badly bruised while working on shingle block; hand caught in chain.

108	"	26	"	Fenelon Falls...	Lumber	Henry York	45	Right side under ribs bruised by a board thrown from edger saw.
109	Aug. 1	Kemp Mfg Co	Toronto	"	Metal ware	Harry Novel	21	First joint on 2nd finger of left hand crushed while forming nail ears with press.
110	July 31	Rathbun Co	Deseronto	"	Locomotive shop	W. W. Cole	21	Finger on left hand split open; face plate fell on it.
111	Aug. 1	W. C. Edwards Co., Limited	Ottawa	"	Lumber	Wm. Banning	16	Three fingers cut with circular saw while oiling shaft. Put his hand too close; index finger cut off.
112	July 31	A. R. Clarke & Cs	Toronto	"	Leather	David McKenzie	16	Middle finger of right hand crushed.
113	" 31	Rathbun Co	Deseronto	"	Cedar mill	Duncan Fraser	65	Fingers crushed while picking blocks out of shingle machine.
114	Aug. 4	"	"	"	"	James Rogers	25	Three fingers split while jointing shingles; hand fell on saw.
115	" 2	"	"	"	Box factory	Claude Deline	16	Third and fourth fingers cut off on right hand while operating rip saw.
116	" 6	Auburn Woollen Co	Peterboro	"	Woolens	Percy Hartley	15	Thumb of left hand taken off, being caught in chain in card room.
117	" 3	Strathcona Cement Works	Strathcona	"	Cement	Daniel Mosier	48	Fell accidentally, bruising his shoulder and side.
118	" 13	Christie, Brown & Co.	Toronto	"	Biscuits	Gordon Cole	16	Leg broken above the knee by the elevator.
119	" 15	J. R. Booth	Ottawa	"	Lumber	Wilfrid Herbert	16	Left thumb cut at fist joint with shingle machine in lath mill.
120	" 17	Riordan Paper Mills Co	Merriton	"	Paper mill	John Boncock	49	Big toe on right foot crushed while lowering shaft, chain slipped.
121	" 17	"	"	"	"	Neil McGenachie	37	Left heel cut and bruised, chain slipped on shaft; he overbalanced on scaffold.
122	" 6	Rathbun Co	Gravenhurst	"	Lumber	Bert Buchanan	15	Second finger cut off at first joint on picket saw.
123	" 14	"	Lindsay	"	Lumber and shingles	Joseph Teatro	24	Fleshy part of index finger split open while taking slab from shingle machine.
124	" 19	Christie, Brown & Co.	Toronto	"	Biscuits	A. Roel ejocquelins	...	Knee cap injured while hanging up roller towels for employees use.
125	" 25	Can. Gen. Electric Co	Peterboro	"	Electric machinery	Wm. Hinchliffe	50	Rib on right side broken, stubbed his foot on a small box, striking his right side.
126	" 19	Rathbun Co	Deseronto	"	Cedar mill	Joe. Stevenson	30	Slight cut over right eye; struck on head by pipe while removing a belt, slipped against a pulley.
127	" 23	A. R. Clark & Co	Toronto	"	Leather	William Schmidt	24	Left arm mangled, amputation necessary; by machine known in the trade as a pulling-on machine
128	" 25	Rathbun Co	Deseronto	"	Car shop	Clarence Rorke	19	Top of thumb of left hand lacerated by cut-off saw.
129	" 29	Can. Gen. Electric Co	Peterboro	"	Electric machinery	B. Patterson	18	End of second finger of left hand cut off while operating power shears.
130	" 28	"	"	"	"	Charles Akey	22	End of third finger of left hand cut off while operating power shears.
131	" 30	"	"	"	"	Chas. Sisson	23	Bad burn all over right hand and both eyes burned while connecting up a volt meter; a loose live wire was touched with switch causing a short circuit.
132	Sept. 5	"	"	"	"	J. Buchanan	20	Second finger of right hand amputated while boring out a casting; finger caught between casting and tool.
133	" 5	Kemp Mfg. Co	Toronto	"	Metal ware	Wm. Bell	18	Second finger on right hand cut off below the nail on a power press.

* Fatal.

ACCIDENTS REPORTED DURING THE YEAR 1902.—CENTRAL DISTRICT.—Continued.

No.	Date.	Employer.	Place.	Business.	Person injured.	Age	Particulars.
134	Aug. 29.....	Rathbun Co.....	Gravenhurst....	Lumber.....	Maxim Lemyre...	50	Knee bruised by board thrown from edger, and struck him on knee.
135	" 30.....	".....	".....	".....	Richard Brennan...	50	Broke bone in wrist by falling off car while unloading lumber.
136	Sept. 4.....	".....	".....	".....	Wm. Creasor.....	35	Thumb cut; caught between belt and shaft, taking flesh off thumb.
137	" 4.....	".....	".....	".....	Chas. Rummerfeld	32	Hand cut with sharp hook while using it, handling lumber to edger.
138	" 15.....	Ottawa Car Co., Limited.....	Ottawa.....	Cars.....	R. Poole.....	30	Cut third finger above knuckle while moving tent pins on table of band saw.
139	Aug. 22.....	The Firstbrook Box Co.....	Toronto.....	Boxes.....	R. Brown.....	18	One finger crushed in setting up machine.
140	Sept. 20.....	".....	".....	".....	John Fortner.....	15	Ends of second, third and fourth fingers torn by circular saw, while striking at same with a stick.
141	" 22..	Ottawa Car Co., Limited.....	Ottawa.....	Cars.....	Moise Guenetite.....	45	Two first fingers crushed off and broke third finger while adjusting blocks; drew a heated bar and let it fall on treadle of hammers which put it in motion.
142	" 19.....	Rathbun Co.....	Gravenhurst....	Lumber.....	John Richardson...	20	End of thumb cut off on trimmer saw while trimming lumber.
143	" 13.....	".....	Deseronto.....	Cedar mill.....	Del. Cook.....	26	Finger poisoned with a sliver.
144	July 11.....	Frost & Wood Co.....	Smith's Falls...	Agricul. machinery.	T. L. Kelly.....	....	Collar bone broken; while hoisting an elevator shaft chain broke and shaft fell.
145	" 11.....	".....	".....	".....	Thomas Ward.....	....	Toe of right foot bruised while hoisting an elevator shaft.
146	Oct. 9.....	Rathbun Co.....	Deseronto.....	Locomotive shop...	Walter Cronk.....	16	Bruised, being caught in drill on set screws.
147	Sept. 20.....	Rat Portage Lumber Co., Ltd.....	Rat Portage.....	Lumber.....	Stephen Barusk....	23	Slipped and fell on a saw; little finger split open and third finger cut off at second joint.
148	" 13.....	".....	".....	".....	J. Dean.....	39	Rib broken and badly bruised, being caught in a belt.
149	" 3.....	Christie, Brown & Co.....	Toronto.....	Biscuits.....	Louis McGrath.....	28	Third and fourth fingers of right hand crushed; gear wheels struck and caught his hand while forcing same.
150	Oct. 13.....	".....	".....	".....	John Reid.....	30	Middle finger of left hand crushed; slipped between rollers of brake.
151	" 8.....	Gilmour & Co., Ltd.....	Trenton.....	Lumber.....	Chas. Smith.....	22	Flesh on thumb and first and second fingers lacerated while operating sanding machine.
152	Aug. 22.....	James H. Wylie.....	Almonte.....	Flannels.....	David Reid.....	....	Hand crushed in burr machine.
153	Oct. 15.....	Rathbun Co.....	Gravenhurst....	Lumber.....	Charles Kenny.....	18	Head cut 3 inches by a slab thrown back from bolting saw; struck head.
154	" 22.....	Firstbrook Box Co.....	Toronto.....	Boxes.....	P. Miller.....	23	Flesh torn off left leg, caught in gearing machine.

155	"	22	Canadian General Electric Co.	Peterborough	Electrical machinery	V. Hicks	20	Small finger on left hand caught between shell and punch; cut off at first joint while operating power press.
156	"	29	Firstbrook Box Co	Toronto	Boxes	Wm. Price	14 1/2	Fourth finger of right hand and second finger of left crushed in the wood of printing machine.
157	Sept.	12	Gillies Bros., Ltd	Braoside	Lumber	Robert Morrell		Arm bruised and bone in elbow broken, caused by riding on lorry and lumber falling off.
158	Oct.	10	"	"	"	Noble Armstrong		Thumb and part of finger taken off by circular saw; shipped on piece of bark.
159	"	13	"	"	"	Ed. Allin		Two fingers taken off on small gear on live rollers.
160	"	16	"	"	"	Ed. Proulx		Shoulder dislocated while loading lumber in car; car moved and he fell off.
161	"	25	"	"	"	A. Graham		Arm broken; was carrying an armful of pickets to lorry, and slipped on platform, which was wet.
162	"	30	Firstbrook Box Co., Ltd	Toronto	Boxes	Jas. O'Connor	20	Second finger on left hand cut while operating a rip saw.
163	"	30	Canadian Portland Cement Co.	Strathcona	Cement	John Mosier	24	Thumb crushed while working on clinker car.
164	"	31	Folsen Iron Works	Toronto	General machinery	Jacob Sable	30	Finger badly cut with emery wheel while sharpening tools; had to be amputated.
165	Nov.	5	Rathbun Co	Deseronto	Cedar mill	John Wade	29	End cut off second finger on right hand while cleaning saw.
166	"	7	Firstbrook Box Co., Ltd	Toronto	Boxes	S. Moorhouse	20	Left foot sprained; caught between ceiling and hoist while operating hoist.
167	"	13	Riordan Paper Mills	Merritton	Paper	Chester Fawell	20	Thick part of hand cut with calendar knife on print machine.
168	"	17	Kemp Mfg. Co.	Toronto	Metal ware	Geo. Watson	19	Third finger on right hand bruised, half of nail cut off, by a press.
169	"	20	Joseph Simpson's Sons	"	Knitted goods	Wallace Miller	16	Leg and knee bruised by falling while carrying knitted goods in elevator.
170	"	18	Frost & Wood Co.	Smith's Falls	Agricul. machinery	Geo. Tomlinson		Right leg badly cut at dipping vat; fell, leg coming in contact with disc plates.
171	"	24	Ottawa Car Co., Ltd	Ottawa	Cars	D. Blakely	28	Nail and top taken off first finger; thumb bruised, while helping to take reaches out of lumber wagon.
172	"	29	Kemp Mfg. Co	Toronto	Metal ware	Geo. Johnson	18	First finger on right hand crushed, taking nail out by root, while working on a press.
173	"	17	Rathbun Co.	Deseronto	Cedar mill	Joseph Bennette	22	Foot bruised, working in tie mill; foot caught between carriage and log.
174	"	28	Can General Electric Co.	Peterboro'	Electrical machinery	W. Fann	18	Third finger of right hand cut off at first joint while operating shaper.
175	Dec.	2	"	"	"	P. F. Gorham	14	Index finger of right hand cut off at knuckle; wounds on back of hand, while operating small milling machine.
176	"	3	Riordan Paper Mills	Merritton	Paper	John Hogan	35	Collar bone broken; fell from ladder while painting pipes in mill.
177	"	6	Rathbun Co	Deseronto	Cedar Mill	Alfred Allen	35	Back injured while pulling blocks out of hopper; block struck his pike-pole, knocking him off platform.
178	"	9	Kemp Mfg. Co	Toronto	Metal ware	Albert Coysb	19	First joint on first finger on right hand crushed while punching screws with press.

ACCIDENTS REPORTED DURING THE YEAR 1902.—CENTRAL DISTRICT.—*Concluded.*

No.	Date.	Employer.	Place.	Business.	Person Injured.	Age.	Particulars.
179	" 15.....	Gilmour & Co.....	Trenton.....	Lumber	Thomas Kelly.....	.....	First finger of left hand cut near the point of finger while working cut-off saw.
180	" 16.....	"	"	"	Edward McCabe.....	.....	Front finger of left hand cut in two places while running mortising machine; finger got under chisel.
181	" 18.....	Firstbrook Box Co	Toronto	Boxes	Charles Laughlin.....	24	Eye-ball struck by piece of knot while rip-sawing.
182	" 14.....	Strathcona Cement Co	Strathcona	Cement	Nathan Meeks.	42	Two ribs broken by falling across an iron pipe.
183	" 27.....	"	"	"	Abraham Connors.	20	Leg slightly bruised by a sledge.
184	" 30.....	Rathbun Co.....	Deseronto	Machine shop.....	Archie Penin.....	21	Right foot bruised by a car wheel falling on it.
185	" 29.....	Canada Cycle & Motor Co.....	Toronto Junct.	Bicycles, etc.....	H. Vanderhart.....	15	End of second finger on right hand crushed while operating treadle on punch press.
186	" 24 ..	Frost & Wood Co.....	Smith's Falls.	Agricul. machinery	L. Sowerby.....	.....	Right foot bruised; while handling a mowing machine frame it fell and struck him on the foot.

REPORT

RELATING TO THE REGISTRATION OF

BIRTHS, MARRIAGES AND DEATHS

IN THE

PROVINCE OF ONTARIO

FOR THE

YEAR ENDING 31ST DECEMBER,

1901.

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO.



TORONTO:

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CONTENTS.

	PAGE.
Report proper.....	5
Population Adopted as a Basis of Compilation.....	5
Births in Ontario Counties.....	5-6
Birth Rate in Cities.....	6
Marriages in Ontario.....	7
Marriage Rate per 1,000.....	7
Table showing Percentage of Married and Unmarried Persons.....	7
Table showing Percentage of Population under 15 years.....	8
Table showing Percentage of Unmarried Persons in Population over 15 years.....	8
Deaths in Ontario.....	9
Table of Deaths by Age Periods.....	9
Table giving Percentage of Deaths by Age Periods.....	10
Deaths in Cities in Ontario.....	10
Deaths by Classes of Disease.....	11
Deaths from Typhoid Fever.....	11
Deaths from Smallpox.....	12
Deaths from Measles, Scarlatina and Whooping Cough.....	12
Deaths from Diphtheria and Croup.....	12
Deaths from Influenza.....	12
Deaths from Pyaemia and Septicaemia.....	12
Death from Cancer.....	13
Deaths from Tuberculosis.....	13
Deaths from Tuberculosis in Cities of Ontario.....	13
Deaths from Tuberculosis by Counties with rate per 1,000.....	13
Table showing Death Rate per 1,000 in Cities in Ontario.....	14
Table showing Deaths from Tuberculosis by Occupations in Toronto.....	15
Table showing Deaths by Occupations in Counties of Ontario.....	16-20
Table showing Deaths by Occupations in Toronto.....	21
Deaths from other Classes of Disease.....	23
Table 1, showing Births, Marriages and Deaths by Counties in 1901.....	22-23
Table 2, " " " by Cities ".....	24
Table 3, " " " by Towns ".....	25
Table 4, showing Illegitimate Births, Twins and Triplets.....	26
Table 5, " Proportion of Male to Female Births.....	26
Table 6, " Order of Births by months in Province.....	26
Table 7, " Marriages by Months in Province.....	27
Table 8, " " by Denominations in Province.....	27
Table 9, " Deaths by Counties during 10 past years.....	28
Table 10, " Recapitulation of Deaths by Classes in Counties.....	29
Table 11, " " " " in Cities.....	30
Table 12, " " " " in Towns.....	31
Table 13, " Total Deaths by individual diseases by Counties.....	32-35
Table 14, " " " by Cities.....	36-37
Table 15, " " " by Towns.....	38-39
Appendix.....	i-cxxiii

THIRTY-SECOND ANNUAL REPORT

OF THE

REGISTRAR-GENERAL OF ONTARIO.

Toronto, Dec. 1st, 1902.

To the Honorable J. R. Stratton,
Registrar-General of the Province of Ontario.

Sir,—I have the honor to submit for your consideration the thirty-second Annual Report made under the Act respecting Births, Marriages and Deaths in the Province of Ontario, being for the year 1901.

Population

The populations utilized as the basis for estimating the various rates in this Report are those of the Canada Census of 1901, arranged by referring the enumeration districts of the census to the various county and district boundaries as they exist in the municipal system of the Province of Ontario.

These populations have generally been accepted as accurate and will serve as a basis for comparing the correctness of the data returned through the 774 division registrars of the Province with those collected by enumerators specially designated by the Census Bureau. The total population is 2,184,144, and as remarked in the report for 1901, shows the population increase during the decade to have been notably less than the estimated increase of 1 per cent. which this office assumed, representing the difference of births over deaths. The various causes affecting the growth of the population as represented by the rate of natural increase were referred to in the last Report and need not be repeated.

Births

The total births registered in 1901 were 46,061, as compared with 46,127 in 1900. Table 1 of the report proper indicates the various increases and decreases by counties. In 15 counties there was a slight increase and in 28 there was a decrease. Carleton, including the city of Ottawa, shows an increase of 407, Prescott and Russell 201, Algoma 138, Grey 132, Nipissing 107, while the other increases were in all cases less than 100. The decreases have been more generally distributed, but are not large. Those above 100 were: Kent 138, Hastings 112, Northumberland and Durham 111, Bruce 104, and Simcoe 100. Comparing with these figures the births in cities found in table 2, it will appear that these have shown an increase of 193 over 1900, so that there has been a total decline of 259 in the municipalities not included under cities. The variation in the rate per 1,000 of births in different counties is remarkable, and of interest as illustrating movements of population. Algoma, for a new district, with 22.0 per

1,000 is disappointing, but when it is understood that a large number of men was there temporarily employed in railway construction and as lumbermen with homes elsewhere, the explanation of the relatively low rate is satisfactory. Haliburton, another frontier district, with a population of young settlers, shows naturally a high rate, 30.8 per 1,000. Parry Sound similarly with its rate of 28.1 and Muskoka with 29.1 are likewise satisfactory along with Renfrew with 28.2 per 1,000. Thunder Bay and Rainy River are disappointing for new districts; but as a matter of fact, the agricultural population is but small, it having been hitherto largely a more or less floating mining population. Its present rapid agricultural settlement will give a good opportunity for future comparison. The counties, whether old or new settlements, having a large French population again stand out prominently with their high birth rates. Carleton has 25.4, Essex 25.1, Nipissing has 40.4, Prescott and Russell 37.9. The phenomenon is interesting, but not unusual, if compared with new settlements as they grew up in the history of the old counties settled forty or fifty years ago, by European immigrants. The old-settled counties with no large towns cannot, for reasons before stated, be expected to increase in population, unless a more intensive system of agriculture be introduced. In keeping with the absence of increase in births in such counties is to be noted, the fact that in 31 towns, mostly county towns, as seen in table 3, 12 only showed an increase, the balance showing a decrease. Had Owen Sound not had 127, or more than half the increase in towns with any increase at all these towns would have shown a decrease in births of 402 instead of only 36.

It therefore appears that apart from other influences, whether social or moral, which may affect birth rates, it would seem that old agricultural communities will have low birth rates, which are even accentuated in old villages and small towns, which are not increasing, though they may do so with the introduction of factories. Hence, it must be to the growth of population on our virgin lands in new Ontario and to the development of manufacturing industries in the cities and towns that we must look for an increase in population. Massachusetts presents the most marked example of what Ontario must become as new settlements grow up in western Canada. Thus the 2,238,907 in 1890 has increased to 2,805,346, or a total of 566,439 in 1900, or an urban increase of 76 per cent., with a similar urban increase between 1880 and 1890 of 69 per cent.

Birth Rate in Cities.—As already remarked, the increase in these has not made up for the decrease elsewhere. Ottawa with 315 alone shows a satisfactory increase in keeping with the total increase of population as per the assessors' returns. Apart from this, the increases were but 105, while the decreases were 225. There are two explanations, first, that the births have not occurred, or, second, that they have not been registered. In table 2 the different rates per 1,000 are set forth. Thus Ottawa has 27.5, while Toronto has 21.4, and Windsor 21.2, Hamilton and London have 18.7 and 18.6 respectively, while Brantford, a smaller city, has 25.4. Kingston, a city which has not increased, has 17.8 as compared with St. Thomas, a growing city, with many factories, with only 17.1. Again, Belleville, a city where the population has declined, having 17.1, may be compared with Stratford, a city with large workshops, with only 17.4. These comparisons amply illustrate what has in other ways been demonstrated, that the returns in both cases hold a distinct relationship to the activity of the particular division registrar in obtaining the registration of the births which have occurred.

Marriages

The total marriages reported during the year 1901 were 18,035, as compared with 17,017 in 1900, or an increase of 928. The rate, 8.2 per 1,000, must be considered high, and as an indication of prosperity extremely satisfactory. The rate is especially high in cities, being 11.5 per thousand. This is, however, quite abnormal, being rendered so by the 835 marriages celebrated in Windsor, amounting to 68.5 per 1,000. Eliminating this from the total for the Province we have still a marriage rate of 7.9, while in the cities, which, including Windsor, give 11.5 per 1,000, there is a rate of 10.0 without it. The following table giving the marriages returned during several past years is of interest :

Marriages in Ontario.

1891.....	14,159	1897.....	15,293
1892.....	14,482	1898.....	15,375
1893.....	14,475	1899.....	16,414
1894.....	14,341	1900.....	17,107
1895.....	13,987	1901.....	18,035
1896.....	14,904		

The table is of much interest, illustrating equally a positive increase in marriages since 1896, and also a very notable and steady increase in the completeness of the returns. They may now be considered absolutely complete, checked as they are by the returns of marriage licenses made to the office, and the practical abandonment of publication of banns. Any such, if published, of course, are known to the local registrar. By corresponding with 51 clergymen, 441 returns previously unregistered were obtained, and only a few licenses were issued, of which assumed marriages no information has been obtained.

With a marriage rate, as seen in the following table, equalling almost that of the highest of other countries, it is apparent that the birth rate should be approximately that of such countries.

Table Showing Marriage Rate per 1,000

England and Wales (1900).....	8.0	German Empire (1899).....	8.5
Scotland (1900).....	7.31	Massachusetts.....	8.3
Ireland (1897).....	5.03	Michigan (1899).....	9.0
Denmark (1899).....	7.5	Connecticut (1899).....	7.6
Sweden (1899).....	6.2	Quebec (1900).....	6.0
Switzerland.....	7.5	Ontario.....	8.2

The figures illustrating this high marriage rate in Ontario are fully borne out by the Canada Census returns for 1901.

The following table gives the proportion of unmarried to married persons in the several Provinces, and, for comparative purposes, in Ireland, which has a phenomenally low rate:

Table Showing Percentage of Married and Unmarried Persons, as per Census of 1901.

	Per Cent.		Per Cent.
Ontario—Married.....	Males 34.9	Unmarried.....	Males 61.8
	Females 35.3		Females 58.2
Quebec—Married.....	Males 33.6	Unmarried.....	Males 63.6
	Females 33.1		Females 61.8
Manitoba—Married... ..	Males 30.9	Unmarried... ..	Males 68.7
	Females 35.7		Females 60.8
Nova Scotia—Married....	Males 32.9	Unmarried.....	Males 64.2
	Females 32.3		Females 59.2
Ireland (Cen. 1901)—Married, Males	26.0	Unmarried.....	Males 63.6
	Females 26.0		Females 61.8

The table is made still more interesting and instructive by the further comparison of the ratio of the population under fifteen years to the total since it will explain why in some Provinces quite notable differences exist.

Table Showing Proportion of Population Under Fifteen Years, as per Canada Census, to Total Population.

Ontario—Population under 15 years.....	31.34
Quebec—Population under 15 years.....	38.69
Manitoba—Population under 15 years.....	38.30
Nova Scotia—Population under 15 years.....	33.78
Ireland—Population under 15 years.....	30.35

The apparently high percentage of married persons in Ontario is affected by the fact that a disproportionately large population is over fifteen years of age.

The following table refers to the population of fifteen years and over.

Table showing Percentage of Married Persons in Population of Fifteen Years and Over.

	Males. Per Cent.	Females. Per Cent.
Ontario.....	51.7	51.3
Quebec.....	55.0	54.1
Manitoba.....	43.3	60.7
Nova Scotia.....	49.0	41.0
Ireland (Census 1901).....	38.25	37.09

These tables do not include in their calculation either widowers or widows, which do not in practice affect the percentages. We see from them that the slightly higher percentage of married persons to the whole, as seen in the first table, is due to the fact of there being a smaller percentage of population under fifteen years. It is apparent, therefore, that a comparison of the percentage of marriages is most accurately obtained by estimating them on the basis of population of fifteen years and over. The Province of Quebec, then, is seen to exceed Ontario, and, indeed, all the other Provinces, in this, except Manitoba, where the percentage of women married is highest. The influx of a large male population of settlers, many of whom are young men, may well explain this fact.

The natural increase, based upon so high a marriage rate, should manifestly naturally exceed that already given in the births returns, as well as by comparative figures for other countries. Thus Quebec, with a population of 1,648,898, shows by the census returns 50,342 children under one year of age, or with a population 533,246 less, it has 3,619 children more than Ontario, or 50,342 to 46,413, or a rate of 30.6, compared with 21.1 in Ontario.

The approximate correctness of the birth returns may be estimated by comparison with the returns for 1901. The Census gives 46,413 children under one year of age, while the Ontario registration records give 46,061. To show further that Ontario's rate is much too small, it may be stated that the fertility of the marriages registered in Scotland in 1894, estimated in 1900, shows that 445 children were born for every 100 marriages, or a fertility rate of 4.45 per marriage. The returns for January, February and March, 1901, are included in both, but the Census is in the other nine months for 1900, while the registration returns are for 1901.

