No. 11.

PROCEEDINGS

OF THE

ASSOCIATION

OF

Ontario Land Surveyors

At its Fourth Meeting since Incorporation

HELD AT

Toronto, 25th, 26th and 27th February

1896

Being the Eleventh Annual Meeting of the Association of Land Surveyors for Ontario.

The Fifth Annual Meeting (Twelfth Annual Meeting of the Association of Land Surveyors for Ontario) will be held in Toronto, commencing on Tuesday, 23rd of February, 1897.

PRINTED FOR THE ASSOCIATION BY
C. BLACKETT ROBINSON, 5 JORDAN STREET,
TORONTO

NOTICES.

The attention of members is called to the lists of Standing and Special Committees appearing on page 6, and in particular to the Committee on Legislation. The work to be done by this committee during the decennial revision of the Ontario Statutes (1897) being of vital importance, each member of the Association should be on the alert to render any assistance in his power.

Members and others can be supplied with copies of the Proceedings for 1886, 1887, 1888, 1889, 1891, 1892, 1893, 1894 or 1895, by remitting fifty cents to the Secretary for each copy required.

Extra copies of Mr. Esten's "Head Notes of Reported Land Cases" have been printed for the Association, and may be obtained from the Secretary at a cost of fifty cents.

The Appendix contains a general index, in alphabetical order, of the contents of this and the ten preceding Annual Reports.

Amongst the more valuable contributions to the Repository during the past year may be noted "Ye Compleat Surveyor," A.D. 1653, presented by Mr. Unwin; "Chart of the Oriental Ocean" (published in Paris in 1653), also "Carte Polaire Artique" (published in Paris, 1774), both presented by Mr. J. J. Francis; six large illustrated volumes of Engineering Works, presented by Mr. Gaviller; several ancient works on Mathematics, presented by Mr. Chipman; Hydrographic Charts of the Great Lakes, presented by Mr. Sankey; a number of pamphlets on Forestry and other matters, by Prof. Bell, of the Geological Survey Department, Ottawa; a pamphlet on Russian Forestry, translated by Mr. A. Kirkwood, of the Crown Lands Department of Ontario, besides a large number of contributions from other donors.

Published annually by the Association of Ontario Land Surveyors.
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PATRONIZE OUR ADVERTISERS.

PREFACE.

To the Members of the Association of Ontario Land Surveyors :

The Proceedings of the Association at its Fourth Annual Meeting since incorporation, together with valuable matter in the Appendix, are herewith presented.

We have again to congratulate ourselves upon having had active and earnest members on the various committees, and to express the hope that the current year may show an advance in that direction.

Respectfully submitted on behalf of the Council,

A. J. VANNOSTRAND,

Secretary.

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ASSOCIATION OF

ONTARIO LAND SURVEYORS

(Incorporated 1892).

ORGANIZED 23RD FEBRUARY, 1886.

Officers for 1896-97.

PRESIDENT.

Willis Chipman, O.L.S., Toronto.

VICE-PRESIDENT.

T. Harry Jones, O L.S., Brantford.

CHAIRMAN OF COUNCIL.

Villiers Sankey, O.L.S., Toronto.

SECRETARY-TREASURER.

A. J. VanNostrand, O.L.S., Toronto.

MEMBERS OF COUNCIL.

Hon. A. S. Hardy, Commissioner of Crown Lands.

Geo. B. Kirkpatrick, Toronto,
Alex. Niven, Haliburton, } For 3 years.

P. S. Gibson, Willowdale,
F. L. Foster, Toronto, } For 2 years.

Villiers Sankey, Toronto,
Herbert J. Bowman, Berlin, } For 1 year.

AUDITORS.

A. P. Walker, Toronto.
Geo. Ross, Welland.

BANKERS.

Imperial Bank of Canada (Yonge Street Branch, Toronto).

BOARD OF EXAMINERS.

Villiers Sankey, Toronto, Chairman.
M. J. Butler, Napanee, } Appointed by Lieut.-Gov.
Geo. B. Kirkpatrick, Toronto, } in Council.
P. S. Gibson, Willowdale, } For 2 years, appointed by
Alex. Niven, Haliburton, } Council of Management.
M. Gaviller, Collingwood, } For 1 year, appointed by
R. Coad, Glencoe, } Council of Management.

STANDING COMMITTEES, 1896.

LAND SURVEYING.—J. L. Morris (Chairman), C F. Aylsworth, Jun., C. C. Fairchild, Wm. Galbraith, W. L. Innes, C. A. Jones, John McLatchie, John Roger, L. V. Rorke.

DRAINAGE —B. J. Saunders (Chairman), C. A. Bigger, Lewis Bolton, W. R. Burke, C. E. Fitton, J. S. Laird, O. McKay, W. G. McGeorge, Jas. Robertson.

ENGINEERING.—Jos. DeGurse (Chairman), E. G. Barrow, T. O. Bolger, A. W. Campbell, W. M. Davis, Jas. Hutcheon, J. M. Moore, A P. Walker.

ENTERTAINMENT.—T. B. Speight (Chairman), R P. Fairbairn, W. E. McMullen, C. F. Miles, C. J. Murphy, Villiers Sankey, A P. Walker.

PUBLICATION —Killaly Gamble (Chairman), W. A. Browne, F. L. Foster, H. H. Gibson, C. J. Murphy.

TOPOGRAPHICAL SURVEY.—Otto J. Klotz (Chairman), G. B. Abrey, M. J. Butler, Thos. Fawcett, John McAree, L. B. Stewart, F. W. Wilkins.