Marriages in Cities. These are given in table 2, and show that, apart from Windsor, the cities of Chatham and St. Thomas, with 15.0 and 12.9 respectively, have the highest rates in the Province. It is not improbable

that, being relatively near the Border, the marriage ratio is affected by the same influences as at Windsor. Toronto and Belleville, with 10.3, and Kingston, with 10.2, follow next in order, while Guelph, with 8.2, is the lowest. Amongst the towns, as found in table 3, the influence of Border conditions is seen to prevail. Thus, Niagara Falls has a rate of 22.1, and Sault Ste. Marie has 17.0. But frontier towns everywhere have high rates. Persons from the new settlements go to points where licenses and the services of clergymen are readily available. Thus Bracebridge has 16.5, L'Original 15.6, Lindsay, 13.3, Napanee 21.0, North Bay 14.6, Owen Sound 19.1, and Farnia 15.4. The Border towns, along with the city of Windsor, as has before been remarked, must continue to create a marked excess over the normal marriage rate; but as the Marriage Act is at present administered by both license issuers and clergymen, there seems little hope of any marked improvement taking place.

Deaths

The total deaths recorded in Ontario in 1901 were 29,608, showing a decrease over the previous year of 114, and giving a rate of 13.6 per 1,000. As it is believed the returns are practically complete, the rate must be considered low. Since 1896, when the Amended Act was passed, the deaths have been:

1896	24,857	1899	28,607
1897	27,633	1900	29,494
1898	26,370	1901	29,608

The Report for 1900 entered quite fully into a comparison of the deaths in 1891 and 1900. The death-rate in the different age-periods in each year was compared, and the influence of a disproportionate population belonging to the later periods upon the general death rate was shown by tables. Table 10 again illustrates the same fact. Thus there were:

	Deaths.
Between 60 and 69 years	3,036
Between 70 and 79 years	4,051
Between 80 and over	3,336
Total	10,423

Or 35 per cent. of the total deaths were of persons of three-score or more years. There were 6,543 deaths of children under one year, or 22 per cent. of the whole, all still-births being included. The years of life, from one to 59, including a population of over 1,964,000, had a death rate of 6.9 per 1,000. As shown in the Report for 1900, the mortality during school-age has in recent years very notably decreased. The table may again be repeated:

Table of Deaths by Age-Periods.

—	1891.	1900.	1901.
1 to 4 years	.....	1,089	1,854
5 to 9 "	1,544	803	816
10 to 14 "	722	563	571
15 to 20 "	740	941	897
20 to 24 "	876	1,257	1,182
25 to 29 "	911	1,083	1,099
30 to 39 "	1,423	1,908	1,993
40 to 49 "	1,270	1,819	1,909
50 to 59 "	1,386	1,931	2,135
60 to 69 "	1,843	2,549	3,036
70 to 79 "	2,214	3,825	4,051
80 and over	2,224	3,099	3,336

for, with a birth rate of 25.4, but 2 per 1,000 less than Ottawa, it has a death rate of only 15.5. Guelph, with 13.6, has also, for a city which has not greatly increased, a fairly satisfactory birth rate of 19.6 per 1,000.

Amongst the towns, Owen Sound leads, with the death rate of 26.9. While the Census and municipal figures are closely in agreement, the result of this will likewise be abnormally high births, 34.1, marriages, 19.1, and indicates that the growth of the town population has notably exceeded the figures given, and, hence, the division is too small.*

Other towns, as Welland with 23.6, Perth with 22, and Brampton with 26.5, show, probably a too high rate, owing to deaths from surrounding municipalities being registered therein.

Deaths by Classes of Disease. Comparison, owing to re-arrangement of the classes of disease under the Bertillon system, enables comparison to be made only with 1898, 1899 and 1900. The class of communicable (epidemic) diseases shows 2,599, as compared with 2,255 in 1900, 2,460 in 1899, and 1,709 in 1898; but other general diseases show 5,327, as compared with 5,559, indicating a more exact definition of diseases in the returns. Diseases of the nervous system show 3,421, as compared with 3,597; diseases of the circulatory system give 2,122, as compared with 2,004; diseases of the respiratory system give 3,547, as compared with 2,995; while those of the digestive system were 2,316, as compared with 3,425. The great falling off is due, in large measure, to the remarkable mortality from diarrhoeal diseases in August, 1901.

Class XI., including a large number of ill-defined diseases, is 6,994, as compared with 6,509 in 1900. The class of accidents is much the same as in 1900, being 1,092, as compared with 1,042.

The deaths from diseases by classes, in cities and in towns, will be found in tables 11 and 12.

Deaths From Typhoid Fever. The deaths from this disease were 500, as compared with 682 in the previous year. The deaths in 1899 were the highest since 1891, due, as before stated, to the exceptional character of the weather during the later autumn. The total deaths in cities were 115, and in the towns 37. As the population in the cities and towns is as 1 to 3.5, it appears that the mortality was very evenly distributed in town and country. It is remarkable that, excepting York with 49, Algoma with 26, had the highest number of deaths from this disease; while its total mortality rate was but 10.3, or, with the exception of Rainy River, the lowest in the Province. Sault Ste. Marie had 14 of the total. The sudden influx into that growing town, and its being the point to which persons sick must be sent from the large railway camps in the neighborhood, were the causes for this unusual number. On the other hand, the Rainy River District, with a large number of men on railway construction, seems to have been unusually healthy, only three deaths being recorded.

The remarkable immunity of the cities and towns with public water supplies is of interest, the total in fourteen cities being 115, the rate being but 0.32 per 1,000. It is known that a number of the newer cities have still well water in the suburbs, and in every instance analyses of the health reports connect the typhoid with such water. The city rates are also increased by the fact of typhoid being a disease very frequently sent into the hospitals from surrounding districts in the counties.

The intimate relationship between water and typhoid is well illustrated by the remarkable showing of Massachusetts, where, with an urban population of 76 per cent., in 1900 the total deaths were 632, in a population of 2,805,348, all water supplies being very carefully supervised by the

* There is reason to believe that the returns were improperly made.

State Board of Health. Scotland, with a population of 4,472,000, had in 1900 only 614 deaths, or .14 per 1,000. In England there were 5,591 deaths in a population of 32,526,075, or .173 per 1,000. Thus, the urban rate, though low, yet indicates defects which still leave room for improvement, especially in rural sanitary conditions.

Deaths from Smallpox. There were 7 recorded for the Province in a total of some 3,000 cases. The type of disease has been discussed at length in the Annual Report of the Provincial Board of Health for 1901, and its bearing upon the phenomenally low mortality was then set forth. The disease at the time of writing, in the end of 1902, is still largely of the mild type.

Deaths from Measles, Scarlatina and Whooping Cough. These diseases have come to have what seems an almost permanent character for mildness. The deaths were respectively, 181, 268 and 166. In 1900 they were 143, 170 and 185. Scarlet fever, of the three, shows a very definite increase.

Deaths from Diphtheria and Croup. The deaths from these diseases were 772, as compared with 738 in 1900. Both years have shown an increase from 634 and 599 in the two previous years. It would appear that, for some reason, the very marked downward tendency of this disease since 1894, when the deaths were 1,075, has been checked. The same observation has been made in several neighboring States, and demands investigation by health authorities. Contrary to typhoid fever, this disease is markedly a disease of dense populations, as seen in the fact that in the fourteen cities the deaths were 312, approaching three-sevenths of the total. Toronto leads with 174.

1895.....	147	1899.....	103
1896.....	132	1900.....	179
1897.....	161	1901.....	174
1898.....	63		

Ottawa shows a still higher death rate, there being 60 deaths in 1901, as compared with 45 in the previous year. Hamilton had 28, as compared with 21 in 1900, while London has increased from 9 to 22. Kingston has 4, as compared with 2 in 1900. Brantford 4, as compared with 1. The balance of the cities have, however, only 20, as compared with 23. Thus it appears there has been a general upward tendency in the cities, while in the rural districts there has been, on the whole, a decrease.

The mortality from the disease has shown in most countries very remarkable decreases since 1894. In a population of 21,327,275 in 1,435 cities and towns of the United States, there were in 1901 8,477 deaths from diphtheria, or a rate of .4 per 1,000 population. It will be seen that the Ontario rate of .32 per 1,000 compares favorably with this total.

Deaths from Influenza. This disease had a death rate of 694, as compared with 324 in 1900 and 990 in 1899. While the specific character of Russian influenza, or la grippe, is undoubted, it would appear that the name serves to include a certain number of diseases roughly diagnosed, and which for lack of care are placed under this head. Its prevalence during January and February are well marked.

Deaths from Pyaemia and Septicaemia. The deaths included in this group were 572, as compared with 558 and 241 in 1899. Whether on account of the increased accuracy in the definition of disease, or not, it is apparent that these diseases show a quite notable increase. Assuming the correctness of diagnosis, it is apparent that they tend to move along the lines which

show cancer as rather increasing. These diseases show certain tendencies in the broad influences which affect the nutrition of the individual, seeming to make him more liable to diseases showing degeneration of tissues, which become of much interest in their influence on mortality.

Deaths from Cancer. There were 1,094 deaths from this disease, as compared with 1,055 in 1900. The deaths from 1897 have increased, being 927, 975 and 1,041 for 1897, 1898 and 1899, but they show no relative increase beyond increase of population. The reasons why from 1891 to 1901 there has been an increase were discussed in the Report for 1900. Their relation to old age, and the relatively high proportion of deaths of old people to the total deaths, has been already dwelt upon.

Deaths from Tuberculosis. The deaths from this disease were 3,243, as compared with 3,484 in 1900, thus showing a decline of 241. This is gratifying, as being the first time for several years in which the deaths from the disease have not increased. Since 1897 the deaths have been:

1897.....	3,154	1900.....	3,484
1898.....	3,291	1901.....	3,242
1899.....	3,405		

In the cities the totals for 1901 were 994, as compared with 1,081 in 1900, or a decrease of 87.

The decline seems to have been general, as may be seen in the following table:

Deaths from Tuberculosis in Cities of Ontario.

—	1900.	1901.	Decrease.
Toronto.....	497	489	8
Hamilton.....	108	95	15
Ottawa.....	142	139	3
London.....	67	57	10
Kingston.....	58	50	8
Brantford.....	40	35	5
Guelph.....	20	17	3
St. Catharines.....	27	26	1
Belleville.....	28	12	16
Stratford.....	18	14	4
Windsor.....	29	20	9
Chatham.....	18	12	6
Woodstock.....	18	9	9
St. Thomas.....	11	19	Increase—8

Thus, as seen, St. Thomas is the only city in which a decline is not seen. As the diseases of the respiratory system were 955, as compared with 879, it would seem that the decrease has been due to the influence of the education of the people in the measures of prevention against this communicable disease.

The rate per 1,000 for the Province was 1.49; for the cities, 2.09; and for the towns, 1.01; making the rate for the rural districts, 1.33.

The distribution of the disease by counties has been before remarked upon, but the notable differences may again be illustrated.

Deaths in Ontario from Tuberculosis by Counties, giving Rate per 1,000.

Algoma.....	3.06	Essex.....	1.50
Brant.....	1.04	Frontenac.....	1.76
Bruce.....	1.11	Grey.....	0.90
Carleton.....	2.34	Haldimand.....	1.20
Dufferin.....	0.80	Halton.....	0.78
Elgin.....	1.30	Haliburton.....	1.70

Deaths in Ontario from Tuberculosis—*Continued.*

Hastings.....	1.14	Perth.....	1.03
Huron.....	0.94	Peterborough.....	1.00
Kent.....	1.34	Prescott and Russell.....	1.59
Lambton.....	1.89	Prince Edward.....	1.65
Lanark.....	1.16	Rainy River.....	3.33
Leeds.....	1.89	Renfrew.....	1.00
Lennox and Addington.....	1.70	Simcoe.....	1.10
Lincoln.....	1.50	Stormont, Dundas and Glengarry..	1.46
Middlesex.....	1.20	Thunder Bay.....	2.54
Muskoka.....	2.00	Victoria.....	1.00
Nipissing.....	3.25	Waterloo.....	1.10
Norfolk.....	1.10	Welland.....	1.21
Northumberland and Durham.....	1.01	Wellington.....	1.06
Ontario.....	1.17	Wentworth.....	1.40
Oxford.....	0.94	York.....	1.71
Peel.....	1.33		

From the table, it becomes apparent, as has been noted before, that the prevalence of tuberculosis varies greatly for different counties. The group of the central western plateau still retains its pre-eminence as having a low death rate. Thus, Bruce has 1.11, Dufferin 0.80, Huron 0.94, Middlesex 1.20, Perth 1.03, Oxford 0.94, Waterloo 1.10, and Wellington 1.06. Similarly, the group on the clay lands of the two peninsulas still maintains a higher rate. Thus Essex has 1.50, Kent 1.34, Lambton 1.89, Lincoln 1.50, and Welland 1.21. The latter group, however, within recent years, with more drainage, has distinctly improved, the rate in most cases not exceeding the average. Halton, again, shows an improvement, and has, with 0.78, the lowest rate in the Province.

The Eastern St. Lawrence counties, with Leeds and Grenville 1.89, Stormont, Dundas and Glengarry, with 1.46, are still high, but, likewise show an improvement over past years. Frontenac, with 1.76, and Lennox and Addington, with 1.70, and Prince Edward, with 1.65, retain an unduly high rate. Hastings has, however, notably decreased from 1.7 to 1.14. Those counties including the large cities have still high death rates, Carleton having 2.34, York 1.71, and Wellington 1.40.

What is most remarkable, however, is the fact that Algoma, with 3.06, Muskoka with 2.00, Nipissing with 3.25, Rain River with 3.33, Thunder Bay, with 2.54, and Haliburton have this year greatly exceeded the normal, and, indeed, show an alarming proportion of deaths from this disease. It illustrates how in small populations, whose occupations have changed so rapidly within a few years from agricultural and lumbering to those of town centres, mining populations and railway construction, the results of dangerous occupations should so soon be seen in the death rate. Racial influences, too, may, in part, have some influence upon the high rate.

The variations in the cities of the Province are seen in the following table:

Table Showing Death Rate per 1,000 in the Cities of Ontario.

St. Catharines	2.8	Windsor.....	1.64
Kington.....	2.79	Guelph.....	1.56
Toronto.....	2.35	London.....	1.50
Ottawa.....	2.32	Stratford.....	1.40
Brantford.....	2.10	Chatham.....	1.32
Hamilton.....	1.80	Belleville.....	1.30
St. Thomas.....	1.65	Woodstock.....	1.02

It will appear that marked variations in prevalence are found in the large centres, and are similar to the figures of 1900. Toronto and Ottawa

maintain the same rate, Kingston shows a small decline from its enormously high rate, St. Catharines shows the same abnormally high rate, Brantford has rather improved, and London, also, has declined, while Belleville shows a remarkable decline, from 3.0 to 1.30. Chatham, similarly, has not only declined, while St. Thomas has risen from 0.9 to 1.65. Woodstock from 2.0, has decreased to 1.02, and Stratford has fallen from 1.8 to 1.40. Guelph, also, has decreased from 1.76 to 1.56, and Windsor has fallen from 2.3 to 1.64.

Table showing Deaths by Occupations of those dying in Toronto in 1901 from Pulmonary Diseases. (Ages are 15 and over).

	Tuberculosis		Other Lung Diseases.			Tuberculosis.		Other Lung Diseases.	
	Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.
Agents			2		Lawyer			2	
Artists	2				Laundryman				
Auctioneers					Liveryman	1		2	
Bakers and conf.	3	1		1	Lampighter				
Barbers	4				Mason	2			
Butchers	4				Matron				
Bartenders	1				Miners	1			
Bookkeepers	3	1	1		Milkman				
Bookbinders		1			Manufacturer			1	
Blacksmiths	2		3		Moulder	1		1	
Brickmakers	1		1		Miller			1	
Bankers, &c.			1		Musician				
Builders	4				Machinist	2		1	
Boarding house keepers					Merchant	2		5	
Bootblacks					Mechanic	3		5	
Athletic instructor	1				Nurses		2		
Carpenter	4		9		Nuns				1
Cabinet maker	2		1		Pattern maker				
Cooper	1		1		Painters	9		2	
Caretaker	1				Pedlars	2			
Cook					Physician	1		1	
Chemist, &c.					Plasterer	1		1	
Clergy	1		2		Plumber				
Carriage & wagon m'k'r.	1		1		Printer	4		1	
Clerks	13	4	4		Photographer	2			
Cigar makers	1				Public official				
Commercial traveller	5		2		Policeman			1	
Coppersmith					Picture framer	2			
Carder					R. R. employee	2		1	
Cattleman	1				Rag sorter and picker			1	
Dentist	1				Stenographer				2
Dressmaker		3		1	Stonecutter	3		2	
Decorator					Student	4	1	1	1
Engineer	2		2		Shoemaker	4		3	
Engraver					Sailor	2		1	
Editor, &c.	1				Seamstress		2		
Envelope maker	1				School teacher	1			
Foreman			1		Surveyor	1			
Farmer	9		3		Silver plater	1		1	
Furrier	1				Senator				
Factory hand	4				Sec. Treas.	1			
Florist			1		Tailor	2			
Fireman	1		1		Teamster	1		4	
Gardener	3		1		Telegraph operator			1	
Glass worker					Tailorress		2		
Gunsmith			1		Telephone operator	1			
Hunter					Volunteer, pension'r, &c.				
Harness maker	1		1		Watchmaker & jeweller	1		1	
Hotel keeper	1				Weaver				
Hair dresser					Gentlemen	1		8	
Indian Chief					Servant	1	10	3	10
Inventor					Housewife		36		45
Lumberman									

Total deaths in Toronto from tuberculosis and scrofula, 489; 202, or 41.30 per cent., of which happened in those over 15 years.

Total deaths from other diseases of respiratory system, 410 150, or 36.58 per cent., of which happened in those over 15 years.

Table showing Deaths by Occupations and Ages in Ontario in 1901.—Continued.

Occupations.	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-59	60-69	70-79	80 and over.	Totals.	
												Male.	Female.
Builders and contractors.					1			3	3	2	2	11	
Boarding house keepers.						1			3			4	
Male													2
Female		1		1									
Carpenters		6	3	3	11	5	13	29	45	49	33	197	
Cabinet makers		5		1					2	3	2	13	
Coopers		2			2			2	4	5	8	23	
Cooks	1		2		1	2	1	2				9	
Male		2	1		2								3
Female													
Chemists & Druggists		9	2	2	2	3		1	2			19	
Clergymen			2	3	2	1	4	11	8	8	9	48	
Carriage & waggon mkr's			1		1		1	1	6	4	7	21	
Clerks	6	13	12	4	6	4	6	4	4			59	
Male	1	4											5
Female													
Cheesemakers	1	2	3	1	1			1		1		10	
Cigarmakers	1	1						1	1			4	
Male													
Female													
Commercial Travellers			2		4	4	2	4		2		18	
Dentists				2	1	1	1		1	1		7	
Dressmakers	2	9	7	5	3	1	1	1	1	1		31	
Engineers		2	2	1	3	3		8	3	2		24	
Electricians			1		1	2		1				5	
Engravers									1	1		4	
Editors, reporters, etc		1		1					3			5	
Foremen						1		1				4	
Forewomen								1				1	
Farmers	116	149	126	120	125	119	145	333	634	984	861	3,712	
Male	76	52	38	9	13	10	11	16	28	68	89	410	
Female													
Furriers								2				2	
Factory hands	5	2	2		2	1		5	2		1	20	
Male		1	1										2
Female													
Gardeners		1		1	2	1	5	5	18	15	12	60	
Male						1							1
Female													
Gentlemen					1	3	3	26	65	196	198	492	
Hunters and Fishermen	1	2	2			4	4	1	2	3	3	23	
Housewives	22	163	299	292	275	265	238	568	757	814	594	4,287	
Harnessmakers & saddlers		1	2	2	3			6	5	8	1	30	
Hotel keepers		1	1	2	8	6	5	15	10	3		51	
Male		1											1
Female													
Labourers	70	97	72	57	67	59	65	143	143	167	107	1,047	
Lumbermen	3	3	3	3	3	3	6	4	4	7	4	45	
Lawyers			1	2	1	1	1	2	4	3	1	16	
Laundry		1		2								3	
Male		1	1					1			1		4
Female													
Liverymen		1	1		4	4		5	1	1		17	
Masons		2	2		2	4	6	12	15	10	8	61	
Mechanists		4	5	1	3			7	4	4	2	31	
Merchants		2	3	7	9	11	15	19	35	23	16	140	
Male													2
Female													
Mechanics	2	6	2	2	3	6	8	11	11	7	8	66	
Milliners	2	3	2					3	2			12	
Miners	1	4	4	2	3	2	2	2	2			22	
Milkmen	1	1						2				4	
Manufacturers		2	1		2		1	3	6	2	4	21	
Millers		1	1	2	2	1	3	2	6	2	4	24	
Moulders		2		4	2				2	2		12	
Musicians						1	1	1				3	
Male					1								1
Female													15
Nurses		4	2	1			3		3	1	1	1	4
Nuns		1		1				1	1			49	
Painters		3	4	3	3	4	7	7	7	6	5	49	
Peddlers					2	1			1			6	
Physicians		1		3		3	3	5	5	2	3	26	
Male													
Female													
Plasterers						1		1	1			3	
Plumbers		2		2	1	1	1		1			8	
Printers	2	2	2	2	2	1	1	1	3	1		17	
Male													
Female													

Table showing Deaths by Occupations and Ages in Ontario in 1901.—Concluded.

Occupations.	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-59	60-69	70-79	80 and over.	Totals.	
												Male.	Female.
Photographers Male..			1	1	1			1	2			6	
Female													
Public officials Male .		1	2	4	3	4	4	4	18	20	10	66	
Female				1	1	1	1	1	1			6	4
Policemen				1	1	1		1	1	1		6	
Railway employees	3	18	18	16	19	10	9	11	3		1	108	
Stenographers Female			3										3
Servants Male..		3	3	1		2		9	11	1	1	31	
Female	35	30	18	18	13	20	9	22	18	23	8		214
Students Male..	26	10	7									43	
Female	34	3											37
Stone cutters				2	1	2		1	2	4	2	14	
Shoemakers Male .				2	1	2	8	23	24	16	76		
Sailors	1	6		2	3	4	3	7	6	10	5	47	
Seamstresses	1	1	4			1	1	1	4	2	1	16	
School teachers Male..		6	7	5	1	2	1	3	2	3	2	32	
Female		10	5	3	1	1	1	3	1	1		26	
Spinsters		3	4	2	1	1	2	1	11	12	9	46	
Tailors	1	1	2	3	1	1	6	5	5	2	2	11	
Tinsmiths	1		3	3								27	
Teamsters		2	3	1	1			1				8	
Telegraph o'prs Male				1									1
Female													
Tanners and curriers	1				1		1	1		4		8	
Volunteers, soldiers and pensioners		2		2				1	3	7	3	18	
Undertakers				1		1		1	1	1		4	
Vet. surgeons					1	2	1	2		4	1	11	
Watchmakers & jewellers		3		3			1	1			1	9	
Weavers Male..		1		2	1	1		1	1	2	6	15	
Female	1		1			1		2				5	
No occupation Male..	48	42	20	15	10	11	11	24	31	68	59	339	
Female	215	139	92	55	58	40	43	114	237	452	594	2,039	
Total	684	864	828	693	726	661	672	1,541	2,291	3,094	2,719	7,644	7,129
Male..	295	439	353	305	361	321	363	806	1,238	1,732	1,431	7,644	14,773
Female	389	425	475	388	365	340	309	735	1,053	1,362	1,288	7,129	

Deaths by Occupations and Ages in Toronto in 1901.

Occupations.		15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-59.	60-69.	70-79.	80 and over.	Totals.	
													M.	F.
Agents	M.		1			1			2	3	1		8	
F.														
Artists	M.		1		1								2	
F.				1						1				2
Architects	M.											1	1	
F.														
Auctioneer	M.					1							1	
Bakers	M.		2		2		1	1	1	1		1	9	
F.														
Barbers	M.			1		2	2						5	
F.														
Butchers	M.			2	1	2	2	2	1				10	
Bartenders	M.		1		1								2	
F.														
Bookkeepers	M.		2			1		3	3	1	1		11	
F.				1										1
Bookbinders	M.		1										1	
F.		1					2	1	1	2	2	4	12	1
Blacksmiths	M.					2	1	1	2	2				

Deaths by Occupations and Ages in Toronto in 1901.—Continued.

Occupations.		15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-59.	60-69.	70-79.	80 and over.	Totals.	
													M.	F.
Brickmakers	M.									1			1	
Bankers	M.		1			1		2				1		5
	F.													
Builders and contractors	M.				1		2	1	1	5	3			13
Boarding house keepers	M.										1			1
	F.									1				1
Carpenters	M.		1	1		2	6	2	5	12	6	2		37
Cabinet makers	M.					1		1				1		3
Coopers	M.								2		1			3
Cooks	M.					1					1			2
	F.								1					1
Chemists and druggists	M.		1				1	1	1	1	1			6
	F.													
Clergy	M.			1		1			3	2	4	3		14
	F.													
Carriage makers	M.					1		1	1					3
Clerks	M.	11	11	5	4	4	4	1		1	5			46
	F.	2	4			1	1							8
Cheesemakers	M.													
	F.													
Cigarmakers	M.		1		1			1						3
	F.													
Commercial travellers	M.		1	4	1	4	1	2	8	3				24
Dentists	M.			1										1
	F.													
Dressmakers	F.	1			2	1	1	1	1			1		8
Engineers	M.			2		2	3	4	3	1	3			18
Electricians	M.						1							1
Engravers	M.									1	1			2
	F.													
Editors and authors	M.			1		1	1				1			4
	F.													
Foreman	M.				2			1	2					5
	F.													
Farmers	M.	2	3	9	2	1	3	2	5	8	10	3		48
	F.													
Furriers	M.										1			1
	F.		1											1
Factory hands	M.	1	3	2	2	1			1	1	1			12
	F.	4	1						1					6
Gardeners	M.			1	1				3	2	2	2		11
	F.													
Gentlemen	M.	1		1			1	1	3	12	26	12		57
Hunters and fishermen	M.													1
Housewives	F.	3	21	31	44	47	42	40	91	74	81	22		496
Harnessmakers and saddlers	M.						1	1	1	1		1		5
Hotel keepers	M.					1	2	1	1	2				7
	F.													
Laborers	M.	4	3	3	7	8	2	13	27	24	16	8		115
Lumbermen	M.	1		1					1	1	1			5
Lawyers	M.			2					3	1	1			7
	F.													
Liverymen	M.				2		1	1		3				7
Laundry	M.			1										1
	F.						1		1					2
Masons	M.				1	1		1	2	2		1		8
Machinists	M.		1	1	4		1	4	2	2	1	1		17
Merchants	M.		1	1		1	1	1	10	9	8	4		36
	F.		1			1								2
Mechanics	M.	1	3	1	3	1	1		1	2	2	3		18
Milliners	F.													
Miners	M.			1					1					2
Milkmen	M.										1			1
	F.													
Manufacturers	M.									2	1			3
Millers	M.				1				1	1				3
Moulders	M.						1							1
Musicians	M.										1			1
	F.						1							1
Nurses	F.		1					1	1	2	1			6

Deaths by Occupations and Ages in Toronto in 1901.—Concluded.

Occupations.		15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-59.	60-69.	70-79.	80 and over.	Totals.		
														M.	F.
Nuns	F.				2		1		1	1					5
Painters	M.			4	1	1	4	1	2	3				16	
Pedlers	M.			1		1				1				3	
Physicians	M.			1		2				1	1	5		10	
	F.														
Plasterers	M.								1	1	2	1		5	
Plumbers	M.								1	1	1			2	
Printers	M.		1	1	1	1	3		2	3		1		13	
	F.														
Photographers	M.	1	1		1				1					4	
	F.														
Public officials	M.						1	1	2	4	2	2		12	
	F.							1	1						2
Policemen	M.				1				2					3	
Railway employees	M.		1	3	3	4	1	2	1	3	1			19	
	F.														
Stenographers	M.														
	F.		2			1									3
Servants	M.	2	1		2	2	2	5	4	4	3			25	
	F.	2	11	4		4	3	4	9	8	3	2		50	
Stonecutters	M.						1		1	1		1		4	
Students	M.	5	5	1				1						12	
	F.	1												1	
Shoemakers	M.				3		3	1		4	6	5	1	23	
	F.														
Sailors	M.		1		2	1				2			1	7	
Seamstresses	F.	1	3	2	2		1		2					11	
School teachers	M.			1			1				1			3	
	F.				1		1				1			3	
Spinsters	F.														
Surveyors	M.			1						1				2	
Tailors	M.	1	1			1	2	1	4	1	5	2		18	
Tinsmiths	M.		1											1	
Teamsters	M.		2			1	2	1	1			1		8	
Telegraph operators	M.			1				1						2	
	F.														
Tanners and curriers	M.							1						1	
Undertakers	M.														
Volunteers, soldiers and pensioners.	M.		1							1	4	2		8	
Vet. surgeons	M.														
Watchmakers and jewellers	M.	1	1		1	1	1		1	1		1		8	
Weavers	M.														
	F.														
No occupation	M.	19	19	4	3	9	4	3	17	31	47	22	178		
	F.	30	36	15	12	16	16	12	41	64	89	93	424		
Grand total		97	152	119	113	139	130	125	290	325	352	201	1008	1035	

Deaths by Occupations in Counties. The preceding table gives a summary of deaths by occupations and counties for the Province. The study would become more interesting if an approximate estimate of the number of persons engaged in each occupation were available. When the Census tables of 1901 are completed such data will be available, and the study of the table, comparatively, will then be possible.

There are several obvious conclusions to be drawn from it, such as the very general distribution of deaths amongst farmers at all the life-periods over fifteen years, and the very large number of them in the decades 60 to 70, 70 to 80 and over. Others, again, such as female servants, show either that an unusual number die in the earlier periods, or what is a known fact, that they disappear in large measure from the class, and their deaths will subsequently be found. Again, the distribution of deaths by ages of house-

wives institutes an interesting comparison with deaths amongst farmers. As it includes housewives in urban as well as rural municipalities, it is evident that the relative ages of men and women on the farm cannot accurately be established. The relative healthfulness of housewives in country and town may perhaps be judged by comparing the county tables, which include the whole, with the individual Toronto table.

The relative healthfulness of an occupation, as, for instance, clerks and seamstresses, must in every instance be estimated upon the average age at which the greatest number of persons are engaged in the occupation.

Deaths from Other Classes of Disease. None of the other classes or individual diseases call for any special consideration. The high mortality rate from diarrhoeal diseases in 1900 was reduced by nearly one-third in 1901, but organic heart disease increased from 1,249 to 1,387, broncho-pneumonia from 1,568 to 1,926, while Bright's disease has remained stationary, being 650, as compared with 656 in 1901, although dropsy increased from 239 to 281. In 1900 there were 11 cases of lockjaw and 20 in 1901, while anthrax caused 2 deaths in 1900, but 1 in 1901.

In many respects, the mortality of 1901 may be looked upon as representing an average year, in which no disease played a part of unusual prominence. The indications as to the direction in which measures of sanitation may properly be taken are again plain, while the direction which the self-education of the public must take in lessening the prevalence of diseases so directly related to nutrition, and the avoidance of excesses, whether business, social or moral, is made abundantly plain by the mortality from tuberculosis. These are as essential measures of prevention as the more direct ones, which may be instituted by legalized public health measures.

Respectfully submitted,

P. H. BRYCE,
Deputy Registrar-General.

TABLE 1.
Table showing the total number of Births, Marriages and Deaths in each County in 1901.

Counties.	Population.	Births.			Marriages.			Deaths.			Totals.			Ratio to 1,000 of the population.				
		Variation from 1900.		Number in 1901.	Variation from 1900.		Number in 1901.	Variation from 1900.		Number in 1901.	Variation from 1900.		Number in 1901.	Increase.	Decrease.	Births.	Marriages.	Deaths.
		Increase.	Decrease.		Increase.	Decrease.		Increase.	Decrease.									
Algonia.....	45,391	978	138	370	102	461	29	1,809	269	22.0	8.3	10.3						
Brant.....	38,140	745	48	292	15	489	54	1,526	117	19.5	7.7	12.8						
Bruce.....	59,020	1,217	104	381	16	666	42	2,264	162	20.6	6.4	11.3						
Carleton.....	96,904	2,461	407	780	39	1,825	80	5,066	526	25.4	8.0	18.8						
Dufferin.....	21,036	434	19	169	6	238	19	841	32	20.6	8.0	11.3						
Elgin.....	43,586	703	63	359	5	535	43	1,597	15	16.1	8.3	12.3						
Essex.....	58,516	1,471	19	1,415	110	775	26	3,661	117	25.1	24.2	13.2						
Frontenac.....	44,534	862	56	322	10	710	5	1,894	61	19.3	7.2	15.9						
Grey.....	69,540	1,539	132	572	68	861	87	2,972	287	22.1	8.2	12.4						
Haldimand.....	21,233	376	1	174	19	261	10	811	30	17.7	8.2	12.3						
Halton.....	19,545	344	64	122	9	286	14	752	59	17.6	6.2	14.6						
Haliburton.....	6,553	202	25	49	4	73	10	324	39	30.8	7.5	11.1						
Hastings.....	69,291	1,091	112	500	2	676	71	2,267	181	18.4	8.4	11.4						
Huron.....	61,820	1,133	26	457	38	732	6	2,322	18	18.3	7.4	11.8						
Kent.....	57,422	1,183	138	518	81	768	20	2,469	37	20.6	9.0	13.4						
Lambton.....	56,642	1,167	0	432	13	751	45	2,356	58	20.6	7.6	13.3						
Lennox.....	37,232	705	37	293	14	492	10	1,490	13	18.9	7.9	13.2						
Leeds and Grenville.....	58,996	994	18	460	25	856	47	2,310	4	16.8	7.8	14.5						

Lennox and Addington	23,346	465	45	227	24	49	304	17	28	996	86	19.9	9.7	13.0
Lincoln	30,552	615	51	175	.....	.....	435	.....	.....	1,223	.....	20.1	5.7	14.1
Middlesex	92,702	1,639	.....	659	.....	32	1,254	85	.....	3,552	19	17.7	7.1	13.5
Muskoka	20,371	611	74	159	3	.....	246	.....	23	1,015	54	29.1	7.6	11.2
Nipissing	26,740	1,068	107	271	56	.....	451	21	.....	1,793	184	40.4	10.2	17.2
Norfolk	29,147	563	46	204	.....	34	393	6	.....	1,160	74	19.3	7.0	13.5
Northumberland and Durham	62,049	1,035	.....	459	88	.....	852	.....	18	2,346	.....	16.7	7.4	13.7
Ontario	40,408	796	.....	249	.....	23	536	.....	46	1,581	.....	19.7	6.1	13.2
Oxford	48,404	1,033	35	352	.....	30	669	.....	38	2,054	.....	21.3	7.3	13.8
Parry Sound	24,936	701	17	185	33	.....	255	.....	55	1,141	.....	28.1	7.4	10.2
Peel	21,475	381	.....	124	.....	18	283	22	.....	788	5	17.7	5.8	13.1
Ferth	49,871	972	.....	383	21	.....	608	18	.....	1,963	20	19.5	7.7	12.2
Peterborough	36,066	723	.....	258	0	.....	460	.....	19	1,441	.....	20.0	7.1	12.8
Prescott and Russell	47,317	1,792	201	372	.....	20	857	110	.....	3,021	291	37.9	7.9	18.1
Prince Edward	17,864	247	.....	120	.....	12	277	28	.....	644	.....	13.8	6.7	15.5
Rainy River	16,441	302	.....	119	8	.....	152	.....	58	573	77	18.4	7.2	9.2
Renfrew	52,712	1,487	95	346	.....	60	646	74	.....	2,479	109	28.2	6.5	12.2
Simcoe	82,315	1,659	.....	638	101	.....	927	.....	94	3,224	.....	20.1	7.7	11.3
Stormont, Dundas and Glengarry	68,930	1,456	74	459	.....	1	880	45	.....	2,795	118	21.1	6.7	12.8
Thunder Bay	12,546	252	.....	90	0	0	141	.....	39	483	.....	20.0	7.2	11.2
Victoria	31,952	678	.....	241	.....	3	393	.....	30	1,312	.....	21.2	7.5	12.3
Waterloo	52,594	1,047	.....	413	11	.....	619	.....	45	2,079	.....	19.9	7.8	11.8
Welland	31,588	626	.....	357	52	.....	432	24	.....	1,415	55	19.8	11.3	13.7
Wellington	59,646	1,022	.....	363	.....	83	677	.....	18	2,062	.....	18.4	6.5	12.2
Wentworth	79,452	1,434	.....	645	73	.....	1,167	41	.....	3,246	42	18.0	8.1	14.7
York	272,663	5,852	.....	2,502	367	.....	4,239	.....	220	12,593	59	21.5	9.2	15.5
Totals	2,184,144	46,061	1,450	18,035	1,353	425	29,608	977	863	93,704	2,502	21.1	8.2	13.6

TABLE 2.
Table showing the total number of Births, Marriages and Deaths in each City in 1901.

Cities.	Population.			Births.			Marriages.			Deaths.			Totals.			Ratio to 1,000 of the Population.		
	Number in 1901.	Variation from 1900.		Number in 1901.	Variation from 1900.		Number in 1901.	Variation from 1900.		Number in 1901.	Variation from 1900.		Number in 1901.	Variation from 1900.		Births.	Marriages.	Deaths.
		Increase.	Decrease.		Increase.	Decrease.		Increase.	Decrease.		Increase.	Decrease.		Increase.	Decrease.			
Toronto	4,445	.....	89	2,148	359	.....	3,422	.....	180	10,015	90	..	21.4	10.3	16.5
Hamilton	982	.....	21	512	69	.....	812	4	.....	2,306	52	.....	18.7	9.7	15.4
Ottawa	1,649	315	.....	567	67	.....	1,360	98	.....	3,576	480	.....	27.5	9.5	22.7
London	707	4	.....	342	.....	55	602	98	..	1,651	47	.....	18.6	9.3	15.9
Kingston	321	.....	60	184	.....	4	378	.....	.....	883	.....	64	17.8	10.2	21.0
Brantford	422	43	.....	185	3	.....	258	37	.....	865	83	.....	25.4	11.1	15.5
St. Thomas	197	8	.....	148	2	.....	167	31	.....	512	41	.....	17.1	12.9	14.5
Guelph	226	.....	11	94	.....	15	156	.....	14	476	..	40	19.6	8.2	13.6
St. Catharines	208	47	.....	83	.....	17	168	.....	15	459	15	.....	20.9	8.4	16.9
Belleville	156	1	.....	94	11	.....	152	.....	48	402	.....	36	17.1	10.3	16.8
Stratford	173	.....	7	65	..	17	139	14	.....	377	.....	10	17.4	6.7	13.9
Windsor	258	.....	2	833	84	.....	188	.....	2	1,279	80	.....	21.2	68.5	15.5
Chatham	132	.....	22	137	25	.....	144	11	.....	413	14	.....	14.5	15.0	15.8
Woodstock	171	.....	13	76	.....	29	151	.....	8	398	.....	50	19.3	8.6	17.1
Totals.....	10,047	418	225	5,468	620	137	8,097	293	267	23,612	902	200	21.1	11.5	17.0			

TABLE 3.
Table showing the total number of Births, Marriages and Deaths in each Town in 1901.

Towns.	Population.			Births.			Marriages.			Deaths.			Totals.			Ratio to 1,000 of the Population.		
	Number in 1901.	Variation from 1900.		Number in 1901.	Variation from 1900.		Number in 1901.	Variation from 1900.		Number in 1901.	Variation from 1900.		Number in 1901.	Variation from 1900.		Births.	Marriages.	Deaths.
		Increase.	Decrease.		Increase.	Decrease.		Increase.	Decrease.		Increase.	Decrease.						
Barrie	92	16	24	65	10	81	4	241	10	15.5	10.9	14.1						
Brockville.....	199	15	72	72	22	168	7	439	1	22.3	8.0	18.8						
Burlington.....	185	10	99	41	6	116	30	400	43	19.0	10.2	11.9						
Bracebridge	78	3	27	27	17	27	16	146	27	31.5	16.5	10.9						
Brampton	42	46	56	56	20	123	4	128	1	15.3	9.8	21.5						
Cornwall	158	63	47	47	24	60	28	337	24	23.6	8.3	18.4						
Cobourg	4,239	18	7	7	6	13	1	38	3	23.3	9.1	16.9						
Cayuga	771	4	30	30	4	59	5	139	8	12.0	7.2	14.2						
Goderich	4,168	50	1	30	4	87	24	300	24	17.1	13.3	12.4						
Lindsay	129	32	5	16	5	18	6	66	11	31.2	15.6	17.5						
Ir-Original	1,026	5	6	6	6	19	5	50	11	18.2	4.4	13.8						
Milton	1,372	25	6	66	20	46	7	160	33	15.3	21.0	14.6						
Napanee	3,143	48	6	91	17	59	4	262	32	23.3	22.1	13.9						
Niagara Falls	4,244	99	11	37	12	58	7	209	21	45.0	14.6	22.9						
North Bay	2,530	114	2	39	3	28	31	103	65	14.3	15.5	11.1						
Orangeville	2,511	36	21	168	88	235	108	703	323	34.1	19.1	26.9						
Owen Sound	8,776	299	127	37	10	40	37	174	51	33.7	12.8	13.8						
Perry Sound	2,884	97	7	113	16	160	15	488	5	19.1	16.1	14.2						
Peterboro	11,239	215	6	46	5	96	28	273	24	25.6	8.9	18.4						
Pembroke	5,156	132	2	43	12	79	11	218	32	26.8	11.9	22.0						
Perth	3,688	96	9	42	14	81	3	168	36	12.2	11.3	21.9						
Pictou	3,698	45	25	42	4	68	13	197	13	27.4	12.8	21.2						
Port Arthur	3,214	88	7	63	11	76	42	277	69	26.5	14.5	14.6						
Rat Portage	5,202	138	6	126	6	119	3	410	21	20.2	17.0	13.9						
Sarnia	8,176	165	12	122	56	107	25	389	118	22.2	13.9	14.0						
Sault Ste. Marie	7,196	160	37	36	4	60	4	134	9	22.1	17.0	13.9						
Stuaceo	2,627	58	2	39	3	90	4	266	58	22.5	6.4	14.8						
Toronto Junction	6,091	137	54	39	2	61	14	135	8	17.2	7.7	20.5						
Walkerton	2,970	51	4	23	2	44	9	93	1	13.4	12.9	23.6						
Welland	1,863	25	4	24	4	44	9	35	1	13.3	11.8	18.0						
Whitby	2,110	25	17	41	9	38	7	74	33	11.8	5.2	16.6						
Totals	142,354	3,080	239	1,729	272	2,368	260	7,167	631	21.6	12.1	16.6						

TABLE 4.

Illegitimate Births, Twins, and Triplets in the Province.

Illegitimate Births.		Ratio to 1,000 births.	Number of pairs of twins.	Number of cases of triplets.
No.	Proportion to whole number of births.			
812	One to every 56.6 births.....	17 6	469	5

TABLE 5.

Births in the Province in 1901, showing the Proportion of Male to Female Births.

Sex.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.
Males	1,893	1,831	2,217	2,151	2,056	1,939	2,046	2,116	2,040	1,866	1,799	1,778	23,732
Females.....	1,788	1,733	2,076	1,950	1,930	1,733	1,927	2,113	1,983	1,797	1,658	1,611	22,299
Total	3,681	3,564	4,293	4,101	3,986	3,672	3,973	4,229	4,023	3,663	3,457	3,389	46,031
Male births to 100 female births....	105.9	105.7	106 8	110.3	106.5	111.8	106.2	100.1	102.9	103.9	108.5	110.4	106.4

TABLE 6.

Order of Births by Months in the Province.

Months.	Males.	Months.	Females.	Months.	Total males and females.
March	2,217	August.....	2,113	March	4,293
April	2,151	March.....	2,076	August.....	4,229
August.....	2,116	September.....	1,983	April	4,101
May	2,056	April	1,950	September.....	4,023
July	2,046	May	1,930	May	3,986
September	2,040	July	1,927	July	3,973
June	1,939	October	1,797	January	3,681
January.....	1,893	January.....	1,788	June	3,672
October	1,866	February.....	1,733	October	3,663
February.....	1,831	June	1,733	February.....	3,564
November.....	1,799	November.....	1,658	November.....	3,457
December	1,778	December	1,611	December	3,389
Total.....	23,732	Total.....	22,299	Total	46,031

TABLE 7.
Marriages by Months in the Province.

Months.	1900	Months.	1901	Quarters.	1900	Quarters.	1901
June	1,853	June... ..	2,178	Quarter ending Dec. 31	5,092	Quarter ending Dec. 31	5,169
December ...	1,813	September ..	1,954	Quarter ending June 30	4,233	Quarter ending June 30	4,667
October	1,792	October	1,930	Quarter ending Mar. 31	3,960	Quarter ending Sept. 30	4,493
September....	1,652	December ...	1,769	Quarter ending Sept. 30	3,816	Quarter ending Mar. 31	3,680
January	1,538	November... ..	1,470	No date given ..	6	No date given ...	26
November....	1,487	January	1,439				
April	1,340	April	1,401				
February	1,214	July	1,371				
March	1,208	August.....	1,168				
July.	1,120	March	1,124				
August	1,044	February....	1,117				
May	1,040	May	1,088				
No date given	6	No date given	26				
Total ..	17,107	Total	18,035	Total	17,107	Total	18,035

TABLE 8.
Marriages by Denominations in the Province.

Denominations.	Number of persons married.	Per cent. of whole.	Proportion to the whole number of persons married.	
Methodist.....	11,983	33.2	As 1 to	3.0 persons married.
Presbyterian	7,408	20.5	"	4.9 "
Church of England	5,595	15.5	"	6.5 "
Roman Catholic.....	5,754	15.9	"	6.3 "
Baptists	2,198	6.1	"	16.4 "
Lutherans.....	958	2.7	"	37.7 "
Congregationalists	342	1.0	"	105.5 "
Mennonites	162	.4	"	222.7 "
Evangelical Association.....	250	.7	"	144.3 "
Quakers.....	34	.1	"	1,060.9 "
Other Denominations.	887	2.5	"	40.6 "
No denomination given	499	1.4	"	72.3 "
Total	36,070	100.0		

TABLE 9.

Showing the Death rate per 1,000 of Population in each County of the Province for ten years.

Counties.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	Average rate per County for ten years.
Algoma						15.9	14.0	16.0	23.7	10.4	....
Brant	11.4	11.3	10.4	12.1	12.3	12.2	11.2	12.9	10.9	12.8	11.7
Bruce	8.3	8.3	8.7	7.9	9.7	9.7	8.6	10.1	10.0	11.3	9.3
Carleton	13.6	15.5	16.9	17.7	17.9	20.3	19.8	19.9	20.5	18.8	18.1
Dufferin	9.6	8.9	7.3	7.9	8.0	8.4	9.6	10.2	10.5	11.3	9.2
Elgin	9.1	9.9	8.5	10.2	10.1	11.0	10.2	10.4	10.3	12.2	10.2
Essex	12.2	11.9	11.6	12.0	12.6	12.9	12.3	13.2	12.3	13.3	12.4
Frontenac	14.5	12.4	11.1	11.2	13.3	13.8	13.9	12.8	13.6	16.0	13.2
Grey	7.7	7.7	7.8	8.1	9.7	9.5	9.8	9.7	9.9	12.3	9.2
Haldimand	10.3	6.6	9.5	8.4	7.7	10.5	9.8	10.2	9.8	12.3	9.5
Halton	9.9	9.0	8.7	8.9	9.2	9.2	9.4	10.7	11.3	14.6	10.1
Haliburton	9.2	8.6	8.2	10.7	12.4	11.2	9.5	10.3	9.0	11.1	10.0
Hastings	8.9	9.0	7.9	9.2	11.2	11.4	10.8	11.1	11.6	11.4	10.3
Huron	8.5	9.1	7.4	7.7	8.3	10.5	9.2	10.5	9.9	11.8	9.3
Kent	8.7	8.7	9.3	9.2	9.8	11.7	11.6	12.1	11.6	13.4	10.6
Lambton	8.4	9.1	8.0	7.6	8.6	10.8	9.7	12.3	11.7	13.3	9.9
Lanark	7.4	7.6	8.9	6.9	10.2	11.8	11.4	11.3	11.6	13.2	10.0
Leeds and Grenville	7.2	8.2	6.5	7.3	10.9	12.5	12.6	12.6	12.1	14.4	10.4
Lennox and Addington	7.7	7.0	10.2	6.8	9.4	12.6	11.3	11.9	10.6	13.0	10.0
Lincoln	14.3	11.4	13.0	13.1	12.2	14.4	12.5	13.4	14.0	14.1	13.2
Middlesex	10.9	10.1	10.0	9.6	8.7	10.7	10.0	10.9	10.4	13.5	10.4
Muskoka						11.4	11.0	13.0	14.7	11.7	....
Norfolk	9.5	8.2	8.1	9.2	9.4	12.1	10.4	11.8	11.9	13.4	11.4
Northumberland and Durham	10.1	9.7	10.5	9.9	10.1	11.6	11.6	12.2	11.9	13.7	11.1
Nipissing						23.5	20.5	26.6	33.7	17.0	....
Ontario	11.	10.3	10.0	9.8	10.2	10.6	10.3	10.3	11.7	13.3	10.7
Oxford	11.4	10.9	10.9	10.3	11.3	11.8	11.5	12.8	12.9	13.8	11.8
Peel	7.5	7.9	7.8	7.1	9.4	9.1	9.2	10.8	9.6	13.2	9.1
Perth	9.1	8.1	8.9	9.0	8.8	9.5	10.8	9.5	10.4	12.2	9.6
Peterboro'	12.1	10.8	12.6	10.4	11.2	12.0	12.7	13.3	12.4	12.8	12.0
Prescott and Russell	12.9	11.7	14.9	11.7	13.1	16.9	13.6	15.3	16.1	18.0	14.4
Prince Edward	11.5	11.6	12.8	9.7	13.8	12.4	11.0	12.1	12.0	15.5	12.2
Parry Sound						14.7	13.6	16.3	19.2	10.2	....
Rainy River						33.1	26.1	33.8	45.6	9.3	....
Renfrew	9.5	9.6	10.6	9.9	12.2	13.0	9.9	10.3	11.3	12.2	10.8
Simcoe	8.1	8.2	9.3	7.4	10.7	11.7	11.3	12.1	13.0	11.2	10.3
Stormont, Dundas & Glengarry	8.9	8.8	7.3	7.8	9.0	12.7	11.3	11.9	10.9	12.8	10.1
Thunder Bay						20.4	16.4	21.7	30.2	11.5	....
Victoria	10.9	10.0	9.7	9.0	9.8	10.8	10.8	10.4	11.7	12.3	10.5
Waterloo	10.5	9.9	9.9	10.1	10.1	10.9	10.2	11.2	12.0	11.8	10.7
Welland	10.5	11.1	9.5	11.0	12.1	14.4	12.9	13.1	11.8	13.7	12.0
Wellington	10.6	9.8	10.3	9.5	9.5	9.9	9.3	10.9	10.6	12.2	10.3
Wentworth	11.7	13.1	12.5	12.7	13.2	12.1	13.0	12.8	13.0	14.7	12.9
York	16.4	16.1	13.1	13.2	12.4	12.9	11.8	13.5	14.5	15.6	13.9
Average rate	10.3	9.9	9.9	9.7	10.7	12.9	11.9	13.2	14.0	13.1	11.1

TABLE 10.
Recapitulation by Classes of Diseases by Counties in 1901.—(Including Cities and Towns.)