SPECIAL COMMITTEES, 1896.

LEGISLATION.—Willis Chipman (Chairman), Herbert J. Bowman, Jos. DeGurse, F. L. Foster, P. S. Gibson, T. H. Jones, Geo. B. Kirkpatrick, Otto J. Klotz, J. L. Morris, A Niven, Villiers Sankey, B J. Saunders.

POLAR RESEARCH.—J. W. Tyrrell (Chairman), M. W. Hopkins, W. Ogilvie, J. A Paterson, L. B. Stewart, Jas Whitson.

STANDARD MEASURES OF LENGTH —M. J. Butler (Chairman), Geo. B. Abrey, H. J. Browne, Villiers Sankey, L B. Stewart, H. K. Wicksteed.

REPOSITORY AND BIOGRAPHY.—H. L. Esten (Chairman), W. R. Aylsworth, Walter Beatty, Geo. B. Kirkpatrick, F. H. Lynch-Staunton, Charles Unwin, V. B. Wadsworth.

EXPLORATION IN ONTARIO.—E. Stewart (Chairman), T. R. Deacon, R. W. DeMorest, James Dickson, A. Niven, H. B. Proudfoot, A. L. Russell.

RE CIVIL ENGINEERS' BILL.—Willis Chipman (Chairman), Herbert J. Bowman, M. J. Butler, A. W. Campbell, Jos. DeGurse, Geo. B. Kirkpatrick, Villiers Sankey, A. J. VanNostrand.

PROGRAMME OF THE

Association of Ontario Land Surveyors

(INCORPORATED),

AT ITS FOURTH ANNUAL MEETING HELD IN TORONTO, FEBRUARY 25TH, 26TH AND 27TH, 1896.

PROGRAMME.

Tuesday, 25th February—Morning at 10 o'clock,

AT THE REPOSITORY, PARLIAMENT BUILDINGS.

Meeting of Council.
Meeting of Standing and Special Committees.

Afternoon at 2 o'clock.

Reading of Minutes of previous meeting.
Reading of Correspondence.
Report of Council of Management (including Reports of Board of Examiners and Secretary-Treasurer). V. Sankey, O.L.S, Chairman, Toronto.
Report of Committee on Publication. K. Gamble, O L.S., Chairman, Toronto.
Report of Committee on Biography. Geo. B. Kirkpatrick, O.L S, Chairman, Toronto.
Report of Committee on Polar Research. Willis Chipman, O.L S., C.E., Chairman, Toronto.
President's Address.
Paper—"Artesian Wells." V. M. Roberts, O.L S., C.E., St. Catharines.
Paper—"The Use of Concrete in Bridge Foundations." J. DeGurse, O.L.S., C.E., Windsor.
Paper—"Some Notes on Concrete and its application to various works." M. J. Butler, O.L.S, C E., Napanee.
Paper—"The Maintenance of a Separate Sewerage System." T. Harry Jones, O.L.S., C.E., Brantford.

Evening at 8 o'clock.

AT THE SCHOOL OF PRACTICAL SCIENCE.

Paper—"The Engineering Field of America." A. R. Davis, O.L.S., C.E., Napanee.
Paper—"Notes on Some New Jersey Roads." T. B. Speight, O.L.S., Toronto.
Paper—"Road Metal." Herbert J. Bowman, O.L.S., C.E., Berlin.

Wednesday, 26th February—Morning at 10 o'clock.

AT THE CANADIAN INSTITUTE, 58 RICHMOND STREET EAST.

Report of Committee on Drainage, with Question Drawer. George Ross, O.L.S., C.E., Chairman, Welland.

Paper—"The Ditches and Water Courses Act of 1894." B. J. Saunders, O.L.S., C.E., Brockville.

Report of Committee on Topographical Surveying. Willis Chipman, O.L.S., C.E., Chairman, Toronto.

Paper—"Ontario Boundaries" A. Niven, O.L.S., Haliburton.

Paper—"Sectional Surveys." P. S. Gibson, O.L.S., C.E., Willowdale.

Afternoon at 2 o'clock.

Report of Committee on Land Surveying, with Question Drawer. T. B. Speight, O.L.S., Toronto, Chairman.

Paper—"Crown Surveys." James Dickson, O.L.S., Fenelon Falls.

Paper—"Natural Boundaries." A. P. Walker, O.L.S., C.E., Toronto.

Paper—"A Road or Not a Road" M. Gaviller, O.L.S., Collingwood.

Evening at 8 o'clock.

ANNUAL DINNER

AT MCCONKEY'S.

H. D. Ellis, O.L.S., Chairman of Committee on Entertainment.

Thursday, 27th February—Morning at 10 o'clock.

Report of Auditors.

Report of Committee on Standard Measures. M. J. Butler, O.L.S., C.E., Chairman, Napanee.

Report of Committee on Engineering. Herbert J. Bowman, O.L.S., C.E., Chairman, Berlin.

Paper—"An Exploration Survey in the Barren Lands." J. W. Tyrrell, O.L.S., C.E., Hamilton.

Paper—"The Route of the Proposed Sault Ste. Marie and James' Bay Railway." Jos. Cozens, O.L.S., Sault Ste. Marie.

Paper—"Field Testing of Minerals, and the Value of a Course of Instruction." W. Hamilton Merritt, M.E., Toronto.

Afternoon at 2 o'clock.

Report of Committee on Entertainment. H. D. Ellis, O.L.S., C.E., Chairman, Toronto.