Causes of Death.	Sex.		Nativity.			Social condition		Ages.												Months.												Totals.											
	Male.	Female.	Not stated.	Canada.	Foreign.	Not stated.	Single.	Married.	Not stated.	Under 5.				5-9.								80 and over.																					
										0-1.	1.	2.	3.	4.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-59.	60-69.	70-79.	80 and over.	January.	February.	March.	April.		May.	June.	July.	August.	September.	October.	November.	December.			
I. Communicable (Pyloric) diseases.....	1330	1290	..	2182	418	40	1890	629	101	344	190	290	144	130	371	127	116	96	89	69	62	45	54	77	125	181	149	12	276	400	329	210	153	147	198	121	186	217	234	199	2590		
II. Other general diseases.....	2458	2909	..	4068	1151	108	2172	2782	429	208	71	55	35	22	74	108	374	547	504	387	359	344	324	600	710	380	92	43	477	488	470	480	499	442	447	384	433	408	390	406	5327		
III. Diseases of nervous system and organs of sense.....	1774	1646	..	12351	1007	63	1502	1035	224	708	155	99	28	26	68	74	51	73	55	63	86	86	115	207	527	613	285	12	321	236	320	326	310	310	249	279	235	249	274	3421			
IV. Diseases of circulatory system.....	1044	1078	..	1284	806	52	472	1474	176	1	4	1	4	4	45	56	61	52	76	60	107	121	338	568	385	99	20	206	192	190	195	177	131	149	150	183	180	170	179	2122			
V. Diseases of the respiratory system.....	1854	1092	..	12387	1091	69	1646	1700	201	722	172	109	54	36	84	43	91	103	77	87	127	87	127	91	110	232	444	592	327	26	496	640	545	437	270	164	103	89	131	192	219	261	3547
VI. Diseases of the digestive system.....	1238	1078	..	1803	391	32	1444	769	103	979	17	18	19	14	66	60	77	75	84	66	60	72	76	154	229	174	71	5	122	115	130	142	144	148	353	385	353	170	136	112	2316		
VII. Diseases of the genito-urinary system.....	615	367	..	576	388	18	194	703	85	3	4	8	4	14	12	22	44	42	42	37	66	38	130	184	229	97	6	94	85	104	78	167	81	72	81	58	65	81	76	982		
VIII. Puerperal diseases.....	237	..	194	40	3	8	227	2	1	8	41	59	52	38	22	10	2	1	2	22	20	21	32	29	21	17	12	12	20	10	237			
IX. Diseases of the skin and cellular tissue.....	28	31	..	40	19	29	25	5	17	2	1		
X. Diseases of the locomotor system.....	12	9	..	15	6	10	11		
XI. Malformations, diseases of infancy, diseases of old age.....	3636	3232	76	4190	2408	87	3707	3830	367	3532	34	10	10		
XII. Suicide.....	59	19	..	50	23	5	20	52	6		
XIII. Accidents.....	854	238	..	757	266	69	537	435	126	22	22	34	18	26	60	64	107	70	73	77	64	95	79	83	41	29	80	46	56	87	102	109	118	123	89	116	88	78	1692				
XIV. Ill-defined causes.....	307	455	..	502	231	29	265	486	71	7	24	22	11	9	33	24	23	38	35	44	40	36	43	107	139	115	57	15	82	60	80	68	81	68	63	69	61	70	57	63	822		
Total.....	15319	14211	78	20788	8245	575	14016	13708	1884	688	565	330	271	816	571	897	1182	1099	958	1035	941	868	2135	3036	4051	3336	186	2883	3009	2963	2677	2432	2182	2432	2167	2344	2225	2182	2202	29608			

TABLE No. II.
Recapitulation by Classes of Diseases by Cities, 1901.

Cause of Death.	Sex.		Nativity.		Social condition.		Ages.										Months.												Totals.										
	Male.	Female.	Canada.	Foreign.	Single.	Married.	Under 5.										70-79.	80 and over.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.		November.	December.								
							0-1	1-2	2-3	3-4	4-5.	5-9.	10-14.	15-19.	20-24.	25-29.																30-34.	35-39.	40-44.	45-49.	50-59.	60-69.		
I. Communicable (Epidemic) diseases...	381	376	639	110 11	609	116	35	69	67	65	67	44	173	45	35	27	14	10	20	8	7	19	21	38	23	2	81	75	81	52	46	53	39	39	65	76	79	71	760
II. Other general diseases...	731	574	1107	458 40	639	753	172	118	30	21	13	6	21	20	113	148	125	113	124	108	110	212	181	93	24	19	103	130	139	153	139	125	133	129	134	129	103	136	1065
III. Diseases of nervous system and organs of sense...	517	408	625	336 24	475	413	97	204	38	29	6	7	16	17	12	26	11	19	26	21	38	87	137	170	64	3	84	66	97	79	88	101	95	84	79	64	71	77	985
IV. Diseases of circulatory system...	279	302	284	275 22	139	361	81	1	2	1	1	19	19	14	23	24	19	26	26	47	102	131	96	19	12	65	47	50	46	36	46	36	37	47	58	52	61	581	
V. Diseases of the respiratory system...	471	484	573	361 21	410	461	84	175	48	31	16	9	26	9	14	38	22	18	39	26	30	76	142	150	80	6	144	133	134	108	70	56	35	19	35	55	81	85	955
VI. Diseases of the digestive system...	353	352	575	117 13	407	165	43	362	2	1	2	3	22	16	20	23	25	26	21	27	14	44	49	27	16	2	31	28	38	41	43	59	158	123	78	41	34	31	705
VII. Diseases of the genito-urinary system...	176	121	154	133 10	63	191	43	1	2	1	2	3	7	12	15	12	17	18	22	16	41	50	54	23	4	30	27	32	31	31	18	20	20	14	25	28	21	297	
VIII. Puerperal diseases...	51	51	37	14	1	50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10	
IX. Diseases of the skin and cellular tissue...	10	6	8	8	9	6	1	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	
X. Diseases of the locomotor system...	5	5	7	3	5	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10	
XI. Malformations, diseases of infancy, diseases of old age...	916	750 31	1252	452 24	1169	437	121	1138	5	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1727
XII. Suicide...	10	4	8	3 3	5	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	
XIII. Accidents...	161	58	130	76 13	95	101	23	2	1	6	1	3	17	10	11	19	10	12	15	14	19	26	21	20	9	1	12	8	8	10	21	26	27	32	18	30	15	12	219
XIV. Ill-defined causes...	71	101	98	61 13	57	96	19	1	4	2	1	4	5	3	11	13	9	10	14	14	30	26	19	5	1	19	9	24	17	17	16	11	11	14	14	8	12	172	
Totals...	4084	3982	31	2407	4214	3163	720	2136	192	162	113	74	301	157	237	341	276	266	304	296	296	640	763	912	602	53	821	675	758	712	668	632	731	626	617	620	600	637	8097

TABLE No. 12.
Recapitulation by Classes of Diseases by Towns, 1901.

Cause of Death.	Sex.		Nativity.		Social condition.		Under 5.					Ages.												Months.												Totals.			
	Male.	Female.	Canada.	Foreign.	Not stated.	Single.	Married.	Not stated.	0-1	1-2	3-4	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-59.	60-69.	70-79.	80 and over.	Not given.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.		November.	December.	
																																							605
	683	605	8	914	345	37	597	508	191	277	18	12	21	43	38	48	60	48	49	50	49	109	135	134	119	12	107	116	116	115	114	82	118	125	96		106	91	110
683	605	8	914	345	37	597	508	191	277	18	12	21	43	38	48	60	48	49	50	49	109	135	134	119	12	107	116	116	115	114	82	118	125	96	106	91	110		
I. Communicable (Epidemic) Diseases.....	64	53	94	17	6	80	22	15	9	7	4	4	12	19	8	5	7	3	6	4	2	3	5	8	3	2	15	21	29	5	8	3	15	12	8	7	117		
II. Other General Diseases.....	105	135	181	53	6	83	115	42	8	4	2	1	4	8	22	35	16	14	16	18	36	30	11	3	2	22	21	15	17	25	22	24	15	16	23	15	20	240	
III. Diseases of Nervous System and Organs of Sense.....	80	50	88	45	3	50	58	22	23	4	2	1	4	3	2	4	3	6	3	4	7	11	23	19	15	10	11	15	17	8	12	7	8	15	7	18	136		
IV. Diseases of Circulatory System.....	36	52	67	26	5	21	57	10	1	1	1	1	7	3	3	2	4	1	3	8	16	23	15	1	1	6	6	4	14	7	7	6	6	10	10	88			
V. Diseases of the Respiratory System.....	70	68	100	36	2	61	63	14	29	9	4	2	2	1	4	2	2	6	7	7	12	21	14	11	1	9	22	26	25	7	2	5	7	2	9	10	138		
VI. Diseases of the Digestive System.....	77	65	123	19	1	91	36	15	62	1	1	1	2	8	3	8	1	3	4	6	16	11	7	2	1	8	3	5	13	7	9	18	40	17	10	8	142		
VII. Diseases of the Genito-Urinary System.....	20	16	25	19	1	6	27	12	1	1	1	1	1	1	1	3	2	2	3	10	8	5	5	1	1	6	3	2	9	5	4	6	3	2	2	2	46		
VIII. Puerperal Diseases.....	7	4	3	1	6	1	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		
IX. Diseases of the Skin and Cellular Tissue.....	3	1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4		
X. Diseases of the Locomotor System.....	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2		
XI. Malformations, Diseases of Infancy, Diseases of Old Age.....	132	120	166	92	2	149	79	32	142	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2		
XII. Suicide.....	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2		
XIII. Accidents.....	65	15	62	22	9	30	26	18	3	1	4	2	3	4	3	5	7	5	8	5	3	9	5	9	4	4	5	2	4	9	6	9	12	8	8	8	8	83	
XIV. Ill-Defined Causes.....	15	17	21	9	2	6	17	9	1	1	1	1	2	2	1	3	3	4	1	1	1	1	1	1	1	1	3	3	3	5	1	3	7	1	3	3	32		
Totals.....	683	605	8	914	345	37	597	508	191	277	18	12	21	43	38	48	60	48	49	50	49	109	135	134	119	12	107	116	116	115	114	82	118	125	96	106	91	110	1296

TABLE
Total Deaths by Individual

	Algona	Brant.	Bruce.	Carleton.	Dufferin.	Elgin.	Essex.	Frontenac.	Grey.	Haldimand.	Halton.	Haliburton.	Hastings.	Huron.	Kent.	Lambton.	Lennox and Grenville.	Leeds and Addington.	Lincoln.	
Communicable Diseases.																				
Typhoid Fever	26	7	3	14	2	7	16	9	19	6	6	3	9	9	21	15	8	6	3	15
Smallpox	3	..	..	2	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Measles	1	..	7	39	3	..	1	2	2	..	..	..	3	1	1	2	14	10	..	..
Scarlet Fever	1	..	1	70	4	5	4	10	2	2	1	..	1	1	3	5	2	5	3	4
Whooping cough	2	..	7	10	1	..	4	1	3	2	3	..	1	..	4	3	10	10	2	..
Diphtheria and croup	10	5	16	74	8	1	118	12	24	5	8	1	118	6	16	4	4	6	12	3
Influenza	28	10	20	16	8	20	23	15	18	5	6	3	23	15	27	12	11	17	10	2
Other epidemic diseases	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Pyæmia and septicæmia	6	6	7	25	2	14	20	23	21	9	6	3	19	20	7	14	11	17	6	13
Malarial fever	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Tuberculosis and scrofula	56	57	78	197	19	64	91	90	71	30	18	12	73	69	86	104	48	125	46	48
Syphilis	..	..	..	20	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Cancer	5	20	19	39	10	31	17	30	29	9	13	1	29	34	38	22	13	22	8	19
Rheumatism and gout	..	3	6	8	..	1	1	1	10	..	1	..	2	5	4	3	4	8	1	..
Diabetes	1	4	5	6	1	5	7	12	8	2	3	..	7	3	8	5	3	2	3	..
Other general diseases	1	2	..	..	..	1	3	2	..	..	..	..	2	2	1	3	..	3	..	1
Alcoholism, acute & chronic	..	..	..	2	..	1	..	..	2	..	..	..	6	..	..	..	..	1	..	..
Diseases of the Nervous System.																				
Encephalitis	3	6	5	2	6	9	5	7	7	2	..	..	6	8	5	2	2	6	2	2
Simple meningitis	4	7	8	33	2	1	9	9	7	1	3	2	10	2	9	4	9	9	1	3
Epidemic cerebro-spinal meningitis	2	5	3	8	..	6	7	3	4	3	2	1	1	3	6	1	..	3	..	3
Congestion and hemorrhage of the brain	5	22	14	32	3	15	33	10	16	8	11	..	27	23	12	26	11	27	7	18
Softening of the brain	..	2	2	2	..	2	..	4	2	..	5	..	2	2	3	4	..	1	..	4
Paralysis without specified cause	6	18	25	44	11	21	27	40	22	20	16	..	28	18	24	20	18	33	14	16
Insanity	..	1	1	1	..	2	2	2	..	..	..	..	..	2	1	1	..	11	1	..
Epilepsy	..	2	4	1	..	2	3	4	6	..	..	..	1	2	1	4	..	8	2	2
Convulsions (not puerperal)	12	8	8	102	4	7	14	8	14	6	5	7	10	15	9	13	14	10	8	9
Other nervous diseases	..	1	2	1	1	2	1	1	2	1	..	..	..	1	1	3	1	2	..	..
Diseases of Circulatory System.																				
Pericarditis	..	3	2	2	..	..	..	..	..	1	..	..	..	..	2	..	..	..	..	..
Endocarditis	..	2	1	1	1	4	3	3	5	1	1	1	1	1	..	2	..	1	1	1
Organic heart diseases	7	27	30	73	10	23	29	33	40	14	17	2	33	32	32	39	20	31	6	24
Angina pectoris	..	3	2	3	..	1	..	2	4	1	..	..	3	2	2	..	..	1	3	1
Diseases of the arteries, athero-ermo, aneurism, etc	..	2	1	1	..	3	1	1	1	1	2	2	..	2	1	..	..	1	..	..
Other diseases of the circulatory system	16	10	17	22	2	16	11	10	21	4	5	1	10	20	19	24	19	19	9	5
Acute bronchitis	11	9	14	30	3	2	3	2	22	2	6	..	2	11	11	6	10	8	2	7
Chronic bronchitis	3	2	5	12	6	4	9	5	15	3	6	..	9	6	10	9	..	5	1	5
Broncho pneumonia	2	1	4	20	3	2	6	4	9	2	3	..	5	10	5	8	1	7	3	5
Pneumonia	14	26	49	90	28	31	45	60	47	15	28	2	53	46	56	70	50	55	12	34
Pleurisy	2	..	1	4	..	2	..	..	2	..	..	..	1	6	1	..	1	4	2	..
Congestion of the lungs (including pulmonary apoplexy	6	2	11	12	9	6	17	6	10	3	4	..	6	10	13	8	2	9	..	3
Asthma and emphysema	..	1	3	6	..	1	1	6	5	1	..	1	8	5	6	3	1	5	3	3
Other diseases of the respiratory system	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ulcer of the stomach	1	1	..	2	..	1	1	1	2	1	..	1	..	1	1	4	..	1	..	..
Other diseases of the stomach (cancer excepted)	2	2	5	6	3	7	6	1	14	..	1	2	3	9	5	3	5	3	4	3
Infantile diarrhœa & gastro-enteritis (Cholera Infantum)	30	10	12	184	1	13	21	25	26	2	6	1	13	14	21	22	15	17	4	11
Diarrhœa and enteritis (not infantile)	..	5	3	14	4	7	6	5	3	3	4	2	13	3	5	3	2	13	3	3
Dysentery	1	..	..	4	2	1	..	..	2	..	..	..	..	3	4	3	1	..	..	1
Hernia and intestinal obstructions	..	4	4	9	..	2	2	4	6	1	1	..	2	9	1	7	1	4	4	2
Other dis's of the intestines	..	1	3	2	1	1	3	..	3	..	..	..	2	1	..	..	..	3	..	1
Diseases of the liver	2	6	6	13	3	7	6	5	11	..	3	1	1	6	11	8	4	8	7	2
Peritonitis (not puerperal)	2	3	5	7	..	2	6	2	13	..	5	..	6	11	4	2	3	5	4	5
Iliac abscess (typhlitis, perityphlitis, appendicitis)	2	2	8	7	3	1	4	5	4	2	3	1	3	3	7	1	3	8	1	5

No. 13.

Diseases by Counties in 1901.

Middlesex.	Muskoka.	Nipissing.	Norfolk.	Northumberland and Durham.	Ontario.	Oxford.	Ferry Sound.	Peel.	Perth.	Peterboro.	Prescott and Russell.	Prince Edward.	Rainy River.	Renfrew.	Simcoe.	Stormont, Dundas and Glengarry.	Thunder Bay.	Victoria.	Waterloo.	Welland.	Wellington.	Wentworth.	York.	Totals.	
12	4	19	12	15	13	17	2	4	11	8	11	6	3	14	26	5	9	10	11	11	7	17	49	500	
4		8			4		2			2	42	2		9		9	1			2			1	7	181
3	3	16		9	4	3	8		10	2	12	2		4	3	1		1	4		7	5	47	268	
4	1	1	1	1	1	1		3	5	3	19	3	5	5	3	10	2	3	1	3	6	6	31	166	
35	8	21	2	10	4	30	2	7	18	25	3	5	19	22	18	2	10	20	6	8	33	206	772		
30	6	5	14	33	23	16	8	13	14	12	19	6	4	17	19	15		8	22	9	20	10	82	694	
	1																	1						2	
32	3	8	6	17	7	13	7	7	12	9	17	6	3	11	28	15	1	14	15	3	3	18	68	572	
133	37	39	37	78	57	51	8	36	58	46	72	33	15	50	86	111	15	36	61	40	69	124	569	3,243	
1																								5	28
52	5	4	15	30	19	33	2	17	24	10	21	10	7	23	40	32	3	16	19	18	40	55	191	1,094	
5	2	1	2	5	6	3	1	3	2	2	4	2	1	8	6	2	3	2	3	3	1	5	19	148	
11		2	3	7	2	7	2	2	5	7	1	2		4	4	5	2	3	7	2	7	2	18	190	
1			1				1	1		1					2							1	5	34	
12		3			1						1					1	1		1			1	2	18	
12	2	6	2	9	3	4	1		4	4	10	4	1	6	13	9		6	4	4	6	3	14	210	
16	3	5	4	4	2	7	4	1	6	7	2	2		5	12	6		3	7	3	4	13	72	321	
	6	2	2	1	3	2	3		3	2	1	2	2		6	4	1	7	3	4	5	4	14	138	
33	6	2	19	37	27	20	4	2	21	16	8	4	1	2	28	23		8	26	18	24	42	174	865	
4		1	1	2	3	2		2	2	2		1		1	1	1		1	3	2		5	14	83	
65	6	4	14	31	21	22	8	11	20	7	21	20	1	18	25	26		14	18	16	22	36	97	944	
9				1	1										1	1		1				2	16	14	68
6	1		3	1	2			1	2	3	2				13	3		3		3	1	11	14	108	
44	9	6	15	18	7	6	8	5	7	9	16	2	3	18	24	20	6	3	22	16	11	12	72	642	
2				3			1	1	2	2	1			1	1	2		1	1	1			5	42	
2	1							1	2						1						1		2	20	
5	1	1		2	3	4		1	3		2			2	6	2		2	1	2	1	1	5	16	82
50	7	6	16	42	33	43	4	8	32	21	37	10	4	17	47	38	5	12	33	8	58	71	263	1,387	
			4	4	2	3	1	1	1	1						2		1	2		1	2	6	58	
	3			1	1	2	3		1	1	1				1			1	5	1	5	4	24	73	
21	4	3	4	23	5	7	4	5	9	8	8	12	5	17	16	20	2	7	4	8	3	19	28	502	
21	10	2	7	12	4	6	9	5	8	11	7	1	4	17	14	14	6	8	19	10	9	20	74	459	
11	2	3	5	12	3	9	1	5	10	5	5	1		4	6	6	1	4	8	2	6	12	48	284	
5		5	3	10	13	11	4	5	6	4	2	1			2	14	1	2	6	4	15	30	74	318	
85	8	11	28	60	35	65	16	17	39	27	33	18	14	15	53	64	11	29	20	33	54	113	267	1,926	
3	3			2	1	1	1	2	5	2	1			2	3			2	2	1	3	2	6	69	
15		9	7	10	9	16	5	5	8	2	30	2		17	11	9	3	8	7	4	12	6	21	353	
7	3			6	1	3	1	4	3	4	1	1		3	7	1		1	1	3	3	3	21	136	
										1														1	2
1			1	1	1	1		1	1		2											1	2	29	
4	2		8	8	3	7	4		3	7	2	3		8	2	2		5	5	3	2	6	19	187	
32	12	39	1	15	10	13	18	2	10	20	52	2	12	32	25	31	13	5	22	22	7	22	126	986	
6		3	4	5	4	1	2	7	8	6	7	4	1	13	10	14		5	7	3	4	4	11	230	
2			2	1		1			1		2	1				1		1	2		1	3	11	51	
7	1		4	4	2	2	1	1	4					2	6	5	1	3	5		6	8	15	140	
2			1		1						2				1							2	8	38	
15		2	1	13	6	2	3		5	3	3		1	4	13	4		3	6	4	6	3	30	237	
6	2	3	7	7	6	6	3	1	5	5	8	5	1	4	10	3		2	4	2	5	16	44	240	
9				2	5		3	3	5	2	1	1		3	7	8		7	3	2	7	8	29	178	

3* R.G.

TABLE No. 13.

Total Deaths by Individual

		Algoma.	Brant.	Bruce.	Carleton.	Dufferin.	Elgin.	Essex.	Frontenac.	Grey.	Haldimand.	Halton.	Haliburton.	Hastings.	Huron.	Kent.	Lambton.	Lanark.	Leeds and Grenville.	Lennox and Addington.	Lincoln.		
Puerperal Diseases.	Diseases of Urinary System.	Acute nephritis.....	1	1	5	11	11	2	
		Bright's disease.....	4	18	18	16	10	12	12
		Other diseases of the kidneys and adnexa.....	1
		Vesical calculi.....	1
		Diseases of the bladder.....	2	1	11	6	3	3	5
		Diseases of the male genital organs.....
		Metritis.....
		Other dis's of the uterus.....
		Ovarian cysts and other ovarian tumors.....
		Other diseases of the female genital organs.....
		Puerperal septicæmia.....	6	1	6	1	1
		Puerperal albuminuria and convulsions.....	3	2	10	2	2
		Other accidents of pregnancy, sudden death.....	3	1	2	2
		Puerperal disease of the breast.....	1
		Dis of Dir. of Loco-motion, Skin.	Erysipelas.....	2
Other dis's of the skin & its adnexa (cancer except'd).....	.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pott's disease.....	.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Malformations.	Suicide.	Diseases of bones & joints.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
		Amputation (for unspecified disease).....	
		Still-births.....	14	32	21	115	10	15	44	
		Congenital debility and malformations.....	50	35	42	189	19	27	79	
		Other diseases of infancy.....	2	1	2	2	1	
		Senile decay.....	27	70	98	113	22	86	78	
		Poison.....	1	1	1	4	
		Strangulation.....	1	
		Gas poisoning.....	
		Drowning.....	
		Firearms.....	
		Fractures and dislocations.....	24	5	10	12	2	11	10	
		Gunshot.....	1	1	1	2	1	2	
		Lightning.....	
		Accidents.	Ill-defined Causes.	Drowning.....	18	2	4	11	2	3	7
Electric cars.....	.....			.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bicycles.....	.....			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Railways.....	6			2	.....	2	.....	9	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Burns and scalds.....	3			2	1	6	.....	8	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homicide.....	.....			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Poison.....	.....			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Strangulation & suffocation.....	.....			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dropsy.....	.....			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tumors.....	4			4	4	14	2	8	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other ill-defined causes.....	18			5	8	15	3	2	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Frost bites.....	.....			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Murder.....	1			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lockjaw.....	.....			2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Anthrax.....	.....			.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals.....		461	489	666	1825	238	535	775	710	861	261	286	73	676	732	768	751	492	856	304	433		

—Concluded.

Diseases by Counties in 1901.

Middlesex.	Muskoka.	Nipissing.	Norfolk.	Northumberland and Durham.	Ontario.	Oxford.	Parry Sound.	Peel.	Perth.	Peterboro.	Prescott and Russell.	Prince Edward.	Rainy River.	Kennew.	Simcoe.	Stormont, Dundas and Glengarry.	Thunder Bay.	Victoria.	Waterloo.	Welland.	Wellington.	Wentworth.	York.	Totals.		
6	5	2	1	4	1	2	3	1	4	3	7	7	2	14	2	3	30	2	4	13	2	1	5	21	99	
30	5	4	3	18	15	12	7	5	13	11	7	7	2	14	2	3	30	2	4	13	2	1	5	100	650	
2				1					1										2	1	7		12	28		
1				1		1		2				3	4					1	5	5		2	4	22		
9	2		2	5	5	7			1	2	1	3	5		3	3	1	3	5	5	3	4	29	162		
1									1													1			3	
					1																	1			4	
																							1		2	
													1												3	
2	3	4	2	1	1	1			3	1	2	1	2	3					1	2	3	2		12	9	
																										81
3	2	1		3	2			2	1		3	2		1			3	1		1			5	6	69	
3	1	2	3	1				5		1	1	3	1	2	7	3	1		3	3	3	3	1	12	86	
																										1
4				3	1	2			1	2		1		3		2	2	1		3	2	2	2	11	56	
															1	1										3
																										3
3				2	1	2			1										1	1		1	1	1	18	
46	14	28	12	21	17	25	14	3	32	18	29	6	7	15	26	25	11	15	20	16	16	58	202	1,108		
66	26	88	19	32	35	53	32	10	35	38	171	10	18	70	88	57	15	25	40	20	61	105	394	2,424		
1				1	2	2			3	1	10	1		2	2	3		1	1	1		1	6	55		
176	23	14	64	151	68	68	11	46	92	42	64	56	6	77	127	142	3	60	81	57	86	96	300	3,407		
				1		3			1	1	1		1	1		1		1	1	1	1		3	31		
									4		1	2						1		1	1		2	30		
								1																	6	
8	2	18	3	11	6	12	6	5	8	11	8	2	3	12	7	8	10	11	8	7	8	15	54	438		
1		2		2	1			1	2	3		1	2						1	1		1	8	47		
1					1						1									2				10		
5	4	5	3	4	2	6	12	3		5	2	2	8	6	6	6	4	1		6	3	5	16	226		
						1																			13	
11	2	10	3	10	5	3		1		3	1	1		7	5	9	5		3	3	3	4	9	169		
1	1	9	2	3	2	1	7	1	4	5	4	1		4		5	1		3	1	1	4	5	116		
1		1		1	1		2	1				1		1	1	2		1	1	1	1	1	1	11	43	
1				1																					9	
16	2	3	8	11	1	12	4	2	7	4	1	5	1	12	1	10		7	6	11	6	5	6	281		
12		3	6	3	4	7	3	3	1	2	4	4	2	2	5	6		2	3	1	7	7	33	214		
10	2	20	5	2	1	4	4	3	6	4	33	10	17		9	10	1	1	1	1	4	9	26	298		
																									2	
1								1															1	1	6	
	1									1														2	20	
																									1	
1254	245	454	393	852	536	669	255	283	608	460	857	277	152	646	927	880	141	393	619	432	677	1167	4239	29608		

TABLE No. 14.

Total Deaths by Individual Diseases in Cities in 1901.

General Diseases.	Toronto.	Hamilton.	Ottawa.	London.	Kingston.	Brantford.	St. Thomas.	Guelph.	St. Catharines.	Belleville.	Stratford.	Windsor.	Chatham.	Woodstock.	Totals.
I.—COMMUNICABLE (EPIDEMIC) DISEASES.															
1. Typhoid Fever.....	37	10	13	6	7	6	2	..	8	1	6	5	9	5	115
2. Smallpox.....	1	..	1	..	..	..	..	..	..	..	..	..	..	..	3
3. Measles.....	8	..	32	3	..	..	..	..	..	1	..	..	..	..	44
4. Scarlet Fever.....	37	4	64	1	7	..	1	2	1	1	..	1	1	1	120
5. Whooping Cough.....	25	6	8	..	2	..	..	..	..	1	1	1	..	..	44
6. Diphtheria and Croup.....	174	28	60	22	4	4	1	..	2	2	3	..	4	8	312
7. Influenza.....	56	8	6	10	7	5	7	5	..	3	2	3	9	1	122
8. Other Epidemic Diseases.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
II.—OTHER GENERAL DISEASES.															
1. Pyæmia and Septicæmia.....	64	10	19	10	14	5	7	3	7	9	3	8	1	1	161
2. Malarial Fever.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3. Tuberculosis and Scrofula.....	489	95	139	57	50	35	19	17	26	12	14	20	12	9	994
4. Syphilis.....	5	1	4	..	..	..	..	..	..	..	..	..	..	..	10
5. Cancer.....	163	39	36	28	14	7	11	8	8	10	3	3	12	8	350
6. Rheumatism and Gout.....	16	3	5	2	..	3	..	..	..	1	..	..	..	..	31
7. Diabetes.....	14	1	6	6	5	2	1	2	..	3	..	2	1	2	45
8. Other General Diseases.....	4	..	2	1	1	1	..	..	..	..	..	..	..	..	9
9. Alcoholism, Acute and Chronic.....	2	1	..	1	..	..	..	..	..	..	..	1	..	..	5
LOCAL DISEASES.															
III.—DISEASES OF NERVOUS SYSTEM AND ORGANS OF SENSE.															
1. Encephalitis.....	10	2	4	7	..	4	2	1	1	1	2	2	1	2	39
2. Simple Meningitis.....	62	10	26	9	7	4	..	2	1	2	2	3	1	1	130
3. Epidemic Cerebro-Spinal Meningitis.....	14	5	4	5	1	3	3	1	..	1	..	2	..	..	37
4. Congestion and Hemorrhage of the Brain.....	135	34	21	18	10	10	1	10	5	12	2	14	2	3	277
5. Softening of the Brain.....	13	4	2	2	1	..	2	..	1	..	..	..	1	..	26
6. Paralysis without specified cause.....	73	16	26	30	16	4	11	9	4	6	2	8	4	4	213
7. Insanity.....	11	..	1	3	..	..	1	..	1	..	..	..	..	..	16
8. Epilepsy.....	12	2	1	1	1	1	..	..	..	1	1	..	..	..	20
9. Convulsions (not puerperal).....	63	10	89	27	6	7	2	4	2	2	..	6	2	..	220
10. Other Nervous Diseases.....	3	..	1	1	..	1	..	..	..	..	..	1	..	..	7
IV.—DISEASES OF CIRCULATORY SYSTEM.															
1. Pericarditis.....	2	..	1	1	..	..	..	..	..	..	..	..	1	..	5
2. Endocarditis.....	15	5	1	3	1	1	..	..	..	1	1	..	2	..	30
3. Organic Heart Diseases.....	191	51	54	28	18	12	8	12	9	12	6	12	7	10	430
4. Angina Pectoria.....	5	1	3	..	2	1	..	..	3	..	..	..	2	..	17
5. Diseases of the Arteries, Atheroma, Aneurism, etc.....	12	1	..	1	1	..	1	..	..	..	..	..	1	..	17
6. Other Diseases of the Circulatory System.....	28	14	12	4	4	5	4	..	1	..	3	2	3	2	82
V.—DISEASES OF THE RESPIRATORY SYSTEM.															
1. Acute Bronchitis.....	51	11	26	13	2	4	2	2	3	..	..	2	1	..	117
2. Chronic Bronchitis.....	42	8	8	4	3	1	1	2	1	5	..	6	2	5	88
3. Broncho-pneumonia.....	59	24	15	2	2	..	7	..	..	..	1	2	1	4	117
4. Pneumonia.....	216	83	58	48	30	12	9	9	16	10	12	5	14	9	531
5. Pleurisy.....	6	2	2	3	..	..	1	..	..	..	2	..	..	..	16
6. Congestion of the Lungs (including Pulmonary Apoplexy).....	16	2	5	8	2	1	1	..	2	1	2	..	1	6	47
7. Asthma and Emphysema.....	19	1	3	4	3	..	1	1	2	..	..	..	2	2	38
8. Other Diseases of the Respiratory System.....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1
VI.—DISEASES OF THE DIGESTIVE SYSTEM.															
1. Ulcer of the Stomach.....	2	1	1	1	..	1	..	1	..	..	..	..	..	..	7
2. Other Diseases of the Stomach (Cancer excepted).....	16	4	3	3	1	2	3	1	..	..	1	1	..	1	36
3. Infantile Diarrhoea and Gastro-enteritis, ("Cholera Infantum").....	111	18	149	19	19	6	6	4	9	5	4	4	1	3	358
4. Diarrhoea and Enteritis (not infantile).....	9	4	9	3	2	5	..	..	2	2	1	1	2	..	40
5. Dysentery.....	8	1	3	1	..	..	1	..	..	..	..	..	1	..	15
6. Hernia and Intestinal obstructions.....	13	5	7	3	3	2	..	3	1	1	..	1	..	..	39
7. Other Diseases of the Intestines.....	6	1	2	1	1	..	1	1	1	..	..	..	..	..	14
8. Diseases of the Liver.....	22	2	12	7	4	4	1	1	1	..	2	2	3	1	62
9. Peritonitis (not puerperal).....	37	10	7	2	1	2	1	..	2	2	1	3	..	5	73
10. Iliac abscess (typhlitis, perityphlitis, appendicitis).....	26	8	4	7	2	1	1	3	5	..	2	1	1	..	61

TABLE No. 14.—Concluded.

General Diseases.	Toronto.	Hamilton.	Ottawa.	London.	Kingston.	Brantford.	St. Thomas.	Geolph.	St. Catharines.	Bellefille.	Stratford.	Windsor.	Chatham.	Woodstock.	Totals.
VII.—DISEASES OF THE GENITO-URINARY SYSTEM.															
1. Acute Nephritis	15	4	4	4	1			1			1		1		31
2. Bright's Disease	93	41	16	16	12	10	2	3	1	3	3	5	3	2	212
3. Other Diseases of the Kidneys and Adnexa	1		1	2				1							5
4. Vesical Calculi	2														5
5. Diseases of the Bladder	21	2	4	5	2	1	1					3			39
6. Diseases of the male Genital Organs															
7. Metritis															
8. Other Diseases of the Uterus															
9. Ovarian Cysts and other Ovarian Tumors		1													1
10. Other Diseases of the Female Genital Organs	3	1						1					1		6
VIII.—PUERPERAL DISEASES.															
1. Puerperal Septicæmia	5		5	2				1					1		17
2. Puerperal Albuminuria and Convulsions	4	4	6	2					1						17
3. Other accidents of pregnancy, sudden death.....	10		1	2	1							3			17
4. Puerperal Disease of the Breast.....															
IX.—DISEASES OF THE SKIN AND CELLULAR TISSUE.															
1. Erysipelas	10	1	2	2				1							16
2. Other Diseases of the Skin and its Adnexa (Cancer excepted)															
X.—DISEASES OF THE LOCOMOTOR SYSTEM.															
1. Pott's Disease	1														2
2. Diseases of Bones and Joints	1	1	1	3								1		1	8
3. Amputation (for unspecified Disease)															
XI.—MALFORMATIONS, DISEASES OF INFANCY.															
DISEASES OF OLD AGE.															
1. Still-Births	175	48	94	26	7	24	9	7	7	6	6	12	4	4	429
2. Congenital Debility and Malformations	316	82	149	33	23	21	3	14	12	7	14	11	12	12	709
3. Other Diseases of Infancy	5	1	2	1		1									10
4. Senile decay	213	46	67	58	37	31	20	8	9	11	21	18	7	13	579
XII.—SUICIDE.															
1. Poison	3				1				1		1	2		1	9
2. Strangulation	1														1
3. Gas poisoning															
4. Drowning		1													1
5. Firearms	2												1		3
XIII.—Accident.															
1. Fractures and Dislocations	45	7	9	6	6	2	7	2	7	2	1	2	2	3	101
2. Gunshot	5	1	1						1		2				10
3. Lightning															
4. Drowning	12	2	10		2		1		1	2		2			32
5. Electric Cars	2	4	1											1	8
6. Bicycles											1				1
7. Railways	3	3	2	5			2	1	1	1	1		2		21
8. Burns and Scalds	4	4	6	1		1		1	1	1	1	2		1	23
9. Poison	9	1		1											11
10. Suffocation	9			1					1	1					12
XIV.—ILL-DEFINED CAUSES.															
1. Dropsy	4	2	4	9	7		4		1	2	2	3	6	1	45
2. Tumors	23	5	5	7	4	2	1		1	1		1	2	7	58
3. Other Ill-Defined Causes	16	6	14	5		2	1	2		6	5	1		4	62
4. Lockjaw.....	1		1			1		1	1	1					6
5. Murder	1														1
Totals.....	3,422	812	1,360	602	378	258	167	156	168	132	139	188	141	151	8,097

TABLE 15.

Total Deaths by Individual Diseases by Towns in 1901.

General Diseases.	Berlin.	Brockville.	Cornwall.	Lindsay.	Niagara Falls.	Owen Sound.	Peterborough.	Rat Portage.	Sarnia.	Sault Ste. Marie.	Toronto Junction.	Totals.
I.—COMMUNICABLE (EPIDEMIC) DISEASES.												
1. Typhoid Fever	5				1	3	4	2	5	14	3	37
2. Smallpox										1		1
3. Measles		2	1								1	4
4. Scarlet Fever	1	1		1						1	2	6
5. Whooping Cough	1	1					1			1	2	6
6. Diphtheria and Croup	3	3		5	2	8	8	1		4	5	39
7. Influenza	3	3	1	3	1	6		3		1	2	23
8. Other Epidemic Diseases	1											1
II. OTHER GENERAL DISEASES.												
1. Pyaemia and Septicaemia	1	7	2	2		7	2		2	3	2	28
2. Malarial Fever												
3. Tuberculosis and Scrofula	8	21	16	8	5	25	20	7	9	12	13	144
4. Syphilis												
5. Cancer	3	5	4	3	1	6	8	5	7	1	4	47
6. Rheumatism and Gout	1	1	1	1		1			1			6
7. Diabetes	2					2	2		2		1	9
8. Other General Diseases		1										1
9. Alcoholism, Acute and Chronic			1		1	2				1		5
LOCAL DISEASES.												
III.—DISEASES OF NERVOUS SYSTEM AND ORGANS OF SENSE.												
1. Encephalitis			1			1	2		1			5
2. Simple Meningitis		2		1	1		1		2	3	1	11
3. Epidemic Cerebro spinal Meningitis		1	3	1	2	3						10
4. Congestion and Hemorrhage of the Brain	4	6	7	3	2	5	10		4	3	1	45
5. Softening of the Brain						2	2		1			5
6. Paralysis without specified cause	5	5	6	5	2	3	2	1	3		3	35
7. Insanity												
8. Epilepsy	1		1				1					3
9. Convulsions (not puerperal)	5	1	3		3	1	3	1	1			18
10. Other Nervous Diseases		2				1	1					4
IV.—DISEASES OF CIRCULATORY SYSTEM.												
1. Pericarditis												
2. Endocarditis			1	1		2			1			5
3. Organic Heart Disease	3	14	5	3		11	8	2	3	1	6	56
4. Angina Pectoris	2		1			3	1					7
5. Diseases of the Arteries, Atheroma, Aneurism, etc	1											1
6. Other Diseases of the Circulatory System	1	1	3		1	1		3	5	4		19
V.—DISEASES OF THE RESPIRATORY SYSTEM.												
1. Acute Bronchitis	4	2	3	2	1	1	3	3	4	3	4	30
2. Chronic Bronchitis	2			1			3		1			7
3. Broncho-pneumonia	1	3	5	1		1	1	2		1	1	16
4. Pneumonia	2	13	6	9	4	11	5	8	9	1	4	72
5. Pleurisy	1	1	1			1	1					5
6. Congestion of the Lungs (including pulmonary apoplexy)				1	1	1						3
7. Asthma and Emphysema					1	1	2				1	5
8. Other Diseases of the Respiratory System												
VI.—DISEASES OF THE DIGESTIVE SYSTEM												
1. Ulcer of the Stomach									1			1
2. Other Diseases of the Stomach (cancer excepted)				1		5	3		2		1	12
3. Infantile Diarrhoea and Gastro-enteritis ("Cholera Infantum")	3	9	11	3	3	2	7	8	5	10	2	63
4. Diarrhoea and Enteritis (not infantile)	2	1	1	1			4	1	1		1	12
5. Dysentery	1											1
6. Hernia and Intestinal obstructions		3	2	1					2			8

TABLE 15.—Continued.

Total Deaths by Individual Diseases by Towns in 1901.

General Diseases.	Berlin.	Brockville.	Cornwall.	Lindsay.	Niagara Falls.	Owen Sound.	Peterborough.	Rat Portage.	Sarnia.	Saint Ste. Marie.	Toronto Junction.	Totals.
VI. DISEASES OF THE DIGESTIVE SYSTEM.—Continued.												
7. Other Diseases of the Intestines.....						3						3
8. Diseases of the Liver.....		1	1		2	2	2		2		1	11
9. Peritonitis (not puerperal).....	1	4	2			2	4	1	1	1		22
10. Iliac abscess (typhlitis, perityphlitis, appendicitis).....			2	2	2						1	9
VII. DISEASES OF THE GENITO-URINARY SYSTEM.												
1. Acute Nephritis.....		1					2				1	4
2. Bright's Disease.....	6	3	3	2	2	2	5	1	2	1	4	31
3. Other Diseases of the Kidneys and Adnexa.....									1			1
4. Vesical Calculi.....		1										1
5. Diseases of the Bladder.....	2	1		1		1	1		1			7
6. Diseases of the male Genital Organs.....												
7. Metritis.....												
8. Other Diseases of the Uterus.....												
9. Ovarian Cysts and other Ovarian Tumors.....								1				1
10. Other Diseases of the Female Genital Organs.....												
VIII. PUERPERAL DISEASES.												
1. Puerperal Septicaemia.....	2				1		1				2	6
2. Puerperal Albuminuria and Convulsions.....					1							1
3. Other accidents of Pregnancy sudden death.....												
4. Puerperal Disease of the Breast.....												
IX. DISEASES OF THE SKIN AND CELLULAR TISSUE.												
1. Erysipelas.....	2	2										4
2. Other Diseases of the Skin and its Adnexa (Cancer excepted).....												
X. DISEASES OF THE LOCOMOTOR SYSTEM.												
1. Pott's Disease.....						1						1
2. Diseases of Bones and Joints.....				1								1
3. Amputation (for unspecified Disease).....												
XI. MALFORMATIONS, DISEASES OF INFANCY, DISEASES OF OLD AGE.												
1. Still-Births.....	3	3	2	4	5	2	8	5	7	3	5	47
2. Congenital Debility and Malformations.....	8	13	8	5	3	12	11	9	9	8	9	95
3. Other Diseases of Infancy.....									1			1
4. Senile Decay.....	17	16	11	9	6	25	7	3	17	3	3	117
XII. SUICIDE.												
1. Poison.....								1				1
2. Strangulation.....					1							1
3. Gas Poisoning.....												
4. Drowning.....												
5. Firearms.....												
XIII. ACCIDENTS.												
1. Fractures and Dislocations.....	1	2	1	3	1	5	4	1	2	8	2	30
2. Gunshot.....					1			2		1		4
3. Lightning.....												
4. Drowning.....		2		1		6	1	1	3	6		20
5. Electric Cars.....												
6. Bicycles.....												
7. Railways.....	2	6	1				1	1		3	2	16
8. Burns and Scalds.....	1	1	1		1	1						4
9. Homicide.....	1	2	1		1	1				1	1	8
10. Accidental Poison.....	1											1
XIV. ILL-DEFINED CAUSES.												
1. Dropsy.....	2		2		1		2	1				8
2. Tumors.....			1	2		2	2	1	4	1		13
3. Other Ill-Defined Causes.....			1			2	2	1		4		10
4. Murder.....										1		1
Total.....	116	168	123	87	59	189	159	76	122	107	90	1,296

APPENDIX.

BIRTHS, MARRIAGES AND DEATHS.

BIRTHS BY MONTHS, 1901—COUNTIES.—Continued.

Counties.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	No. of pair of twins.	Triplets.	Illegitimate.	Still Born.
Lanark:																	
Males.....	36	25	42	26	26	41	32	33	38	26	23	26	374	12	.....	4	9
Females.....	29	19	31	39	32	25	28	28	26	19	29	26	331	16	.....	5	8
Total	65	44	73	65	58	66	60	61	64	45	52	52	705	14 pair	.....	9	17
Leeds and Grenville:																	
Males.....	33	44	42	44	51	41	33	48	43	45	38	31	493	12	.....	5	3
Females.....	39	25	44	40	35	38	51	51	46	47	41	44	501	8	.....	3	5
Total	72	69	86	84	86	79	84	99	89	92	79	75	994	10 pair	1 case	8	8
Lennox and Addington:																	
Males.....	19	17	17	21	27	28	15	19	25	16	7	29	240	7	.....	6	5
Females.....	11	19	22	18	21	20	16	24	24	11	22	17	225	1	.....	1	.....
Total	30	36	39	39	48	48	31	43	49	27	29	46	465	4 pair	.....	7	5
Lincoln:																	
Males.....	28	28	17	38	33	21	29	84	35	32	25	25	339	5	.....	5	11
Females.....	26	22	27	23	13	21	23	21	25	29	20	26	276	7	.....	2	7
Total	54	50	44	55	46	42	52	55	60	61	45	51	615	6 pair	.....	7	18
Middlesex:																	
Males.....	70	78	75	83	76	62	79	64	85	72	66	62	872	14	.....	17	22
Females.....	66	49	70	60	70	85	52	88	66	54	50	57	767	8	.....	13	15
Total	136	127	145	143	146	147	131	152	151	126	116	119	1,639	11 pair	.....	30	37
Muskoka:																	
Males.....	23	32	35	31	26	34	25	23	18	26	18	25	316	9	.....	4	9
Females.....	18	27	25	30	33	31	15	28	30	16	25	17	295	5	.....	3	3
Total	41	59	60	61	59	65	40	51	48	42	43	42	611	7 pair	.....	7	12
Nipissing:																	
Males.....	29	43	55	63	59	63	40	53	39	42	28	34	548	11	.....	5	13
Females.....	33	46	55	44	50	38	48	56	46	32	39	33	520	11	.....	2	8
Total	62	89	110	107	109	101	88	109	85	74	67	67	1,068	11 pair	.....	7	21

Norfolk:	21	25	27	24	26	23	27	30	31	19	20	22	295	11	3	10
Males	17	16	17	27	34	22	23	27	36	20	16	13	268	9	5	3
Females																
Totals	38	41	44	51	60	45	50	57	67	39	36	35	563	10 pair	8	13
Northumberland and Durham:																
Males	46	50	44	52	22	41	31	58	47	45	37	43	519	9	8	9
Females	32	34	37	49	39	55	50	53	49	54	32	32	516	5	4	12
Totals	78	84	81	101	61	96	84	111	96	99	69	75	1,035	7 pair	12	21
Ontario:																
Males	27	31	39	41	34	34	26	41	42	27	33	42	414	7	8	8
Females	36	28	30	25	43	23	27	39	36	31	32	32	382	7	4	4
Totals	63	59	69	66	74	57	53	80	78	58	65	74	796	7 pair	12	12
Oxford:																
Males	38	33	50	44	41	44	59	50	59	41	42	36	537	6	4	2
Females	35	40	51	36	43	37	41	42	60	44	36	31	496	14	4	14
Totals	73	73	101	80	84	81	100	92	119	85	78	67	1,033	10 pair	8	16
Parry Sound:																
Males	22	20	32	32	36	41	33	34	34	25	24	20	353	9	3	8
Females	29	27	33	39	33	28	26	39	27	21	32	14	348	9	3	8
Totals	51	47	65	71	69	69	59	73	61	46	56	34	701	9 pair	3	16
Peel:																
Males	17	17	15	19	16	13	18	12	18	17	14	19	195	2	3	3
Females	16	15	21	15	14	10	14	21	16	15	19	10	186	.....	2	1
Totals	33	32	36	34	30	23	32	33	34	32	33	29	381	1 pair	2	4
Peterborough:																
Males	35	30	31	34	33	31	24	38	36	37	31	26	384	6	3	8
Females	28	26	31	29	26	20	35	32	43	24	21	24	339	6	2	6
Totals	63	56	62	63	59	51	59	70	79	59	52	50	723	6 pair	5	14
Perth:																
Males	38	41	37	42	33	39	43	51	40	51	45	54	514	9	1	4
Females	36	45	36	36	29	37	33	49	38	39	43	37	458	5	4	9
Totals	74	86	73	78	62	76	76	100	78	90	88	91	972	7 pair	5	13
Prescott and Russell:																
Males	87	73	96	92	96	80	73	70	62	63	73	89	954	19	7	17
Females	71	79	81	81	79	57	65	67	62	62	60	73	838	23	1	5
Totals	158	152	177	173	175	137	139	137	124	125	133	162	1,792	21 pair	8	22

BIRTHS BY MONTHS, 1901—COUNTIES.—Concluded.