Ratification of New By-Laws.

Unfinished Business.

New Business.

Nomination of Officers (President, Vice-President, Two Members of Council, Secretary-Treasurer and Auditors).

Appointment of Scrutineers.

Adjournment.

Evening at 8 o'clock.

PEARY'S LECTURE.

At Association Hall, cor. Yonge and McGill Streets, Lecture by Lieut. R. E. Peary, the Arctic Explorer.

ASSOCIATION OF

ONTARIO LAND SURVEYORS

(INCORPORATED 1892).

MINUTES OF THE FOURTH ANNUAL MEETING

(Eleventh Annual Meeting of Provincial Land Surveyors of Ontario),

FEBRUARY 25th, 26th and 27th, 1896.

The meeting opened at the Repository of the Association, in the Parliament Buildings, at 2.30 o'clock p.m. ; the President, Mr. M. Gaviller, in the chair.

Among the members present there were: Messrs. G. B. Kirkpatrick, Toronto ; Mr. Gaviller, Collingwood ; H. DeQ. Sewell, Port Arthur ; K. Gamble, A. J. VanNostrand, H. W. Selby, Toronto ; A. Niven, Haliburton ; George Ross, Welland ; R. P. Fairbairn, Toronto ; J. W. Tyrrell, Hamilton ; G. B. Abrey, Toronto ; T. B. Speight, Toronto ; H. J. Bowman, Berlin ; J. Warren, Walkerton ; M. J. Butler, Napanee ; James Dickson, Fenelon Falls ; V. Sankey, Toronto.

It was moved and adopted that the Minutes of the previous meeting, as printed in the last Annual Report, be taken as read.

The Secretary-Treasurer's Report was presented by the Chairman of the Council, Mr. V. Sankey, who moved its adoption. Seconded by Mr. Niven and carried.

The Report of the Committee on Publication was presented by the Chairman of the Committee, Captain K. Gamble, who moved its adoption. Seconded by Mr. Niven and adopted.

The Report of the Committee on Biography was then read by the Chairman of the Committee, Mr. Kirkpatrick, who moved its adoption. Seconded by Mr. H. W. Selby and adopted.

The President read his address which was received with applause.

On motion of Mr. A. Niven, seconded by Mr. Sewell, a vote of thanks was tendered by the meeting to the President for his able address.

A paper on "Artesian Wells" by Mr. V. M. Roberts, C.E., of St. Catharines, was omitted in consequence of his indisposition.

"The Use of Concrete in Bridge Foundations" was the title of a paper presented by Mr. J. DeGurse, of Windsor, and read by Mr. Herbert J. Bowman, of Berlin.

It was moved by Mr. G. B. Abrey, seconded by Mr. Butler and carried, that the discussion on this paper be postponed until Mr. Butler's paper on "Some Notes on Concrete and its Application to Various Works," be read.

The Report of the Committee on Drainage was then presented to the Association by Mr. George Ross, of Welland. The Question Drawer was held over until the morning session.

Mr. Butler reported the work that had been accomplished by the Committee on Standard Measures, and read correspondence which had been received from various Departments in the Governments at Ottawa and Toronto.

Mr. Sankey moved that the Committee be asked to continue their work on the lines suggested by the mover in discussing the report of Mr. Butler. Seconded by Mr. George Ross and carried.

At 4:30 o'clock p.m. the meeting was adjourned until 8 p.m., to meet at the School of Practical Science.

At 8:30 o'clock p m. the meeting re-opened; the President, Mr. Gaviller, in the chair.

"The Maintenance of a Separate Sewerage System" was the title of a paper read by Mr. T. Harry Jones, of Brantford.

Mr. M. J. Butler, of Napanee, then presented his paper on "Some Notes on Concrete and its Application to Various Works."

A paper on "Road Metal" was presented by Mr. Herbert J. Bowman, of Berlin.

At 10 p.m. the meeting adjourned.

Second Day.

On 26th February, 1896, at 10 o'clock a.m., the meeting opened at the Canadian Institute, the President in the chair.

Among the members present there were: Messrs. M. J. Butler, Napanee; Peter S. Gibson, Willowdale; James Dickson, Fenelon

Falls; Willis Chipman, Toronto; George Ross, Welland; A. J. Van-Nostrand, Toronto; K. Gamble, Toronto; H. DeQ. Sewell, Port Arthur; T. B. Speight, Toronto; A Niven, Haliburton; Mr. J. Warren, Walkerton; J. W. Tyrrell, Hamilton; G. B. Abrey, Toronto; H. J. Bowman, Berlin; T. Harry Jones, Brantford; V. Sankey, and others.

The President, Mr. Gaviller, announced the receipt of Report No. 2 of the Association of P. L. S of British Columbia.

A paper, read by Mr. T B. Speight, of Toronto, on "Notes on some New Jersey Roads" was received with applause.

The Secretary was instructed to have extra copies made of this paper.

The Report of the Committee on Drainage, with the Question Drawer, was then taken up for discussion.

It was moved by Mr. P. S. Gibson, seconded by Mr. M. J. Butler, that the report be received. Carried.

The Report of the Committee on Topographical Surveying was presented by Mr. M. J. Butler, who moved the adoption of the Report. It was seconded by Mr. Niven, and carried.

At 12 o'clock noon the meeting adjourned until 2 o'clock p.m.

At 2 o'clock p.m. the meeting re-opened; the President, Mr. Gaviller, in the chair.

Mr. A. Niven, of Haliburton, was then called upon to read his paper on "Ontario Boundaries," which was received with great applause.

"Sectional Surveys" was the subject of a paper presented by Mr. P. S Gibson, of Willowdale.

The Report of the Committee on Land Surveying was deferred until Thursday morning.

The Report of the Committee on "Polar Research" was then presented by Mr. Willis Chipman, of Toronto, who moved its adoption. It was seconded by Mr. Niven and carried.

Report of the Council of Management, including Reports of Board of Examiners and Secretary-Treasurer, presented by Mr. V. Sankey, Chairman of Council, were received and adopted.

It was moved by Mr. V. Sankey, seconded by Mr. E. Stewart, and adopted, that Captain K. Gamble act as Auditor in the place of Mr. Proudfoot who is absent.

It was moved by Mr. G B. Kirkpatrick, seconded by Mr. V. Sankey, and adopted, that the Rules of Order be suspended temporarily to allow of a discussion on the contemplated changes in the Act respecting Land Surveyors.

After some discussion the following motion was presented:—

Moved by Mr. Willis Chipman, seconded by Mr. Dickson, and resolved, that a Committee on Legislation composed of the Council for 1896, and the Chairmen of the standing Committees on Land Surveying, Drainage, Engineering and Topographical Surveying for 1896 be, and are, hereby appointed to take up the subject of the necessary amendments to the Survey Acts and other Acts, with powers to bring the same before the notice of the Government in order that the same may be passed at the next meeting of the Provincial Legislature, and that this Committee also have power to add to its numbers and to engage counsel if necessary.

The motion of Mr. Chipman was carried.

A discussion took place as to the admission of honorary members of the Association.

After some discussion it was moved by Mr. V. Sankey, seconded by Captain K. Gamble, and resolved, that the matter of Honorary Membership be referred to the Council, in order that the same may be considered and a report brought before the Association.

The Report of the Council was then received and adopted by the meeting.

Mr. James Dickson, of Fenelon Falls, read a paper on "Crown Surveys"

A paper on "The Ditches and Water Courses Act of 1894," written by Mr. B. J. Saunders, of Brockville, was read by Mr. George Ross, Mr. Saunders being too ill to attend.

At 5:30 p.m. the meeting adjourned to 10 a.m., 27th February, 1896

THIRD DAY.

On 27th February, 1896, at 10 o'clock a.m., meeting re-opened; President Mr. M. Gaviller in the chair.

The paper of Mr. A. R. Davis, of Napanee, on "The Field of American Engineering," was read by Mr. H. DeQ. Sewell, Mr. Davis being unable to attend.

The Report of the Committee on Engineering was presented by Mr. Herbert J. Bowman, of Berlin, and, after some discussion, was received and adopted.

" Field Testing of Minerals, and the Value of a Course of Instruction " was the subject of a highly interesting paper delivered orally, accompanied with a test of some gold specimens, by Mr. Wm. Hamilton Merritt, M.E., of Toronto.

The thanks of the meeting were tendered to Mr. Merritt for the very instructive address delivered, on motion of Mr. A. Niven, seconded by Mr. Butler.

A paper written by the President, Mr. Gaviller, " A Road or Not a Road," was taken as read, the Secretary being instructed to publish it.

Messrs A. P. Walker and K. Gamble handed in the Report of Auditors, which was read by Mr. Walker, who moved its adoption. It was seconded by Mr. T. H. Jones and carried.

At 1 o'clock p.m. adjourned to 2 p.m.

At 2 o'clock p.m. the meeting resumed; the President, Mr. Gaviller, in the chair.

A paper on " Natural Boundaries " was read by Mr. A. P. Walker, of Toronto.

The Report of the Committee on Land Surveying, with Question Drawer, was presented by Mr. T. B. Speight, of Toronto.

After some discussion Mr. Speight moved the adoption of the Report, seconded by Mr. Dickson, and carried.

The Report of the Committee on Entertainment was taken as read, being presented by Mr H. D. Ellis, of Toronto. On motion of Mr. Speight, seconded by Mr W. A. Browne.

A paper on " An Exploration Survey in the Barren Lands," written by Mr J. W. Tyrrell, of Hamilton, was read and received with great applause.

RATIFICATION OF NEW BY-LAWS.

Mr. V. Sankey read By-Laws 41 and 42, as referred to in the Report of Council.

Mr. H. DeQ. Sewell moved the ratification of the By-Laws. This was seconded by Mr. P. S. Gibson and carried.

NEW BUSINESS.

Mr. Niven referred to an interview he had had with Mr. Kirk, of Stratford, one of the promoters of the First Association and now in the eighty-seventh year of his age, who extended a very cordial

invitation to all members of the Association when in Stratford to call on him.

It was moved by Captain K. Gamble, seconded by Mr. Willis Chipman and resolved, that the Council be requested to change the name of the standing "Committee on Topographical Surveying" to that of the "Committee on Topographical Survey"

It was moved by Mr. Willis Chipman, seconded by Mr. J. W. Tyrrell and resolved, that the following special committees be appointed by the Council at the same time that the standing Committees are appointed:

a. Polar Research.
b. Exploration in Ontario.
c. Repository.
d. Legislation.

It was moved by Captain K. Gamble, seconded by Mr. P. S. Gibson and resolved, that any omissions or clerical errors in the records of the proceedings of this meeting, now in the hands of the Stenographer and the Secretary, be corrected by the Committee on Publication before publishing.