Counties.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	No. of pairs of twins.	Triplets.	Illegitimate.	Still born.
Prince Edward:																	
Males.....	11	9	5	5	10	12	12	12	11	9	9	9	114	6	1	3	6
Females.....	8	11	15	4	13	14	8	12	16	11	16	5	133	.....	2	2	1
Totals.....	19	20	20	9	23	26	20	24	27	20	25	14	247	3 pair	1 case	5	7
Rsiny River:																	
Males.....	22	10	18	17	19	4	20	8	11	11	8	8	156	5	.....	1	2
Females.....	10	9	11	11	14	13	14	17	9	9	13	16	146	7	.....	.....	5
Totals.....	32	19	29	28	33	17	34	25	20	20	21	24	302	6 pair	.....	1	7
Renfrew:																	
Males.....	72	60	64	97	70	71	65	66	51	65	52	42	775	21	.....	10	19
Females.....	67	55	81	72	71	50	60	70	52	48	36	50	712	11	.....	8	6
Totals.....	139	115	145	169	141	121	125	136	103	113	88	92	1,487	16 pair	.....	18	25
Simcoe:																	
Males.....	56	70	96	75	75	68	79	61	72	62	58	63	834	21	.....	6	14
Females.....	51	64	81	72	71	64	64	88	70	71	60	69	825	5	.....	9	14
Totals.....	107	134	177	147	146	132	142	149	142	133	118	132	1,659	13 pair	.....	15	28
Stormont, Dundas and Glengarry:																	
Males.....	59	55	73	61	66	62	62	70	56	59	76	46	745	24	.....	3	10
Females.....	52	65	70	70	55	52	62	73	55	62	41	54	711	24	.....	3	7
Totals.....	111	120	143	131	121	114	124	143	111	121	117	100	1,456	24 pair	.....	6	17
Thunder Bay:																	
Males.....	9	15	16	6	8	9	9	7	15	10	17	8	129	4	.....	.....	10
Females.....	11	6	8	12	10	7	15	10	11	9	-13	11	123	4	.....	.....	2
Totals.....	20	21	24	18	18	16	24	17	26	19	30	19	252	4 pair	.....	.....	12

Victoria:	24	21	34	28	27	27	29	37	24	34	34	24	34	84	24	348	10	8	4
Males	27	22	23	31	28	34	34	35	31	30	20	20	20	20	335	2	.....	2	3
Females	51	43	57	59	55	61	63	72	55	64	54	44	678	54	6 pair	6 pair	.....	5	7
Totals																			
Waterloo:	34	40	56	41	48	42	59	49	55	48	37	48	552	37	48	552	8	8	9
Males	39	38	49	46	43	29	50	46	44	39	40	32	495	40	32	495	4	2	5
Females	73	78	105	87	91	71	109	95	99	82	77	80	1,047	77	80	1,047	6 pair	5	14
Totals																			
Welland:	21	27	30	26	28	28	27	24	38	30	19	24	322	19	24	322	6	1	6
Males	22	25	40	21	27	23	23	33	32	26	18	14	304	18	14	304	10	3	7
Females	48	52	70	47	55	51	50	57	70	56	37	38	626	37	38	626	8 pair	4	13
Totals																			
Wellington:	41	50	53	48	40	43	39	53	39	26	57	39	598	57	39	598	12	7	17
Males	57	41	35	42	35	34	43	51	43	37	38	38	494	38	38	494	12	5	8
Females	98	91	88	90	75	77	82	104	82	63	95	77	1,022	95	77	1,022	12 pair	12	25
Totals																			
Wentworth:	85	56	74	55	66	61	55	80	66	52	57	63	770	57	63	770	4	11	20
Males	63	36	60	45	55	60	50	56	68	56	58	57	664	58	57	664	10	13	15
Females	148	92	134	100	121	121	105	136	134	108	115	120	1,434	115	120	1,434	7 pair	24	35
Totals																			
York:	270	254	294	291	266	218	270	225	243	214	221	225	2,991	221	225	2,991	66	127	68
Males	236	227	250	259	240	235	265	252	210	229	189	239	2,831	189	239	2,831	56	113	51
Females	506	481	544	550	506	453	535	477	453	443	410	464	5,852	410	464	5,852	61 pair	240	119
Totals																			
Total Males	1,893	1,881	2,217	2,151	2,056	1,939	2,046	2,116	2,040	1,866	1,799	1,778	23,732	1,799	1,778	23,732	480	4	447
Total Females	1,788	1,733	2,076	1,950	1,930	1,733	1,927	2,113	1,983	1,797	1,658	1,611	22,299	1,658	1,611	22,299	458	11	333
Grand Total	3,681	3,564	4,293	4,101	3,986	3,672	3,973	4,229	4,023	3,663	3,457	3,389	46,031	3,457	3,389	46,031	469 pair	5 cases	780

BIRTHS BY MONTHS, 1901.—CITIES.

Cities.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	No. of pairs of twins.	Triplets.	Illegitimate.	Still born.
Toronto :																	
Males	205	197	237	224	197	164	206	172	181	157	155	177	2,272	50		98	56
Females	191	165	200	208	182	187	213	183	162	163	139	180	2,173	42	3	101	35
Total	396	362	437	432	379	351	419	355	343	320	294	357	4,445	46 pair	1 set	199	91
Hamilton :																	
Males	53	42	58	40	43	40	41	47	46	40	35	47	532	8		10	17
Females	42	23	42	31	39	41	46	35	42	38	34	37	450	6		17	8
Total	95	66	100	71	82	81	87	82	88	78	69	84	982	7 pair		27	25
Ottawa :																	
Males	72	52	63	66	72	85	68	75	78	76	63	64	834	5		107	8
Females	60	58	68	59	72	61	80	80	72	85	57	63	815	19		94	13
Total	132	110	131	125	144	146	148	155	150	161	120	127	1,649	12 pair		201	16
London :																	
Males	27	30	45	39	25	27	37	35	37	38	24	31	395	5		4	12
Females	26	19	29	27	33	37	21	32	28	24	15	26	312	3		1	6
Total	53	49	74	66	58	64	58	67	65	62	39	57	707	4 pair		5	18
Kingsston :																	
Males	6	17	14	13	13	14	16	19	18	12	13	11	166	4		6	
Females	17	13	26	10	12	7	17	11	11	7	16	8	155	6		7	
Total	23	30	40	23	25	21	33	30	29	19	29	19	321	5 pair		13	
Brantford :																	
Males	19	18	18	20	22	19	27	10	14	17	23	20	227	3		3	
Females	24	15	18	14	14	13	14	29	10	6	24	14	195	9		4	
Total	43	33	36	34	36	32	41	33	24	23	47	34	422	6 pair		7	
St. Thomas :																	
Males	16	3	8	12	9	5	6	10	7	6	7	8	97	3			4
Females	10	6	12	4	11	9	10	10	4	10	7	7	100	1			2
Total	26	9	20	16	20	14	16	20	11	16	14	15	197	2 pair			6

Guelph :	12	13	10	9	13	10	10	C	8	6	3	20	7	117	2	4	5
Males	9	7	9	17	6	10	10	11	13	6	5	9	7	109	6	3	3
Females																	
Total	21	20	19	26	19	20	20	17	21	12	8	29	14	226	4 pair	7	8
St. Catharines :																	
Males	5	10	7	7	13	8	8	11	13	9	15	7	11	116	4	2	4
Females	11	7	10	9	4	6	10	7	7	8	5	6	9	92	4	2	2
Total	16	17	17	16	17	14	21	20	20	17	20	13	20	208	4 pair	4	6
Belleville :																	
Males	5	6	6	9	4	5	8	8	6	5	4	11	7	76	1	3	.....
Females	3	6	7	3	6	6	7	14	7	7	9	8	4	80	3	5	.....
Total	8	12	13	12	10	11	15	20	13	12	13	19	11	156	2 pair	8	.....
Stratford :																	
Males	10	4	8	8	9	10	8	10	5	5	7	5	13	97	4	.....	.....
Females	4	6	7	4	2	8	7	11	12	10	4	4	1	76	.....	.....	.....
Total	14	10	15	12	11	18	15	21	17	17	17	9	14	173	2 pair	.....	.....
Windsor :																	
Males	9	6	9	15	10	11	19	17	8	8	15	9	10	138	4	1	.....
Females	13	14	12	11	12	9	5	8	12	7	7	12	5	120	4	2	.....
Total	22	20	21	26	22	20	24	25	20	20	22	21	15	258	4 pair	3	1
Chatham :																	
Males	7	5	9	9	6	2	8	8	3	3	6	6	3	72	.....	1	.....
Females	7	3	4	3	7	3	5	7	4	4	6	6	5	60	.....	2	.....
Total	14	8	13	12	13	5	13	15	7	7	12	12	8	132	.....	3	.....
Woodstock :																	
Males	8	3	7	7	7	8	6	8	9	5	5	11	7	86	2	3	1
Females	13	9	7	6	7	5	4	12	12	5	5	3	2	85	2	.....	1
Total	21	12	14	13	14	13	10	20	21	10	10	14	9	171	2 pair	3	2
Total Males	454	406	499	478	443	408	467	438	426	401	389	416	416	5,225	95	242	102
Total Females	430	351	451	406	407	402	450	452	390	380	340	368	368	4,822	105	238	71
Grand Total	884	757	950	884	850	810	917	890	816	781	729	784	784	10,047	100 pair	1 set	173

MARRIAGES BY MONTHS, 1901.—COUNTIES.

Counties.	Jan'y.	Feb'y.	March.	April.	May.	June.	July.	August.	Sept'r.	October	Nov'r.	Decr.	Not stated.	Totals.
Algoma	29	11	22	36	34	32	41	26	39	43	30	21	6	370
Brant	22	16	13	30	15	37	16	19	31	46	22	25		292
Bruce	42	21	35	27	19	47	22	19	26	48	28	47		381
Carleton	42	58	38	68	50	115	71	64	96	85	58	35		780
Dufferin	19	17	12	15	9	20	13	5	11	17	20	20		169
Elgin	36	28	20	27	28	27	28	19	34	36	22	54		359
Essex	78	73	71	104	101	154	148	131	182	148	133	92		1,415
Frontenac	23	26	23	24	21	40	28	23	31	35	26	22		322
Grey	58	34	65	35	34	65	47	29	51	49	33	68		572
Haldimand	21	8	8	8	7	15	9	5	22	20	15	36		174
Halton	14	8	7	10	2	16	8	6	5	17	10	18		122
Haliburton	3	2	3	3	3	5	7	4	7	7	1	4		49
Hastings	46	44	30	44	24	50	43	33	45	47	39	52		560
Huron	36	39	42	39	31	51	11	33	43	47	36	63		487
Kent	33	26	29	48	37	56	34	26	47	61	51	64		518
Lambton	37	26	22	32	33	44	37	19	56	52	30	44		432
Lanark	21	22	14	24	18	36	15	20	26	34	31	32		293
Leeds and Grenville	53	30	33	40	22	62	21	31	47	45	38	37		460
Lennox and Addington	14	19	19	17	16	28	15	6	27	21	22	23		227
Lincoln	13	17	8	10	12	14	12	9	30	20	10	20		175
Middlesex	57	38	43	57	49	80	41	59	65	66	61	52		659
Muskoka	5	1	10	13	8	25	12	12	18	18	15	22		159
Nipissing	23	91	3	27	17	33	41	23	28	24	18	13		271
Norfolk	13	13	11	16	14	17	9	14	23	20	21	33		204
Northumberland and Durham	42	36	34	35	17	34	27	22	46	48	39	81		459
Ontario	25	13	29	25	21	30	13	10	16	24	15	28		249
Oxford	31	21	35	28	21	48	23	11	30	38	22	44		352
Parry Sound	14	7	14	18	7	23	20	14	14	14	14	26		185
Peel	18	12	10	8	3	12	7	4	5	17	10	18		124
Perth	29	28	31	28	18	63	13	11	38	42	35	47		383
Peterborough	27	17	29	19	12	27	12	13	25	30	25	22		258
Prescott and Russell	48	25	12	23	25	43	44	34	53	25	31	9		372
Prince Edward	11	8	8	6	4	16	6	11	17	10	13	10		120
Rainy River	8	6	4	13	9	12	15	12	13	9	7	11		119
Renfrew	25	13	12	32	20	44	40	36	48	28	31	16		346
Simcoe	59	47	39	40	37	88	41	44	58	69	40	76		638
Stormont Dundas and Glengarry	32	36	18	32	32	46	43	28	60	57	45	35		459
Thunder Bay	4	4	1	6	10	8	13	4	12	9	10	9		90
Victoria	29	17	22	18	14	28	17	15	18	15	21	27		241
Waterloo	42	27	29	36	14	50	17	23	49	46	42	38		413
Welland	20	13	25	26	18	33	22	17	54	58	32	36		367
Wellington	34	31	35	26	28	34	14	24	31	32	24	46		363
Wentworth	39	34	31	51	32	94	44	32	80	94	51	63		645
York	164	125	125	178	149	372	211	183	297	266	200	230		2,502
Totals	1,439	1,117	1,124	1,401	1,088	2,178	1,371	1,168	1,954	1,980	1,470	1,769	26	18,085

MARRIAGES BY DENOMINATIONS AND AGES, 1901.

Sex.	Religious denomination of bride and bridegroom.											How married.		Counties.	Ages.														
	Episcopalian.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalists.	Lutherans.	Evangelical Association.	Quakers.	Mennonites.	Other denominations.	No denomination given.	License.		Banns.	Totals.	Under 20 years of age.	From 20 to 24 years.	From 25 to 29 years.	From 30 to 34 years.	From 35 to 39 years.	From 40 to 44 years.	From 45 to 49 years.	From 50 to 54 years.	From 55 to 59 years.	From 60 to 64 years.	From 65-69 years.	70 yrs and over.	Ages not given.
Males	53	99	79	116	9	2	4	1	1	3	3	8	.....	.....	370	1	99	146	68	26	10	10	2	2	2	2	2	2	2
Females	40	91	85	120	17	.....	4	1	.....	4	8	.....	.....	.....	370	98	151	66	17	13	5	4	2	.....	1	1	1	1	13
Total	93	190	164	236	26	2	8	2	1	7	11	297	73	710	740	99	250	212	85	39	15	14	4	2	3	3	3	3	16
Males	40	44	110	23	48	16	4	.....	.....	4	3	.....	.....	292	.....	5	108	78	35	29	10	10	6	1	2	2	2	3	3
Females	38	36	117	27	48	21	1	.....	.....	2	2	.....	.....	292	.....	48	119	64	26	14	6	2	3	2	1	2	2	2	5
Total	78	80	227	50	96	37	5	.....	.....	6	5	282	10	584	53	227	142	61	43	16	12	9	3	3	3	3	3	4	8
Males	47	125	108	53	16	3	14	8	1	4	2	.....	.....	381	.....	2	90	139	77	37	15	10	2	3	2	2	1	1	3
Females	37	124	116	54	23	2	8	10	2	4	1	.....	.....	381	.....	54	153	106	31	20	8	3	1	1	.....	.....	.....	.....	4
Total	84	249	224	107	39	5	22	18	3	8	3	323	58	762	56	243	245	87	23	13	13	3	3	4	2	1	1	7	
Males	138	122	109	318	21	6	8	.....	.....	20	8	.....	.....	780	.....	9	216	290	124	59	35	19	13	3	5	2	2	2	3
Females	116	140	98	372	21	1	10	.....	.....	19	3	.....	.....	780	.....	96	338	205	72	22	19	12	.....	.....	3	2	2	10	
Total	254	262	207	720	42	7	18	.....	.....	39	11	573	207	1560	105	554	496	196	81	54	31	13	3	3	8	4	2	13	
Males	32	48	70	2	6	3	.....	.....	.....	8	.....	.....	.....	169	.....	.....	39	67	28	24	5	3	1	.....	.....	1	1	.....	4
Females	36	49	59	2	6	3	.....	.....	.....	15	.....	.....	.....	169	.....	26	72	38	17	5	4	1	.....	.....	1	1	1	.....
Total	68	97	129	4	11	6	.....	.....	.....	23	.....	167	2	338	26	111	105	45	29	9	4	1	.....	.....	1	1	2	4	
Males	33	51	174	9	65	2	1	2	1	15	6	.....	.....	359	.....	6	136	95	58	25	7	10	4	5	6	3	3	1	
Females	21	62	162	11	74	3	.....	3	1	18	4	.....	.....	359	.....	72	150	71	24	13	9	3	2	6	3	2	2	4	
Total	54	113	336	20	139	5	1	5	2	33	10	354	5	718	78	286	166	82	38	16	13	6	6	11	9	5	3	5	

ELGIN.—Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41													
IX. THE SKIN.																																																						
1. Erysipelas																																																						
2. Skin and Adnexa (cancer excepted)																																																						
Total																																																						
X. LOCOMOTOR SYSTEM.																																																						
1. Pott's Disease																																																						
2. Disease of Bones and Joints																																																						
3. Amputation (for unspecified Dis.)																																																						
Total																																																						
XI. MALFORMATIONS, ETC.																																																						
1. Still-Births	5	8	2	15			15			15																																												
2. Congen. Debility & Malformations	17	10		27			27			27																																												
3. Other Diseases of Infancy																																																						
4. Senile Decay	52	34		24	61	1	5	70	6																																													
Total	74	52	2	66	61	1	47	75	6	42																																												
XII. SUICIDE.																																																						
1. Poison	1			1			1																																															
2. Strangulation	1			1			1																																															
3. Gas Poisoning																																																						
4. Drowning																																																						
5. Firearms	1	1		2			1	1																																														
Total	11			6	5		5	6		3																																												
XIII. ACCIDENTS.																																																						
1. Fractures and Dislocations	2			2			2																																															
2. Gunshot	3			2			2																																															
3. Lightning																																																						
4. Drowning																																																						
5. Electric Cars																																																						
6. Bicycles	9			9			6	3																																														
7. Railways	5	3		7			7	1																																														
8. Burns and Scalds	1			1			1																																															
9. Poison	31	3		28	6		22	12		3																																												
Total	4	4		5	2	1	7	1																																														
XIV. ILL-DEFINED CAUSES.																																																						
1. Dropsy	1	1		4			1	3																																														
2. Tumors	1	1		2			1	1																																														
3. Other Ill-Defined Causes	6	8		11	2	1	2	11	1																																													
Total	233	2		369	4	162	4	203	16	81																																												
Total from all causes.	300	233	2	369	4	162	4	203	16	81	7	11	11	7	20	22	22	21	18	18	16	18	18	16	18	56	67	86	78	1	56	56	23	36	33	36	23	45	42	64	55	29	30	31	32	33	34	35	36	37	38	39	40	41

FBONTENAC.—Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41		
IX. THE SKIN.																																											
1. Erysipelas.....																																											
2. Skin and Adnexa (cancer excepted)																																											
X. LOCOMOTOR SYSTEM.																																											
1. Pott's Disease.....																																											
2. Diseases of Bones and Joints.....																																											
3. Amputation (for unspecified Dis.)..																																											
XI. MALFORMATIONS, ETC.																																											
1. Still-Births.....	4	6	3	13			13			13																																	
2. Congen. Deblity & Malformations.	25	21	1	46			46			46																																	
3. Other Diseases of Infancy.....	1																																										
4. Senile Decay.....	45	58		27	73	3	8	85	10																																		
XII. SUICIDE.																																											
1. Poison.....	74	86	3	87	73	3	68	85	10	59	1																																
2. Strangulation.....	1			1																																							
3. Gas Poisoning.....																																											
4. Drowning.....																																											
5. Firearms.....																																											
XIII. ACCIDENTS																																											
Total.....																																											
1. Fractures and Dislocations.....	10	3		7	6		3	9	1																																		
2. Gunshot.....	2			2			1	1																																			
3. Lightning.....	1																																										
4. Drowning.....	4			4			2	2																																			
5. Railways.....	2			2			1	1																																			
6. Homicide.....																																											
7. Strangulation.....	1			1			1																																				
8. Lock-jaw.....	1			1			1																																				
9. Frost bite.....	1			1			1																																				
Total.....																																											
20	5		19	6			9	14	2																																		
XIV. ILL-DEFINED CAUSES.																																											
1. Dropsy.....	4	6		4	6		2	7	1																																		
2. Tumors.....	3	6		4	5		2	7																																			
3. Other Ill-Defined Causes.....	3	1		2	2		3	1																																			
Total.....																																											
10	13		10	13			7	15	1																																		
Total from all causes.																																											
344	363	3	502	193	15	326	341	43	137	7	12	5	4	12	9	27	26	32	20	28	26	75	83	96	84	7	88	76	77	77	54	39	49	63	59	41	52	710					

HALDIMAND.—Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41		
IX. THE SKIN.																																											
1. Erysipelas																																											
2. Skin and Adnexa (cancer excepted)																																											
Total																																											
X. LOCOMOTOR SYSTEM.																																											
1. Pott's Disease																																											
2. Disease of the Bones and Joints																																											
3. Amputation (for unspecified Dis.)																																											
Total																																											
XI. MALFORMATIONS, ETC.																																											
1. Still-Births	4	2		6			6			6																																	
2. Congen. Debility & Malformations	7	4		11			11			11																																	
3. Other Diseases of Infancy	19	18		15	22		4	33																																			
4. Senile Decay	30	24		32	22		21	33		17																																	
Total																																											
XII. SUICIDE.																																											
1. Poison	1			1				1																																			
2. Strangulation	4			3				3																																			
3. Gas Poisoning																																											
4. Drowning																																											
5. Firearms																																											
Total	5			4			1	4																																			
XIII. ACCIDENTS.																																											
1. Fractures and Dislocations	4	1		4	1		1	3	1																																		
2. Gunshot																																											
3. Drowning	1			1			1																																				
4. Railways	1			1																																							
5. Burns and Scalds	1			1			1																																				
6. Poison	1			1			1																																				
7. Suffocation	1			1			1																																				
Total	8	2		9	1		6	3	1		1	1	1	2																													
XIV. ILL-DEFINED CAUSES.																																											
1. Dropsy	1	2		2	1		1	2																																			
2. Tumors	1	1		1			1	1																																			
3. Other Ill-Defined Causes	1	1		2			1	1																																			
Total	2	4		5	1		1	4	1																																		
Total from all causes.	137	134		191	70		100	153	8	37	3	2	2	2	6	6	10	11	6	4	8	7	23	23	67	23	28	3	26	23	34	13	22	17	18	23	38	39	40	41			

HALTON. — *Continued.*

Number of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41					
IX. THE SKIN.																																														
1. Erysipelas	1			1				1																																						
2. Skin and Adnexa (cancer excepted)				1																																										
Total ..																																														
X. LOCOMOTOR SYSTEM.																																														
1. Pott's Disease																																														
2. Disease of Bones and Joints																																														
3. Amputation (for unsput-cifed Dis.)																																														
Total ..																																														
XI. MALFORMATIONS, ETC.																																														
1. Still-Births	5	2		7			7			7																																				
2. Congen. Debility & Malformations	6	4		10			10			10																																				
3. Other Diseases of Infancy	1			1			1			1																																				
4. Senile Decay	20	17		16	21		2	85																																						
Total ..	31	24		34	21		20	35		17	1																																			
XII. SUICIDE.																																														
1. Poison																																														
2. Strangulation																																														
3. Gas Poisoning																																														
4. Drowning																																														
Total ..																																														
XIII. ACCIDENTS.																																														
1. Fractures and Dislocations	4			3	1		1	3																																						
2. Gunshot	1			1			1																																							
3. Lightning																																														
4. Drowning	2			2			1	1																																						
5. Bicycles	2																																													
6. Railways	2			1			1																																							
7. Burns and Scalds	1			1			1																																							
Total ..	9	1		7	3		4	6		1	1																																			
XIV. ILL DEFINED CAUSES.																																														
1. Dropsy	2	3		3	2			5																																						
2. Tumors	1			1			1																																							
3. Other Ill-Defined Causes	1			1			1																																							
4. Lockjaw	1			1			1																																							
Total ..	5	3		6	2		1	7																																						
Total from all causes	135	131		192	94		98	187		44	10	1	4	10	4	4	9	4	6	7	12	6	21	40	54	42	2	33	43	29	20	21	12	24	16	16	30	29	13	286						

HURON.—Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41		
IX. THE SKIN.																																											
1. Erysipelas	1			1			1									1																											
2. Skin and Adnexa (cancer excepted)																																											
Total	1			1			1									1																											
X. LOCOMOTOR SYSTEM.																																											
1. Pott's Disease																																											
2. Diseases of Bones and Joints	1			1			1																																				
3. Amputation (for unspecified Dis's)																																											
Total	1			1			1																																				
XI. MALFORMATIONS, ETC.																																											
1. Still-births	17	11		28			28			28																																	
2. Congen. Deblity & Malformations.	21	17	1	39			39			39																																	
3. Other Diseases of Infancy	2			1	1		2			1																																	
4. Senile Decay	70	58		8	116	4	7	115	6																																		
Total	108	88	1	76	117	4	76	115	6	67	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
XII. SUICIDE.																																											
1. Poison	3			1			1																																				
2. Strangulation				1			3																																				
3. Gas Poisoning																																											
4. Drowning																																											
5. Firearms																																											
Total	3	1		2	2		4																																				
XIII. ACCIDENTS.																																											
1. Fractures and Dislocations	10	2		9	3		2	10																																			
2. Gunshot																																											
3. Lightning																																											
4. Drowning	5	1		6			6			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
5. Burns and Scalds	1	1		2			1	1																																			
6. Homicide																																											
Total	16	4		17	3		9	11		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
XIV. ILL-DEFINED CAUSES.																																											
1. Dropsy	1	5		2	4		1	5																																			
2. Tumors	4	6		9	1		1	9																																			
3. Other Ill-defined Causes	3	2		5			4	1																																			
4. Lockjaw	1	1		2			2																																				
Total	9	14		18	5		6	17		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Total from all causes.	375	356	1	427	289	16	262	449	21	126	12	6	3	4	10	16	22	31	30	18	22	27	61	96	131	107	2	71	84	86	79	63	53	56	41	51	44	60	44	732			