Mr. E. Stewart moved, seconded by Mr. G. B. Kirkpatrick and resolved, that a vote of thanks be tendered to all those who have furnished Papers to this Association at this meeting.

It was resolved, on motion of Mr Butler, seconded by Mr. Willis Chipman, that the sum of $150 be paid to the Secretary as a slight recognition of the very efficient manner in which he has discharged the duties of his office for the past year.

The Secretary, Mr. A. J. VanNostrand, responded to the resolution in fitting terms, expressing his gratitude for the recognition.

The President announced that the management of the Canadian Institute had extended a cordial invitation to the members of the Association to visit the Museum.

NOMINATION OF OFFICERS.

President.

Mr. Niven nominated Mr. Willis Chipman. Seconded by Captain K. Gamble. Carried unanimously.

Vice-President

Mr. E Stewart nominated Mr. T. Harry Jones of Brantford. Seconded by Mr. Sankey and carried unanimously.

Council.

Mr. Dickson nominated Mr. Niven.

Mr. Sewell nominated Mr. Kirkpatrick.

Mr. Bowman nominated Mr. John Davis, of Alton. Mr. Davis withdrew his name.

Mr. Bowman nominated Mr. W. M. Davis, of Woodstock.

Mr. VanNostrand nominated Mr. A. P. Walker, of Toronto.

Mr. P. S Gibson nominated Mr. James Dickson. Mr. Dickson withdrew his name.

Mr. Stewart nominated Mr. G. B. Abrey.

Mr. Chipman nominated Mr. B. J. Saunders, of Brockville.

Mr. Sankey nominated Mr. Charles R. Wheelock, of Orangeville.

Mr. Kirkpatrick nominated Mr. L.V Rorke, of North Bay.

Mr. Bowman nominated W. F. VanBuskirk.

Mr. Bowman nominated Mr. A. W. Campbell, of St. Thomas.

Mr. Sankey nominated Mr. J. W. Tyrrell.

Secretary-Treasurer.

Mr. H. DeQ. Sewell proposed that the present Secretary-Treasurer be re-elected. It was seconded by Mr. P. S. Gibson, and carried unanimously.

Auditors.

Mr. Butler nominated Mr. George Ross, of Welland.

Mr Sankey nominated Mr. Esten, of Toronto, who withdrew his name.

Mr. Chipman nominated Mr. Walker.

Messrs. Ross and Walker were declared elected unanimously.

Scrutineers.

The President appointed Captain K. Gamble and Mr Harry J. Browne.

Mr. Speight read a letter from Mr. Arthur Harvey, Chairman of the Local Committee of the British Association for the Advancement of Science, the meeting of which is to be held at Toronto in 1897, expressing a desire for the co-operation of this Association in the different branches of science and scientific research.

The question of honorary membership was discussed very fully by the members, when it was on motion referred to the Council of Management to deal with the matter.

On motion of Mr. Butler Mr. Niven took the chair.

Mr. Willis Chipman expressed his pleasure at being elected President as follows:—

Gentlemen, I wish to express to the members of the Association my appreciation of the honour conferred upon me by being elected without opposition to the office of President. It is an honour any member should feel proud of. I will endeavour during the coming year to do my duty to the Association.

I may be permitted to say that this year will be an important one for us. We have set the ball rolling in the way of a topographical survey of this Province, and I have hopes that in another year we will be able to report substantial progress. This is the most important work the Association has in hand.

Another important plank in our platform is the exploration and development of the north half of this Province, of which even we surveyors know little or nothing. There is no more known to-day of this area than was known two hundred years ago. I think those two planks in our platform will alone give sufficient work for several committees.

Another matter I may be permitted to touch upon is the printing of papers before the meeting. This is a step in the right direction, but I believe that these papers when printed should not be read at the Annual Meeting of the Association. Nothing is necessary when a paper is printed but merely to comment upon it. Too much time is now spent in the reading of papers, that could be better devoted to discussion. I thank you most heartily for the honour you have done me.

Mr. Butler moved that a hearty vote of thanks be tendered by this Association to Mr. M. Gaviller for the very efficient manner in which he has performed the duties of President during the past year. It was seconded by Mr. Kirkpatrick and carried unanimously.

Mr. Gaviller in reply to the resolution thanked the meeting as follows:—

Gentlemen, In reply to your very kind motion, I have on several occasions, I think, thanked you for electing me President, and now it only remains for me to thank you for the very good behaviour shown at the meetings we have had during the past few days. We have never had any trouble. I hope my successors will never have any more than I have had. Those who have occupied the office and been through one step to another should be quite content to retire, and go into the committees, and still to work and help along the Association which I hope to do.

At 4:45 p m., the meeting adjourned.

MEMBERS IN ATTENDANCE AT THE FOURTH ANNUAL MEETING.

Abrey, G B.
Bolton, L
Bowman, H. J.
Browne, H. J.
Browne, W. A.
Butler, M. J.
Chipman, W.
Cozens, J.
Davis, J.
Dickson, J.
Ellis, H. D.
Esten, H. L.
Fairbairn, R. P.
Fitton, C. E.
Galbraith, J.
Gamble, K.
Gaviller, M.
Gibson, H. H.
Gibson, P. S.
James, S.
Johnson, R T.
Jones. T. H.
Kirkpatrick, G. B.
Laird, R.
McFarlen, G. W.
McKay, O.
McMullen, W. E.
Miles, C. F.
Murphy, C. J.
Niven, A.
Rorke, L. V.
Ross, G.
Sankey, V.
Selby, H. W.
Sewell, H. DeQ.
Speight, T. B.
Spry, W.
Stewart, E.
Stewart, L. B.
Tyrrell, J. W.
VanNostrand, A. J.
Walker, A. P.
Wa[illegible]n, J.
W[illegible]elock, C. R.
Whitson, J. F.

RESULT OF ELECTIONS.

President.....Willis Chipman.....(by acclamation).
Vice-President.....T. Harry Jones.....(by acclamation).
Secretary-Treasurer.....A. J. VanNostrand.....(by acclamation).

Members of Council of Management elected for ensuing three years.

G. B. Kirkpatrick, A. Niven.

Auditors for ensuing year.

Geo. Ross and A. P. Walker (by acclamation).

I hereby declare the above-named members of Council of Management elected.

A. J. VanNostrand,
Secretary-Treasurer.

Certified correct.

H. J. Browne,
Killaly Gamble,
Scrutineers of Ballots.

REPORT OF COUNCIL OF MANAGEMENT FOR 1895-6.

The Council held its regular meetings in April and November, and one special meeting on the 19th of July.

At the April meeting By-laws Nos. 41 and 42 were passed and are now reported to the Association for ratification under the authority of By-law No. 33. Mr. Sankey was again elected Chairman of the Council and Messrs. Gibson and Niven were appointed on the Board of Examiners. The several standing and special committees were also nominated.

In the matter of unlicensed practitioners the Council has had several cases reported, but in most of these the evidence was not strong enough to warrant proceedings being instituted. In one, however, in the northern part of the Province, proceedings are now being taken and the result will be reported on a future occasion.

The Council has given very serious attention to the matter of arrears of dues, and after much consideration decided that a scale of discounts should be offered to those surveyors who were in arrears for more than the current year, on condition of prompt payment. Before doing so, however, the advice of a solicitor was taken as to the legality of this step, the result being that fourteen surveyors have availed themselves of this privilege which the Council considers is an evidence of the wisdom of its action. It may be mentioned that in some of these cases the surveyors apparently did not thoroughly understand that they were liable to be sued for unpaid dues. There are a few who are still in arrears, but the Council hopes that it will not be driven to the necessity of bringing these cases into court, which will be its unpleasant duty if the dues are not shortly settled.

The Hon. A. S. Hardy, Commissioner of Crown Lands, attended the November meeting, and several matters of importance were discussed with him. His attention having been drawn to the fact that the fees paid by candidates for examination, together with the grant made by the Government, do not cover the expenses, he expressed his willingness to assist in meeting this deficit by an increased grant, which, it is hoped, will be received this year.

Mr. M. J. Butler was re-appointed in November by His Honor the Lieutenant-Governor to the Board of Examiners for a period of three years.

The papers given at the April examination are published in the Report for 1895.

The Repository in the Parliament Buildings has been opened and furnished, and many contributions have already been received. There is, however, no lack of room for more.

The Council has had under consideration the advisability of providing for the admission as honorary members to the Association of

men distinguished in branches of learning or science, and would ask the members of the Association for an expression of opinion on the subject.

In view of the fact that the Statutes of Ontario will be revised in 1897, the Council would suggest that a special committee be appointed to deal with this matter, having power to bring the proposed legislation before the Government. In conclusion, it may be stated that $200 has been transferred from the current account to the Savings Bank account.

Respectfully submitted,

VILLIERS SANKEY,

Chairman of Council.

REPORT OF THE BOARD OF EXAMINERS, 1895-6.

The Board held its regular meetings in April and November.

At the April meeting no candidates presented themselves for preliminary examination ; there were five, however, for final.

The following gentlemen passed and were sworn in :—Alfred Ernest Farncomb, London ; John Vicar Munro, London.

Passed supplemental : Andrew Lane, Toronto Junction.

One candidate failed in Survey Act and one in Survey Act and Descriptions

At the November meeting, two candidates presented themselves for preliminary examination :—Wm Howard Fairchild, Brantford ; John Edward Schwitzer (B.A. Sc., McGill), Ottawa, and both passed.

For final examination, the following gentlemen passed and were sworn in :—Douglas John Gillon (grad. R.I E.C., Cooper's Hill), Fort Frances ; George Albert McCubbin, St. Thomas ; Sydney Munnings Johnson (B.A. Sc., Toronto), Stratford.

Passed supplemental : Ellsworth Doan Bolton (B.A. Sc., McGill), Listowel.

One candidate failed in Descriptions and the Survey Act.

The following bonds were submitted and approved by the Board :—

APRIL SESSION, 1895.

ALLAN, JOHN RICHARD.

NOVEMBER SESSION, 1895.

LANE, ANDREW.
MUNRO, JOHN VICAR.
FARNCOMB, ALFRED ERNEST.

The appended list shows the articles filed during the year :—

LIST OF ARTICLED PUPILS.

Name of Pupil.	Name of Surveyor.	Residence.	Date of Articles.	Term.
Charlesworth, Lionel Clare	Stewart, Elihu.....	Collingwood	1st April, 1895	One year.
Boswell, Elias John.....	Bowman, Herbert J.....	Berlin	1st June, 1895.....	One year.
Margach, William Innes	Proudfoot, Hume Blake.....	Toronto	23rd May, 1895	Three years.
Taylor, William Verner.....	Beatty, David	Parry Sound.....	1st August, 1895.....	One year.
Schwitzer, John Edward	Mountain, George A.....	Ottawa	15th November, 1895 ..	One year.
Fairchild, William Howard	Jones, Thomas Henry.	Brantford.....	6th November, 1895 ...	Three years.