LEEDS AND GRENVILLE. — *Continued.*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41							
IX. THE SKIN.																																																
1. Erysipelas	1			1			1																																									
2. Skin and Adnexa (cancer excepted)																																																
Total	1			1			1																																									
X. LOCOMOTOR SYSTEM.																																																
1. Pott's Disease																																																
2. Disease of Bones and Joints																																																
3. Amputation (for unspecified Dis.)																																																
Total																																																
XI. MALFORMATIONS, ETC.																																																
1. Still-Births	5	3	1	9			9			9																																						
2. Congen. Deblity & Malformations.	25	26		51			51			51																																						
3. Other Diseases of Infancy	67	71		51	84	3	9	112	17																																							
4. Senile Decay																																																
Total	97	100	1	111	84	3	69	112	17	60																																						
XII. SUICIDE.																																																
1. Poison	1			1																																												
2. Strangulation																																																
3. Gas Poisoning																																																
4. Drowning																																																
Total	1	1		1	1		1	1	1																																							
XIII. ACCIDENTS.																																																
1. Fractures and Dislocations	9	3		9	2		4	6	2																																							
2. Gunshot																																																
3. Drowning	8	4		9	3		6	5	1																																							
4. Bicycles																																																
5. Railways	11			8	1	2	2	7	2																																							
6. Burns and Scalds	1	1		2			2																																									
7. Poison	1	1		2			1																																									
Total	30	9		30	7	2	15	19	5	1																																						
XIV. ILL-DEFINED CAUSES.																																																
1. Dropsy	4	10		12	2		2	9	3																																							
2. Tumors	3	2		3	2		4	1																																								
3. Other Ill-Defined Causes	7	6		9	4		3	8	2																																							
4. Lockjaw	1			1			1																																									
5. Suffocation	1			1			1																																									
Total	16	18		26	8		5	23	6																																							
Total from all causes	445	410	1	645	201	10	323	441	92	122	9	9	9	14	18	30	37	22	26	36	33	31	80	117	117	125	117	10	69	81	78	86	79	61	78	70	45	63	62	78	856							

IV. CIRCULATORY SYSTEM.												
1. Pericarditis	1	1	1	1	1	1	1	1	1	1	1	1
2. Endocarditis	1	1	1	1	1	1	1	1	1	1	1	1
3. Organic Heart Disease	4	3	2	4	1	1	4	1	1	1	3	1
4. Angina Pectoris	3	1	3	1	4	2	2	2	1	1	1	1
5. Arteries, Atheroma, Aneurism, etc.	7	6	9	4	2	10	1	1	4	6	1	1
6. Other Dis's. of Circulatory System.	7	3	10	1	7	1	1	1	1	2	1	1
Total..	26	20	33	17	26	26	26	26	26	26	26	26
V. RESPIRATION.												
1. Acute Bronchitis	7	3	10	1	7	1	1	1	1	1	1	1
2. Chronic Bronchitis	2	2	1	1	1	1	1	1	1	1	1	1
3. Broncho-pneumonia	3	5	8	1	1	1	1	1	1	1	1	1
4. Pneumonia	1	2	1	2	1	1	1	1	1	1	1	1
5. Pleurisy	1	2	1	2	1	1	1	1	1	1	1	1
6. Congestion of the Lungs	1	2	1	2	1	1	1	1	1	1	1	1
7. Asthma and Emphysema	1	2	1	2	1	1	1	1	1	1	1	1
8. Other Dis's. of Respiratory System.	1	2	1	2	1	1	1	1	1	1	1	1
Total..	14	12	21	5	17	8	1	9	2	1	2	2
VI. DIGESTIVE SYSTEM.												
1. Ulcer of the Stomach	2	2	2	2	2	2	2	2	2	2	2	2
2. Other Dis's. of Stom. (Cancer exp't'd)	9	3	12	12	12	12	12	12	12	12	12	12
3. Infan. Diarr. & Cholera Infantum.	4	4	4	4	4	4	4	4	4	4	4	4
4. Diarrhoea & Enteritis (not infantile)	5	5	5	5	5	5	5	5	5	5	5	5
5. Dysentery	6	6	6	6	6	6	6	6	6	6	6	6
6. Hernia & Intestinal obstructions.	7	7	7	7	7	7	7	7	7	7	7	7
7. Other Diseases of the Intestines.	8	8	8	8	8	8	8	8	8	8	8	8
8. Diseases of the Liver	1	1	1	1	1	1	1	1	1	1	1	1
9. Peritonitis (not puerperal)	1	1	1	1	1	1	1	1	1	1	1	1
10. Iliac abscess and appendicitis.	1	1	1	1	1	1	1	1	1	1	1	1
Total..	12	5	16	1	13	4	1	12	3	1	1	1
VII. GENITO-URINARY SYSTEM.												
1. Acute Nephritis	2	3	4	1	2	3	1	1	1	1	1	1
2. Bright's Disease	3	4	1	2	3	1	1	1	1	1	1	1
3. Other Dis's. of Kidneys and Adnexa	4	4	4	4	4	4	4	4	4	4	4	4
4. Vesical Calculi	5	5	5	5	5	5	5	5	5	5	5	5
5. Diseases of the Bladder	6	6	6	6	6	6	6	6	6	6	6	6
6. Dis. s. of the Male Genital Organs.	7	7	7	7	7	7	7	7	7	7	7	7
7. Metritis	8	8	8	8	8	8	8	8	8	8	8	8
8. Other Diseases of the Uterus	9	9	9	9	9	9	9	9	9	9	9	9
9. Ovarian Cysts & Ovarian Tumors.	10	10	10	10	10	10	10	10	10	10	10	10
10. Other Dis's. of Fem. Genital Organs	11	11	11	11	11	11	11	11	11	11	11	11
Total..	4	3	5	2	2	5	1	1	1	3	1	1
VIII. PUERPERAL DISEASES.												
1. Puerperal Septicæmia	3	3	2	1	3	3	2	1	2	1	2	1
2. Puerperal Albuminuria and Convul.	2	2	2	2	2	2	2	2	2	2	2	2
3. Other. acc. of Preg., sudden death.	1	1	1	1	1	1	1	1	1	1	1	1
4. Puerperal Disease of the Breast.	1	1	1	1	1	1	1	1	1	1	1	1
Total..	6	6	5	1	6	6	1	1	2	2	1	1

NORFOLK.—Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
IX. THE SKIN.																																									
1. Erysipelas.....																																									
2. Skin and Adnexa (cancer excepted)																																									
X. LOCOMOTOR SYSTEM.																																									
1. Pott's Disease.....																																									
2. Diseases of Bones and Joints.....																																									
3. Amputation (for unspecified Dis.).....																																									
Total.....																																									
XI. MALFORMATIONS, ETC.																																									
1. Still-Births.....	10	2	12	12	12	12	12	12	12	12																															
2. Congen. Deblity & Malformations.....	10	8	1	19			19			19																															
3. Other Diseases of Infancy.....	40	24		29	34	1	5	48	11																																
4. Senile Decay.....																																									
Total.....																																									
XII. SUICIDE.																																									
1. Poison.....																																									
2. Strangulation.....																																									
3. Gas Poisoning.....																																									
4. Drowning.....																																									
5. Firearms.....																																									
Total.....																																									
XIII. ACCIDENTS.																																									
1. Fractures and Dislocations.....	2	1																																							
2. Gunshot.....																																									
3. Lightning.....																																									
4. Drowning.....	3			3			2	1																																	
5. Electric Cars.....																																									
6. Bicycles.....	2	1		3			2	1																																	
7. Railways.....	2			2			1	1																																	
8. Burns and Scalds.....	1			1																																					
9. Strangulation.....																																									
Total.....																																									
XIV. ILL-DEFINED CAUSES.																																									
1. Dropsy.....	3	5		4			1	6	1																																
2. Tumors.....	2	4		5			5	1																																	
3. Other Ill-Defined Causes.....	2	5		3			1	4																																	
Total.....																																									
Total from all causes.....																																									
	191	191	1	295	92	6	141	219	33	61	7	8	2	1	5	4	15	15	10	9	30	49	68	68	2	47	34	41	36	26	26	12	29	36	35	30	393				

ONTARIO.—Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
IX. THE SKIN.																																										
1. Erysipelas.....		1					1																																			
2. Skin and Adnexa (cancer excepted)				1																																						
X. LOCOMOTOR SYSTEM.																																										
1. Pott's Disease.....																																										
2. Disease of Bones and Joints																																										
3. Amputation (for unspecified Dis.)																																										
XI. MALFORMATIONS, ETC.																																										
1. Still Births.....	12	5	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	
2. Congen. Deblity & Malformations	18	17	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
3. Other Diseases of Infancy	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
4. Senile Decay.....	28	40	13	55	10	57	1																																			
XII. SUICIDE.																																										
1. Poison.....	59	63	67	55	64	57	1																																			
2. Strangulation	2		1	1	2																																					
3. Gas Poisoning																																										
4. Drowning																																										
5. Firearms																																										
XIII. ACCIDENTS.																																										
Total.																																										
1. Fractures and Dislocations	5	1	3	3	4	2																																				
2. Gunshot	1		1	1	1	1																																				
3. Lightning	1																																									
4. Drowning	2		2	2	2	2																																				
5. Electric Cars																																										
6. Bicycles																																										
7. Railways	5		2	3	1	3	1																																			
8. Burns and Scalds	2		1	1	1	1																																				
9. Poison.....	1		1	1	1	1																																				
XIV. ILL-DEFINED CAUSES.																																										
Total.																																										
1. Dropsy.....	1		1	1	1	1																																				
2. Tumors.....	1	3	2	2	2	2																																				
3. Other Ill-Defined Causes	1		1	1	1	1																																				
Total.																																										
Total from all causes.....																																										
	267	269	333	202	1	233	289	12	80	10	12	4	1	6	11	14	28	18	22	15	20	16	38	92	84	4	58	53	61	29	34	40	38	41	46	48	536					

VIII. PUERPERAL DISEASES.	141	142	136	85	62	110	126	47	36	4	4	1	9	3	9	7	19	7	22	39	32	54	2	33	25	27	23	15	17	20	35	18	18	22	282	
1. Puerperal Septicæmia	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2. Puerperal Albuminuria and Convul.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3. Other acc. of Preg., sudden death.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4. Puerperal Disease of the Breast.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Total	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
IX. THE SKIN.	141	142	136	85	62	110	126	47	36	4	4	1	9	3	9	7	19	7	22	39	32	54	2	33	25	27	23	15	17	20	35	18	18	22	282	
1. Erysipelas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2. Skin and Adnexa (cancer excepted).	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Total	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
X. LOCOMOTOR SYSTEM.	141	142	136	85	62	110	126	47	36	4	4	1	9	3	9	7	19	7	22	39	32	54	2	33	25	27	23	15	17	20	35	18	18	22	282	
1. Diseases of Bones and Joints	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2. Amputation (for unspecified Dis).	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Total	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
XI. MALFORMATIONS, ETC.	141	142	136	85	62	110	126	47	36	4	4	1	9	3	9	7	19	7	22	39	32	54	2	33	25	27	23	15	17	20	35	18	18	22	282	
1. Still-Births	2	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
2. Congen. Debal. and Malformations.	5	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
3. Other Diseases of Infancy	19	27	2	34	10	5	33	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
4. Semite Decay	25	33	15	34	10	18	33	8	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Total	54	54	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
XII. SUICIDE.	141	142	136	85	62	110	126	47	36	4	4	1	9	3	9	7	19	7	22	39	32	54	2	33	25	27	23	15	17	20	35	18	18	22	282	
1. Poison	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2. Strangulation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3. Drowning	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4. Firearms	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
XIII. ACCIDENTS.	141	142	136	85	62	110	126	47	36	4	4	1	9	3	9	7	19	7	22	39	32	54	2	33	25	27	23	15	17	20	35	18	18	22	282	
1. Fractures and dislocations	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2. Gunshot	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3. Drowning	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4. Burns and Scalds	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5. Accidental Poison	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
XIV. ILL-DEFINED CAUSES.	141	142	136	85	62	110	126	47	36	4	4	1	9	3	9	7	19	7	22	39	32	54	2	33	25	27	23	15	17	20	35	18	18	22	282	
1. Dropsy	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2. Tumors	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3. Other Ill-Defined Causes	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
4. Lock-jaw	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5. Murder	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Total	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Total from all causes	141	142	136	85	62	110	126	47	36	4	4	1	9	3	9	7	19	7	22	39	32	54	2	33	25	27	23	15	17	20	35	18	18	22	282	

PRESCOTT AND RUSSPI L.—Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41		
IX. THE SKIN.																																											
1. Erysipelas.....																																											
2. Skin and Adnexa (cancer excepted).....																																											
Total.....																																											
X. LOCOMOTOR SYSTEM.																																											
1. Pott's Disease.....																																											
2. Disease of Bones and Joints.....																																											
3. Amputation (for unsuspected Dis.).....																																											
Total.....																																											
XI. MALFORMATIONS, ETC.																																											
1. Still-Births.....	14	15		29			29			29																																	
2. Congen. Debility & Malformations.....	100	71		171			171			171																																	
3. Other Diseases of Infancy.....	5	5		10			10			10																																	
4. Senile Decay.....	26	38		45	15	4	6	56	2																																		
Total.....																																											
XII. SUICIDE.																																											
1. Poison.....	145	129		254	16	4	216	56	2																																		
2. Strangulation.....	1			1			1																																				
3. Gas Poisoning.....	1			1			1																																				
4. Drowning.....																																											
Total.....																																											
XIII. ACCIDENTS.																																											
1. Fractures and Dislocations.....	8			7	1		3	5																																			
2. Lightning.....	1						1																																				
3. Drowning.....	2			2			1																																				
4. Railways.....	1			1			1																																				
5. Burns and Scalds.....	3	1		4			3	1																																			
6. Poison.....	1			1			1																																				
Total.....																																											
XIV. ILL DEFINED CAUSES.																																											
1. Dropsy.....	15	2		16	1		8	9																																			
2. Tumors.....	2	2		4			3	1																																			
3. Other Ill-Defined Causes.....	17	16		27	1	5	21	11	1																																		
4. Anthrax.....	1			1			1																																				
Total.....																																											
Total from all cause.....																																											
	457	400		797	46	14	002	248	7	318	43	14	18	30	26	24	30	23	14	16	24	18	32	42	69	59	2	62	98	70	101	85	72	68	65	50	58	54	857				

RAINY RIVER.—Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
IX. THE SKIN.																																										
1. Erysipelas.....																																										
2. Skin and Adnexa (cancer excepted).....																																										
X. LOCOMOTOR SYSTEM.																																										
1. Pott's Disease.....																																										
2. Disease of Bones and Joints.....																																										
3. Amputation (for unsuspected Dis).....																																										
XI. MALFORMATIONS, ETC.																																										
1. Still Births.....	2	4		7			7			7																																
2. Congen. Debility & Malformation.....	12	6		18			18			18																																
3. Other Diseases of Infancy.....	4	2		3	3			5	1																4	2		2														
4. Senile Decay.....																																										
17	10	4		28	3		25	5	1																	4	2		2	1												
XII. SUICIDE.																																										
1. Poison.....																																										
2. Strangulation.....																																										
3. Gas Poisoning.....																																										
4. Drowning.....																																										
5. Firearms.....																																										
XIII. ACCIDENTS.																																										
1. Fractures and Dislocations.....	3			3			3																																			
2. Gunshot.....	2			1	1		2																																			
3. Lightning.....																																										
4. Drowning.....	8			5	3		5	1	2																																	
5. Electric Cars.....																																										
6. Bicycles.....																																										
7. Railways.....	1																																									
8. Burns and Scalds.....	1																																									
9. Poison.....	1																																									
15				10	5		10	3	2																																	
XIV. ILL-DEFINED CAUSES.																																										
1. Dropsy.....	2			1	1																																					
2. Tumors.....	3	7		9	1		8	2																																		
3. Other Ill-Defined Causes.....																																										
5	8			11	2		8	4	1																																	
Total.....																																										
90	59	4	122	27	3	89	14	48	1	1	1	3	7	13	8	5	7	10	8	10	4	7	6	10	10	5	4	8	13	10	10	8	12	23	15	8	14	152				
Total from all causes.....																																										

VIII. PUERPERAL DISEASES.														
1. Puerperal Septicæmia	2	1	1	1	1	1	1	1	1	1	1	1	1	2
2. Puerperal Albuminuria and Convul.	1	1	1	1	1	1	1	1	1	1	1	1	1	7
3. Other acc. of Preg	7	1	1	2	3	1	1	1	1	1	1	1	1	10
4. Puerperal Disease of the Breast	10	1	2	3	3	1	1	1	1	1	1	1	1	10
Total	29	4	5	7	8	5	5	5	5	5	5	5	5	34
IX. THE SKIN.														
1. Erysipelas	1	1	1	1	1	1	1	1	1	1	1	1	1	3
2. Skin and Adnexa (cancer excepted)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	2	2	2	2	2	2	2	2	2	2	2	2	2	4
X. LOCOMOTOR SYSTEM.														
1. Pott's Disease	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2. Diseases of Bones and Joints	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	2	2	2	2	2	2	2	2	2	2	2	2	2	2
XI. MALFORMATIONS, ETC.														
1. Still-Births	10	15	15	15	15	15	15	15	15	15	15	15	15	15
2. Congen. Debil. and Malformations	44	70	70	70	70	70	70	70	70	70	70	70	70	70
3. Other Diseases of Infancy	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4. Senile Decay	37	40	40	40	40	40	40	40	40	40	40	40	40	40
Total	91	73	101	60	3	90	68	6	85	2	28	45	2	164
XII. SUICIDE.														
1. Poison	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2. Strangulation	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3. Firearms	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	2	2	2	2	2	2	2	2	2	2	2	2	2	2
XIII. ACCIDENTS.														
1. Fractures and Dislocations	10	2	10	2	6	4	2	1	1	1	1	1	1	12
2. Drowning	6	6	6	6	6	6	6	6	6	6	6	6	6	6
3. Railways	7	6	6	6	6	6	6	6	6	6	6	6	6	6
4. Burns and Scalds	3	1	4	1	4	1	1	2	1	1	1	1	1	7
5. Suffocation	2	1	1	1	1	1	1	1	1	1	1	1	1	2
6. Suffocation by Gas	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7. Accidental Poison	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8. Frost Bite	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	29	5	29	4	16	12	6	1	4	2	1	1	1	34
XIV. ILI-DEFINED CAUSES.														
1. Dropsy	4	8	5	7	3	8	1	1	1	1	1	1	1	12
2. Tumors	1	1	1	1	1	1	1	1	1	1	1	1	1	2
3. Other Ill D.fined Causes	7	10	13	3	1	6	7	4	1	2	3	1	1	17
Total	12	19	19	11	1	9	17	5	3	2	3	2	2	31
Total from all causes	360	286	473	161	10	331	276	36	160	18	23	9	13	646

CAUSES OF DEATHS BY COUNTIES, IN 1901.—SIMCOE.—POPULATION, 82,315. (Including municipalities of all classes)

Main data table with columns for Sex, Nativity, Soc'l con., Age, Months, and Total. Includes sub-sections for General Diseases, Local Diseases, and Nervous System.

General Diseases.

Number of Column.

I. COMMUNICABLE DISEASES.

Table listing communicable diseases: 1. Typhoid Fever, 2. Smallpox, 3. Measles, 4. Scarlet Fever, 5. Whooping Cough, 6. Diphtheria and Group, 7. Influenza, 8. Other Epidemic Diseases.

II. OTHER GENERAL DISEASES.

Table listing other general diseases: 1. Pyaemia and Septicaemia, 2. Malarial Fever, 3. Tuberculosis and Scrofula, 4. Syphilis, 5. Cancer, 6. Rheumatism and Gout, 7. Diabetes, 8. Other General Diseases, 9. Alcoholism, Acute and Chronic.

Local Diseases.

III. NERVOUS SYSTEM.

Table listing nervous system diseases: 1. Encephalitis, 2. Simple Meningitis, 3. Epidemic Cerebro-spinal Meningitis, 4. Congestion and Hemorrhage of Brain, 5. Softening of the Brain, 6. Paralysis without specified cause, 7. Insanity, 8. Epilepsy, 9. Convulsions (not puerperal), 10. Other Nervous Diseases.

IV. CIRCULATORY SYSTEM.

Table listing circulatory system diseases: 1. Pericarditis.

2. Endocarditis.....	31	3	4	2	6	1	2	1	1	1	3	1	1	1	1	1	1	1	1	2	4	1	6	
3. Organic Heart Disease	27	20	25	21	1	13	34																47	
4. Angina Pectoris.....	1					1																	1	
5. Arteries, Atheroma, Anurism, etc.	11	5	9	7		5	11																16	
6. Other Dis's of Circulatory System.	42	29	40	30	1	26	45																71	
Total.....																								
V. RESPIRATION.	4	10	13	1		11	2	1															11	
1. Acute Bronchitis.....	5	1	3	4		2	6																6	
2. Chronic Bronchitis.....	2					2																	2	
3. Broncho-pneumonia.....	32	21	26	16	1	23	26	4															63	
4. Pneumonia.....	1	2	1	2		2	1																3	
5. Pleurisy.....	4	7	9	2		8	3																11	
6. Congestion of the Lungs.....	3	4	5	2		6	1																7	
7. Asthma and Emphysema.....																								
8. Other Dis's of Respiratory System.																								
Total.....																								
VI. DIGESTIVE SYSTEM.	49	47	68	27	1	44	45	7	17	5	4	1	1	1	1	1	8	2	1	5	6	15	8	96
1. Ulcer of the Stomach.....																								2
2. Other Dis's of Stom.-(cancer except'd)																								25
3. Infant. Diarr. & Cholera Infantum.	16	9	25			25			25															10
4. Diarrhea & Enteritis (not infantile)	6	4	6	4		4			6															6
5. Dysentery.....	3	3	1	3	2	2	3	1																6
6. Hernia and Intestinal obstructions.	7	6	7	6		1	12																	13
7. Other Diseases of the Intestines.....	9	1	9	1		6	4																	10
8. Diseases of the Liver.....	3	4	6	1		3	4																	7
9. Peritonitis (not puerperal).....																								6
10. Inac.abcess and appendicitis.....																								6
Total.....																								
VII. GENITO-URINARY SYSTEM	46	27	55	16	2	42	30	1	25															78
1. Acute Nephritis.....	1	2	3			2	1		1															3
2. Bright's Disease.....	17	10	19	7	1	8	16	3	1															27
3. Other Dis's of Kidneys and Adnexa																								3
4. Vesical Calculi.....	3		3			2	1																	
5. Diseases of the Bladder.....																								3
6. Dis's of the male Genital Organs.....																								
7. Metritis.....																								
8. Other Diseases of the Uterus.....																								
9. Ovarian Cysts & Ovarian Tumors.....																								
10. Other Dis's of fem. Genital Organs.																								33
Total.....																								
VIII. PUERPERAL DISEASES.	1	2	3			1	2																	8
1. Puerperal Septicemia.....																								3
2. Puerperal Albuminuria & Conval.																								3
3. Other acc. of Preg., sudden death.																								6
Total.....																								

SIMCOE. — *Continued.*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
IX. THE SKIN.																																									
1. Erysipelas	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	
2. Skin and Adnexa (cancer excepted)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
X. LOCOMOTOR SYSTEM.																																									
1. Pott's Disease	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2. Disease of Bones and Joints	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3. Amputation (for unsimplified Dis.)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
XI. MALFORMATIONS, ETC.																																									
1. Still-Births	13	10	3	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
2. Congen. Deblity & Malformations.	42	44	2	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88
3. Other Diseases of Infancy	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4. Senile Decay	61	66	102	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107
Total	117	121	5	136	107	107	126	102	15	114	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
XII. SUICIDE.																																									
1. Poison	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2. Strangulation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3. Gas Poisoning	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4. Drowning	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Total	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
XIII. ACCIDENTS.																																									
1. Fractures and Dislocations	5	2	1	4	3	3	3	4	3	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2. Gun shot	3	1	1	1	2	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3. Lightning	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4. Drowning	5	1	3	3	3	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5. Bicycles	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6. Railways	4	1	3	2	2	2	1	4	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
7. Burns and Scalds	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
8. Poison	20	4	14	7	3	10	13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Total	495	427	5	631	281	15	460	423	44	193	22	13	6	7	21	29	34	44	47	21	38	36	24	56	99	110	118	9	71	103	90	84	56	55	73	81	77	79	82	76	
XIV. ILL-DEFINED CAUSES.																																									
1. Dropsy	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2. Tumors	2	3	3	3	2	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3. Other Ill-Defined Causes	6	3	6	3	3	5	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4. Lockjaw	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Total	8	8	5	9	7	6	7	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
Total from all causes	495	427	5	631	281	15	460	423	44	193	22	13	6	7	21	29	34	44	47	21	38	36	24	56	99	110	118	9	71	103	90	84	56	55	73	81	77	79	82	76	
Total	495	427	5	631	281	15	460	423	44	193	22	13	6	7	21	29	34	44	47	21	38	36	24	56	99	110	118	9	71	103	90	84	56	55	73	81	77	79	82	76	
Total from all causes	495	427	5	631	281	15	460	423	44	193	22	13	6	7	21	29	34	44	47	21	38	36	24	56	99	110	118	9	71	103	90	84	56	55	73	81	77	79	82	76	
Total	495	427	5	631	281	15	460	423	44	193	22	13	6	7	21	29	34	44	47	21	38	36	24	56	99	110	118	9	71	103	90	84	56	55	73	81	77	79	82	76	
Total from all causes	495	427	5	631	281	15	460	423	44	193	22	13	6	7	21	29	34	44	47	21	38	36	24	56	99	110	118	9	71	103	90	84	56	55	73	81	77	79	82	76	
Total	495	427	5	631	281	15	460	423	44	193	22	13	6	7	21	29	34	44	47	21	38	36	24	56	99	110	118	9	71	103	90	84	56	55	73	81	77	79	82	76	
Total from all causes	495	427	5	631	281	15	460	423</																																	

CAUSES OF DEATHS BY COUNTIES IN 1901.—STORMONT DUNDA & GLENGARRY.—POPULATION, 68,930. (Including municipalities of all classes.

General Diseases.	Sex.		Nativity.		Soc' con		Ages.										Months.												Total.	
	Male.	Female.	Canada.	Foreign.	Single.	Married.	Under 5.					Ages.					Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.		
							0-1.	1.	2.	3.	4.	5-9.	10-14.	15-19.	20-24.	25-29.														30-34.	35-39.	40-44.	45-49.	50-59.	60-69.	70-79.	80 & over.	Not given.
I. COMMUNICABLE DISEASES.																														
1. Typhoid Fever	1	4	4	1	4	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5
2. Smallpox	6	3	9	1	8	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9
3. Measles	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4. Scarlet Fever	7	3	10	1	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10
5. Whooping Cough	10	8	18	1	18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
6. Diphtheria and Croup	3	12	12	3	8	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
7. Influenza	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8. Other Epidemic Diseases	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total.																														
II. OTHER GENERAL DISEASES.																														
1. Pyæmia and Septicæmia	28	30	54	4	49	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	58
2. Malarial Fever	5	10	11	1	4	11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
3. Tuberculosis and Scrofula	38	73	99	10	51	42	15	3	3	2	2	3	11	14	16	9	12	6	4	9	10	3	4	15	14	9	6	11	8	111
4. Syphilis	16	16	25	6	5	24	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	32
5. Cancer	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
6. Rheumatism and Gout	3	2	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5
7. Diabetes	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
8. Other General Diseases	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9. Alcoholism, Acute and Chronic	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total.																														
Local Diseases.																														
III. NERVOUS DISEASES.																														
1. Encephalitis	4	5	9	1	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9
2. Simple Meningitis	4	2	6	1	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6
3. Epilepsy	3	1	4	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
4. Epitemic Cerebro-spinal Meningitis	8	15	14	9	1	17	5	2	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
5. Congestion & Hemorrhage of Brain	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6. Paralysis without specified cause	12	14	20	6	1	21	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	26
7. Insanity	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8. Epilepsy	2	1	3	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
9. Convulsions (not puerperal)	11	9	19	1	20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
10. Other Nervous Diseases	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Total.																														
46 49 78 17 42 44 9 19 6 2 2 3 2 1 1 3 2 3 1 3 5 9 20 13 13 10 6 9 10 8 6 8 6 8 8 95																														

STORMONT, DUNDAS & GLENGARRY.—Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
IV. CIRCULATORY SYSTEM.																																										
1. Pericarditis																																										
2. Endocarditis	1			2				1									2		1				1	1	5	12	4															
3. Organic Heart Disease	21	17		34	2	2	4	29	5											2				1	1	1																
4. Angina Pectoris	1	1		1	1		2																																			
5. Arteries, Atherosclerosis, Aneurysm, etc.																																										
6. Other Dis. s. of Circulatory System.	3	17		19	1		9	2									1	3	1	2	2	1	2	4	2	1	1	5	6	1	2											
Total	26	36		56	4	2	13	41	8								1	3	3	4	2	1	4	9	14	4		5	7	8	9	8	1	6	1	1	4	2				
V. RESPIRATION.																																										
1. Acute Bronchitis	9	5		13	1		11	2	1																																	
2. Chronic Bronchitis	2	4		5	1		6																																			
3. Broncho-pneumonia	8	6		14			13	1																																		
4. Pneumonia	34	30		59	5		36	24	4																																	
5. Pleurisy	1																																									
6. Congestion of the Lungs	5	4		9			7	1	1																																	
7. Asthma and Emphysema		1		1																																						
8. Other Dis. s. of Respiratory System.																																										
Total	59	50		102	7		67	36	6								2	3	2	1	4	2	2	4	5	17	2	14	18	16	20	8	5	5	7	4	3	4	5			
VI. DIGESTIVE SYSTEM.																																										
1. Ulcer of the Stomach																																										
2. Other Dis. s. of Stomach (cancer except'd)		2																																								
3. Infant. Diarr. & Cholera Infantum	19	12		31			31																																			
4. Diarrhoea & Enteritis (not infantile)	7	7		9	4		7																																			
5. Dysentery	1			1																																						
6. Hernia and Intestinal obstructions.	3	2		5			1	2																																		
7. Other Diseases of the Intestines																																										
8. Diseases of the Liver	4			3	1		1	1	2																																	
9. Peritonitis (not puerperal)	2	1		3			1	1	1																																	
10. Iliac abscess and appendicitis	3	5		8			7	1																																		
Total	38	30		62	5	1	50	12	6								1	2	3	9	1	4	1	1	3	2	2	4	18	16	20	8	5	5	7	4	3	4	5			
VII. GENITO-URINARY SYSTEM																																										
1. Acute Nephritis																																										
2. Bright's Disease	20	10		21	9		4	22	4																																	
3. Other Dis. s. of Kidneys and Adnexa																																										
4. Vesical Calculi																																										
5. Diseases of the Bladder	3			1	1		2																																			
6. Dis. s. of the Male Genital Organs ..																																										
7. Metritis																																										
8. Other Diseases of the Uterus																																										
9. Ovarian Cysts & Ovarian Tumors ..																																										
10. Other Dis. s. of Fem. Genital Organs																																										
Total	23	10		22	10	1	6	23	4								2	1	2	2	8	10	4	2	1	2	5	3	4	5	3	3	4	5	1	3	2					

VIII. PUERPERAL DISEASES.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1.	Puerperal Septicæmia	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
2.	Puerperal Albuminuria & Convul.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
3.	Other acc of Preg., sudden death.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
4.	Puerperal Disease of the Breast.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Total		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
IX. THE SKIN.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1.	Erysipelas	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
2.	Skin and Adnexa (cancer excepted)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Total		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
X. LOCOMOTOR SYSTEM.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1.	Pott's Disease	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
2.	Diseases of the Bones and Joints	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
3.	Amputation (for unspecified Dis.)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Total		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	9	

WATERLOO.—Continued.

Number of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41		
IX. THE SKIN.																																											
1. Erysipelas	1	2		2	1		2	1	2																																		
2. Skin and Adnexa (cancer excepted)																																											
Total	1	2		2	1		2	1	2																																		
X. LOCOMOTOR SYSTEM.																																											
1. Pott's Disease																																											
2. Diseases of the Bones and Joints	1			1			1				1																																
3. Amputation (for unspecified Dis's)																																											
Total	1			1			1				1																																
XI. MALFORMATIONS, ETC.																																											
1. Still-Births	8	11	1	20			20			20																																	
2. Congen. Deblity & Malformations	23	17		40			40			40																																	
3. Other Diseases of Infancy	1			1			1			1																																	
4. Senile Decay	55	26		9	72		257	22																																			
Total	87	54	1	70	72		63	57	22	60	1																																
XII. SUICIDE.																																											
1. Poison																																											
2. Strangulation																																											
3. Gas Poisoning																																											
4. Drowning																																											
5. Firearms																																											
Total																																											
XIII. ACCIDENTS.																																											
1. Fractures and Dislocations	7	1		6	1		4	4																																			
2. Gunshot	1			1			1																																				
3. Electric Cars	1			1			1																																				
4. Railways	8			2	1		1	2																																			
5. Burns and Scalds	1	2		2	1		2	1																																			
6. Suffocation	1	2		3			2	1		2																																	
7. Poison		1		1			1																																				
Total	14	6		16	3		10	6	4	2	1	1																															
XIV. ILL-DEFINED CAUSES.																																											
1. Dropsy	3	3		2	4		4	2																																			
2. Tumors	2	1		2	1		2	1																																			
3. Other Ill-Defined Causes		1		1			1																																				
Total	5	5		5	5		7	3																																			
Total from all causes.	337	281	1	395	215	9	268	264	27	128	18	17	13	30	17	18	17	19	20	36	62	103	70	6	58	59	67	44	51	51	48	51	51	48	61	51	44	52	619				

2. Endocarditis.....	12	4	8	7	1	7	7	2	1	1	2	4	1	1	1	2	3	1	1	2	3	1	1	1	2	1	2	16													
3. Organic Heart Disease.....	115	148	133	124	6	66	175	22	1	7	8	9	11	7	12	12	21	38	66	52	8	3	36	24	22	14	29	16	14	19	22	16	28								
4. Angina Pectoris.....	4	2	2	3	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6								
5. Arteries, Atheroma, Aneurism, etc.	12	12	14	9	1	12	11	1	1	2	1	4	2	3	3	4	3	4	4	4	1	1	4	2	2	3	3	2	3	3	2	4	24								
6. Other Dis. of Circulatory System..	13	15	15	13	4	4	20	4	2	2	2	2	2	2	2	2	2	2	2	2	1	1	4	2	2	3	3	3	2	4	28										
V. RESPIRATION. Total.....	167	182	174	166	9	91	218	30	1	11	10	10	13	15	9	16	17	29	59	79	56	8	5	45	30	32	26	19	30	21	23	26	31	20	36	339					
1. Acute Bronchitis.....	38	39	59	14	1	55	19	5	39	8	3	1	3	1	1	2	2	2	2	17	13	8	1	8	14	18	10	5	5	1	4	4	3	2	74						
2. Chronic Bronchitis.....	19	29	10	14	5	33	10	1	23	11	6	2	4	1	2	2	2	2	2	6	5	6	11	15	6	8	5	2	2	2	4	8	10	7	48						
3. Broncho-pneumonia.....	37	37	54	17	3	50	19	5	25	7	9	2	2	8	3	16	11	16	13	40	42	32	11	51	34	46	22	17	15	7	2	12	9	31	21	267					
4. Pneumonia.....	154	113	169	106	2	100	161	16	3	3	3	3	2	1	1	1	1	1	1	2	2	1	1	5	3	4	6	2	1	2	2	2	2	1	2	66					
5. Pleurisy.....	2	4	3	3	3	1	3	2	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	6	1	1	3	1	1	1	1	1	1	1	4	6				
6. Congestion of the Lungs.....	9	12	8	11	2	6	14	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	6	1	1	3	1	1	1	1	1	1	1	4	21				
7. Asthma and Emphysema.....	11	10	8	13	2	15	4	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	21				
8. Other Dis. of Respiratory System..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
VI. DIGESTIVE SYSTEM. Total.....	270	242	302	202	8	219	256	38	93	27	19	5	6	12	3	8	20	12	6	21	19	17	59	67	75	41	2	81	72	94	43	34	31	12	5	25	22	50	43	512	
1. Ulcer of the Stomach.....	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	
2. Other Dis. of Stomach (except'd)	8	11	10	8	1	126	9	4	124	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
3. Infan. Diarr. & Cholera Infantum.	76	50	126	6	2	9	2	2	6	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	126
4. Diarrhoea & Enteritis (not infantile)	6	5	3	7	1	3	6	2	6	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11	
5. Dysentery.....	9	6	9	6	6	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	
6. Hernia and Intestinal obstructions.	4	4	5	3	5	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8	
7. Other Diseases of the Intestines...	16	14	12	16	2	4	25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	30		
8. Diseases of the Liver.....	20	24	31	12	1	23	18	3	5	1	3	1	2	4	6	5	2	1	2	6	4	1	1	5	5	2	1	5	4	3	3	4	5	3	4	5	3	4	4	44	
9. Peritonitis (not puerperal).....	19	10	22	6	1	17	9	3	1	2	3	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	29	
10. Iliac abscess and appendicitis.....	103	132	221	67	7	201	80	14	129	3	1	2	8	8	9	15	14	8	13	6	20	29	14	7	16	12	14	25	21	19	52	64	37	42	15	18	295				
VII. GENITO-URINARY SYSTEM. Total.....	110	10	17	3	1	9	10	2	11	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	21	
1. Acute Nephritis.....	61	39	53	47	19	68	13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100	
2. Bright's Disease.....	7	4	5	11	1	3	9	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12		
3. Other Dis. of Kidneys and Adnexa.	4	4	1	3	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	
4. Vesical Calculi.....	26	3	11	16	2	3	20	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	
5. Diseases of the Bladder.....	6	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6. Dis. of the male Genital Organs...	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7. Metritis.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8. Other Diseases of the Uterus...	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9. Ovarian Cysts & Ovarian Tumors...	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
10. Other Dis. of fem. Genital Organs.	3	3	2	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3		
VIII. PUERPERAL DISEASES. Total.....	105	65	95	71	4	36	113	21	1	2	2	5	7	6	9	5	9	15	7	24	24	38	16	14	11	19	13	14	17	14	16	6	16	17	13	170					
1. Puerperal Septicæmia.....	12	10	7	5	1	11	1	1	3	2	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12		
2. Puerperal Albuminuria and Convul.	6	1	1	5	1	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		
3. Other acc. of Puerp., sudden death.	12	7	7	5	1	12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12		
4. Puerperal Diseases of the Breast...	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Total.....	30	15	15	15	2	28	2	2	15	15																															

YORK.—Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41					
IX. THE SKIN.																																														
1. Erysipelas							7	4			4	1										1																								
2. Skin and Adnexa (cancer excepted)																																														
X. LOCOMOTOR SYSTEM.																																														
1. Pott's Disease				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2. Disease of Bones and Joints																																														
3. Amputation (for unspecified Dis.)																																														
XI. MALFORMATIONS, ETC.																																														
1. Still Births	123	72	7	202		202	202			202	202																																			
2. Congen. Deblity & Malformations	205	189	394	394		394	394			394	394																																			
3. Other Diseases of Infancy	3	3	6	1		6	6			6	6																																			
4. Senile Decay	147	153	60	233	7	12	239	49																																						
XII. SUICIDE.																																														
1. Poison	478	417	7	661	234	7	614	239	49	596	3	3																																		
2. Strangulation	3	1	1	2		2	3																																							
3. Firearms	4			3	1		2																																							
8. 1.	8	1		1	2		2	7																																						
XIII. ACCIDENTS.																																														
1. Fractures and Dislocations	41	13		32	19	3	18	29	7																																					
2. Gunshot	6	2		6	2		7	1																																						
3. Lightning	15	1		10	5	1	15	1																																						
4. Drowning	7	2		6	2	1	6	3	1																																					
5. Electric Cars	2			2	1	1	1																																							
6. Railways	7	2		6	2	1	6	3	1																																					
7. Burns and Scalds	2	3		5	3	1	4	1																																						
8. Accidental Suffocation	4	7		5	3	1	2	6	1																																					
9. Poison	84	30		67	37	10	55	50	9	1																																				
XIV. ILL-DEFINED CAUSES.																																														
1. Dropsy	4	2		4	2		5	1																																						
2. Tumors	14	19		19	12	2	11	20	2																																					
3. Other Ill-Defined Causes	11	9		13	4	3	11	6	3	1																																				
4. Lockjaw	2						1	1																																						
5. Murder	1						1	1																																						
Total	32	30		36	21	5	23	32	7	1																																				
Total from all causes	2170	2062	7	2820	1336	83	2219	1730	290	1046	105	70	65	163	79	127	186	147	138	172	157	156	337	409	509	293	31	449	359	417	371	358	336	346	319	314	300	323	347	4239						

CAUSES OF DEATHS BY CITIES IN 1901—BRANTFORD—POPULATION, 16,619.

General Diseases.	Sex.		Nativity.		Soc'l con.		Ages.													Months.												Total.							
	Male.	Female.	Canada.	Foreign.	Single.	Married.	Under 5.						Ages.							Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.								
							0-1.	1-2.	2-3.	3-4.	4-5.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.														50-54.	55-59.	60-69.	70-79.	80 & over.	Not given.	
I. COMMUNICABLE DISEASES.																																							
Number of Columns.																																							
1. Typhoid Fever.....																																							
2. Smallpox.....	3	3		3	4																																		
3. Measles.....																																							
4. Scarlet Fever.....																																							
5. Whooping Cough.....																																							
6. Diphtheria and Croup.....	4	4		4	4																																		
7. Influenza.....	4	1		3	2																																		
8. Other Epidemic Diseases.....																																							
II. OTHER GENERAL DISEASES.																																							
Total.....																																							
1. Pyæmia and Septicæmia.....	7	8		10	5																																		
2. Malarial Fever.....	1	4		3	1																																		
3. Tuberculosis and Scrofula.....	17	18		32	1																																		
4. Syphilis.....																																							
5. Cancer.....	5	2		3	1																																		
6. Rheumatism and Gout.....	3	1		3	2																																		
7. Diabetes.....	1	1		1	1																																		
8. Other General Diseases.....	1	1		1	1																																		
9. Alcoholism, Acute and Chronic.....																																							
Total.....																																							
Local Diseases.																																							
III. NERVOUS SYSTEM.																																							
1. Encephalitis.....	3	1		2	2																																		
2. Simple Meningitis.....	1	3		4	4																																		
3. Epidemic Cerebro-spinal Meningitis.....	2	1		3	3																																		
4. Congestion & Hemorrhage of Brain.....	4	6		6	2																																		
5. Softening of Brain.....																																							
6. Paralysis without specific cause.....	4			1	2																																		
7. Insanity.....																																							
8. Epilepsy.....	1																																						
9. Convulsions (not puerperal).....	4	3		7	1																																		
10. Other Nervous Diseases.....	1	1			1																																		
Total.....																																							

GUELPH.—Continued.

	79	77	103	1	71	81	4	33	1	11	3	5	4	10	8	13	12	29	11	21	12	21	15	13	6	11	11	13	34	35	36	37	38	39	40	41		
Number of Column.																																						
IX. THE SKIN.																																						
1. Erysipelas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2. Skin and Adnexa (cancer excepted).																																						
Total	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
X. LOCOMOTOR SYSTEM.																																						
1. Pott's Disease																																						
2. Diseases of Bones and Joints																																						
3. Amputation (for unspecified Dis.)																																						
Total																																						
XI. MALFORMATIONS, ETC.																																						
1. Still-births	1	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
2. Congen. Debility & Malformations	8	6	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
3. Other Diseases of Infancy	3	5	1	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7		
4. Senile Decay																																						
Total	12	17	22	7	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21		
XII. SUICIDE.																																						
1. Poison																																						
2. Strangulation																																						
3. Gas Poisoning																																						
4. Drowning																																						
5. Firearms																																						
Total																																						
XIII. ACCIDENTS.																																						
1. Fractures and Dislocations	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
2. Gunshot																																						
3. Electric Cars																																						
4. Bicycles	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
5. Railways	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
6. Burns and Scalds	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
Total	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
XIV. ILL-DEFINED CAUSES.																																						
1. Dropsy																																						
2. Tumors	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
3. Other Ill-defined Causes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
4. Lockjaw	1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
Total	1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
Total from all causes.	79	77	103	1	71	81	4	33	1	11	3	5	4	10	8	13	12	29	11	21	12	21	15	13	6	11	11	13	34	35	36	37	38	39	40	41		

CITY OF KINGSTON. — Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
IX. THE SKIN.																																										
1. Erysipelas.....																																										
2. Skin and Adnexa (cancer excepted)																																										
Total.....																																										
X. LOCOMOTOR SYSTEM.																																										
1. Pott's Disease.....																																										
2. Disease of Bones and Joints.....																																										
3. Amputation (for unspecified Dis.)...																																										
Total.....																																										
XI. MALFORMATIONS, ETC.																																										
1. Still-Births.....	3	3	1	7			7			7																			1	2	1	2	1	1	1	1	1	1	1	7		
2. Congen. Debility & Malformations.	11	12		23			23			23																			1	1	1	7	3	1	1	1	1	1	1	23		
3. Other Diseases of Infancy.....	18	39		15	41	1	6	44	7																			7	6	8	7	2	3	6	5	3	2	6	57			
4. Senile Decay.....	32	54	1	45	41	1	36	44	7	30																		8	8	9	16	7	4	3	7	6	8	4	87			
Total.....																																										
XII. SUICIDE.																																										
1. Poison.....				1			1																																			
2. Strangulation.....																																										
3. Gas Poisoning.....																																										
4. Drowning.....																																										
Total.....																																										
XIII. ACCIDENTS.																																										
1. Fractures and Dislocations.....	4	2		2	4																																					
2. Gunshot.....																																										
3. Lightning.....																																										
4. Drowning.....	2			2			1	1																																		
5. Railways.....																																										
6. Burns and Scalds.....																																										
Total.....	6	2		4	4		1	6	1																																	
XIV. ILL DEFINED CAUSES.																																										
1. Dropsy.....	1	6		2	5		2	4	1																																	
2. Tumors.....	1	3		3	1		2	2																																		
3. Other Ill-Defined Causes.....																																										
4. Anthrax.....																																										
Total.....	2	9		5	6		4	6	1																																	
Total from all causes.....	172	205	1	238	115	5	177	176	25	82	3	7	4	3	6	7	19	15	11	11	14	14	12	35	45	45	41	46	40	35	41	22	19	31	35	36	21	37	378			

ST. THOMAS.—Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
IX. THE SKIN.																																										
1. Erysipela.....																																										
2. Skin and Adnexa (cancer excepted)																																										
X. LOCOMOTOR SYSTEM.																																										
1. Pott's Disease.....																																										
2. Diseases of Bones and Joints.....																																										
3. Amputation (for unspecified Dis.).....																																										
Total.....																																										
XI. MALFORMATIONS, ETC.																																										
1. Still-Births.....	6	3	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
2. Congen. Debility & Malformations.	2	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
3. Other Diseases of Infancy.....	14	6	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21		
4. Senile Decay.....																																										
Total.....																																										
XII. SUICIDE.																																										
1. Poison.....																																										
2. Strangulation.....																																										
3. Gas Poisoning.....																																										
4. Drowning.....																																										
5. Firearms.....																																										
Total.....																																										
XIII. ACCIDENTS.																																										
1. Fractures and Dislocations.....	7		3	4	4	4	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		
2. Gunshot.....																																										
3. Lightning.....																																										
4. Drowning.....	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
5. Electric Cars.....																																										
6. Bicycles.....																																										
7. Railways.....	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
8. Burns and Scalds.....																																										
9. Homicide.....																																										
Total.....																																										
XIV. ILL-DEFINED CAUSES.																																										
1. Dropsy.....	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
2. Tumors.....																																										
3. Other Ill-Defined Causes.....																																										
Total.....																																										
Total from all causes.																																										
	94	73	107	59	1	68	95	4	24	3	1	1	2	4	4	9	10	4	6	9	8	12	27	19	24	18	17	25	13	13	8	9	15	21	5	11	167					

TORONTO.—Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
IX. THE SKIN.																																										
1. Erysipelas																																										
2. Skin and Adnexa (cancer excepted)																																										
Total																																										
X. LOCOMOTOR SYSTEM.																																										
1. Pott's Disease																																										
2. Disease of Bones and Joints																																										
3. Amputation (for unsusped Dis.)																																										
Total																																										
XI. MALFORMATIONS, ETC.																																										
1. Still-Births	104	64	7	175																																						
2. Congen. Debility & Malformations	169	147	316																																							
3. Other Diseases of Infancy	2	3	4	1																																						
4. Senile Decay	107	106		26	181	6	6	167	40																																	
Total	382	320	7	521	182	6	502	167	40	491	3	2																														
XII. SUICIDE.																																										
1. Poison	3			1		2		3																																		
2. Strangulation		1					1																																			
3. Gas Poisoning																																										
4. Drowning																																										
5. Firearms	2			2																																						
Total	5	1		4		2		5																																		
XIII. ACCIDENTS.																																										
1. Fractures and Dislocations	36	9		27	15	3	14	24	7																																	
2. Gunshot	3	2		3	2		4	1																																		
3. Drowning	12			9	2		12																																			
4. Electric Cars				1	1		1																																			
5. Bicycles																																										
6. Railways	2	1		2	1		3	1																																		
7. Burns and Scalds	2	2		4	1		3	1																																		
8. Poison	4	5		1	5	3	2	7																																		
9. Suffocation	7	2		5	3	1	2	6	1																																	
Total	68	21		51	28	10	40	40	9																																	
XIV. ILL-DEFINED CAUSES.																																										
1. Dropsy	3	1		3	1			3	1																																	
2. Tumors	7	16		13	8	2	8	13	2																																	
3. Other Ill-Defined Causes	8	8		9	4	3	9	4	3																																	
4. Lockjaw	1			1	1		1	1																																		
5. Murder	1			1	1		1	1																																		
Total	20	25		25	15	5	18	21	6																																	
Total from all causes	1748	1667	7	2234	1109	79	1851	1314	257	886	93	61	50	41	132	60	107	155	118	117	136	132	128	308	383	201	29	363	276	331	293	287	270	292	260	257	245	270	278	3422		

SAULT STE. MARIE. — Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
IX. THE SKIN.																																									
1. Erysipelas																																									
2. Skin and Adnexa (cancer excepted)																																									
Total																																									
X. LOCOMOTOR SYSTEM.																																									
1. Pott's Disease																																									
2. Disease of Bones and Joints																																									
3. Amputation (for unspec fied Dis.)																																									
Total																																									
XI. MALFORMATIONS, ETC.																																									
1. Still-Births	2	1		3			3			3																															3
2. Congen. Deblity & Malformations	5	3		8			8			8																														8	
3. Other Diseases of Infancy		3					2	1																																3	
4. Senile Decay																																									
Total																																									
XII. SUICIDE.																																									
1. Poison																																									
2. Strangulation																																									
3. Gas Poisoning																																									
4. Drowning																																									
5. Firearms																																									
Total																																									
XIII. ACCIDENTS.																																									
1. Fractures and Dislocations	8			3	3	2	2	2	4																																
2. Gunshot	1						1																																		
3. Drowning	5	1		5	1		6																																		
4. Electric Cars											2																														
5. Bicycles	3																																								
6. Railways																																									
7. Burns and Scalds																																									
8. Poison	1																																								
Total																																									
XIV. ILL-DEFINED CAUSES.																																									
1. Tumors	1																																								
2. Other Ill-Defined Causes	3	1		2	2		2	2																																	
3. Murder	1																																								
Total																																									
Total from all causes.																																									
66	41		76	16	15	66	21	20		27	5	3	2	2	5	10	2	12	4	4	3	2	7	5	3	3	3	6	5	7	6	6	5	12	12	9	17	11	6	107	

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