The Board desire to state that good results are already apparent from the printing of the examination papers; the candidates at the latter examinations being more accurately prepared than those previously. The following subjects, however, do not, as yet, receive the attention from candidates that they should, namely, Survey Act, Descriptions, Mensuration and Dividing Land, Astronomy and Spherical Trigonometry. In the preliminary subjects, Orthography, Penmanship, Logarithms and Algebra.

Certificates of service in conformity with the requirements of the statute have been printed, and can be had from the Secretary on application by those apprentices whose time has expired. Suitable forms of Articles of Apprenticeship would have been printed for last year's reports, but it was expected that the new edition of "Acts, Orders and Regulations of the Crown Lands Department" would have been issued in 1895.

REPORT OF THE SECRETARY-TREASURER.

MR. CHAIRMAN,—I beg leave to submit the following report of the official business of the Association transacted by my department between February 25th, 1895, and February 24th, 1896:

The following circulars were issued:

No. 20.	Ballot for 1895 96	225 copies.
" 21.	Explanation of Ballot, with names of candidates	225 "
" 22.	Request for Contributions to the Repository	250 "
" 23.	To Withdrawn Members, *re* Associate Membership	45 "
" 24.	To Unregistered Ontario Land Surveyors	30
" 25.	To Members in arrears for more than one year	35 "
" 26.	To Members in Rainy River and Thunder Bay Districts, *re* alleged unprofessional conduct	16
" 27.	To Members in Arrears for Current Association Year	70
" 28.	Announcement of Fourth Annual Meeting	250
" 29.	Programme for Fourth Annual Meeting	350

Letters and Accounts sent from Secretary's Office	710
Post Cards	67
Letters and Post Cards received	485
Reports and Exchanges sent to Members and Others	1650
Reports shipped to Exchanges	770

The Register stands as follows:

Active Members subject to dues	199
Active Members exempted from dues	21
Withdrawn from practice	47
Dead	5
Total number of Registrations	272

I am glad to be able to report that, notwithstanding current pessimistic rumors regarding the condition of financial affairs in our country, there are fewer members now in arrears than at any annual meeting since incorporation.

Arrangements for exchanging reports with the Societies of the School of Practical Science, Michigan, Illinois, Iowa, Ohio and Indiana were continued, and the reports of all those societies have been distributed during the year, with the exception of the two latter, which will probably be received and sent out within a short time.

Our mailing list is constantly receiving additions, as the work of the Association becomes more widely known, and in nearly all cases reports or other works of value are received in return for our report.

It is very gratifying to note the growing activity of the several standing and special committees. In spite of the usual difficulty which nearly every chairman necessarily meets with in securing a quorum, and thereby a general expression of opinion from the members of his committee, the reports this year shew that each committee has devoted much care and attention to the interests of its department.

Our collection of books, maps, instruments, etc., for the Repository has received many interesting, useful and valuable additions during the year, and now contains 70 bound volumes (including a set of the reports of the United States Coast and Geodetic Survey), 177 books and pamphlets unbound (including a set of reports of the Geological Survey Department of Canada), 46 maps and charts, 14 photographs, 2 ancient surveyor's compasses and 1 compass corrector. When the fittings now being prepared have been put in place, this room will be most convenient for members to make use of for reading, drafting, etc. In the meantime, will each member contribute to the collection as opportunity occurs ?

The thanks of the Secretary are due to those members who, upon receiving a somewhat late appeal for papers for the present meeting, cheerfully responded, with the result that a meagre programme of half-a-dozen papers received an impetus which brought it to its present dimensions

It will be observed that, as yet, only three " withdrawn " members have availed themselves of the advantages of Associate membership, but it is probable that the list of Associates will steadily increase.

The total cost of extra copies of the American exchanges will be about the same as last year.

Accompanying this report is a statement of the receipts and expenditures for the Association during the past year.

All of which is respectfully submitted.

A. J. VANNOSTRAND,

Secretary-Treasurer.

Toronto, 24th February, 1896.

STATEMENT OF RECEIPTS AND EXPENDITURES BETWEEN 25TH FEBRUARY, 1895, AND 24TH FEBRUARY, 1896.

1895-6.	RECEIPTS.		
To balance on hand 25th February, 1895			$1,032 63
" Amounts collected from advertisements in 1894 Report		$ 15 50	
" " " " 1895 "		89 00	
			104 50
" " " Proceedings sold			1 01
" 15 Registration fees	$ 1 00	15 00	
" 3 Full Annual Dues for 1st Association year	4 00	12 00	
" 4 " " 2nd "	4 00	16 00	
" 10 " " 3rd "	4 00	40 00	
" 147 " " 4th "	4 00	588 00	
" 3 " " 5th "	4 00	12 00	
" 2 Commuted Arrears, 1st to 4th " (inclusive)	10 00	20 00	
" 1 " " 1st to 4th " "	9 00	9 00	
" 7 " " 2nd to 4th " "	8 00	56 00	
" 4 " " 3rd to 4th " "	7 00	28 00	
" 1 Associate Dues for 3rd "	2 00	2 00	
" 2 " " 4th "	2 00	4 00	
" 1 Balance of Associate Dues 1st to 4th Association year		5 00	
			807 00
" Accrued Interest on Deposit in Savings Account			23 39
" Receipts in Board of Examiners' Account, including Government Grant of $150 00			492 00
			$2,460 53

	EXPENDITURES.	
By Postage	$ 76 76	
" Bank collections	45	
" Printing circulars, wrappers, stationery, blank forms, etc	55 15	
" Publishing Proceedings of 1895 meeting	279 35	
" Freight on Exchanges received	2 75	
" Customs brokerage	2 50	
" Amount paid to Secretary-Treasurer for 1894-5	120 00	
" " Stenographer for 1895 meeting	35 00	
" " paid for Rent of Rooms	10 00	
" " " Rubber stamp	30	
" " " Furniture and map mounting for Repository	13 50	
" " " Extra copies of '94 exchanges	13 00	
" " " " " '95 "	23 87	
" " " Expenses of Council Meetings	12 00	
" " " Express charges on map, instrument, etc	1 65	
" " " Lithographing for Entertainment Com'tee	6 75	
" " " Office sundries	45	
" " " Typewriting	2 45	
" " " Cartage	1 65	
" " " Back Nos. Michigan Engineers' Annual	4 50	
" " " Customs duty on electro	34	
" " " Solicitor's opinion *re* O.L.S. Act	20 00	
" " " Binding Reports and Exchanges	7 80	
		$ 690 22
" " " Disbursements in Board Examiners' account		579 37
" Balance cash on hand	$ 20	
" " on hand in Savings account Feb. 24 1896	752 48	
" " " Current " " "	438 26	
		1,190 94
Total		$2,460 53

A. P. WALKER,
KILLALY GAMBLE, } *Auditors.*

A. J. VANNOSTRAND.
Secretary-Treasurer.

REPORT OF AUDITORS.

To the Association of Ontario Land Surveyors.

We hereby certify that we have examined the accounts of the Secretary Treasurer and vouchers therefor for the year ending 24th February, 1896, as well as the financial statement, and have found them correct.

A. P. WALKER,
KILLALY GAMBLE, } *Auditors.*

Toronto, 27th February, 1896.

DISCUSSION.

Mr. Butler—Twice during the last year I was written to for information with reference to a little paper I had contributed to last year's proceedings, one from the Superintendent of Schools in New York asking where that book could be purchased which I recommended in my paper, and another enquiry came from the neighborhood of California showing that our proceedings are not only travelling afar but they are being read and studied. One other thing I was going to suggest, as included in the suggestions thrown out by the Report of the Board, I think we should ask for an amendment to our Act so that the words "mechanics" and "mensuration of solids" may be added to the subjects in the final examination.

Mr. Chipman—If this is the proper time to discuss the future of this Association I would like to refer to a subject that perhaps would come under the head of new business.

In 1897 the Acts of the Province are to be consolidated and revised and whatever legislation we deem it best to advance our interests, and the interests of the public, should be carefully drawn up between now and then There are a great many things I think we could get added to our Act if we would only look after it carefully.

Mr. Sankey—The Council has drawn attention to that matter and has suggested that a special committee be appointed. If that does not meet the views of the Association some other action will have to be taken. It appeared to the Council that that would be a better way than to leave this entirely to the Committee on Surveys. It is a matter of very great importance, as our Vice-President has just said, and the Council is of opinion that a special committee should be appointed. It is not a matter that probably we would succeed in discussing and finishing at a meeting like this. It would be necessary to have some committee specially appointed which would receive all suggestions, no matter how trivial they may be. Everyone who has a suggestion to make should, I think, make it, and let this committee we speak of judge as to whether it should be brought before the Government. A year will be none too long to discuss this matter and work

it up. We could not bring anything before the present session of the Legislature, but we should have what we want to bring in a concise and definite form by next meeting.

The President—I think when we commence discussing this subject of changes in the Act we might go on for a week and come to nothing I think those most interested would not mind putting their opinions on paper and sending them in to this Committee.

Mr. Butler—Once we get away from the meeting other duties intervene and one forgets it until the next meeting. A good many of the surveyors are here now and an expression of opinion is easily got from them and the committee will go away and digest the matter.

Mr. Kirkpatrick—I fear it would be too late at the next meeting of this Association to discuss amendments. The amendments would have to be introduced on the authority you give the Committee to prepare them, because the Government would have to be approached and everything to be in order, before the meeting of the House. The House met late this year. It would certainly be too late to initiate any legislation. So anything we think of doing the Committee should be authorized to lay before the Government early in the fall, or at least in the early winter, and of course I think the only way that that could be done would be by correspondence with Members concerning any important change, asking them their opinion.

Mr. Chipman—Is this the proper time to discuss this matter ?

Mr. Kirkpatrick—We can suspend the rules of order if it be thought necessary. I would move that the rules of order be suspended for a little to allow of a discussion on the contemplated changes in the Act. Seconded by Mr. Sankey. Carried.

Mr Chipman—The members of the Association may not be aware that the Canadian Society of Civil Engineers is looking towards incorporation. The draft bill I have here. It was afterwards amended, at their last meeting, and they intend to bring it before the Legislature of Ontario at as early a date as possible. That Act is framed somewhat similar to our own, to form a comparatively close corporation. I understood from the Secretary of the Local Committee in Toronto that they would have a deputation of engineers to meet the land surveyors. I fully expected it, but for some reason unknown to me they have not done so. Their object was to see if they could not amalgamate in some way with this Association, or change the Constitution of this Association, or get legislation to alter it, so as to make this Association the Association of Canadian Society of Civil Engineers, either the one or the other. These are matters that will come up before this committee that will be appointed. I don't think it has come officially before the Association, but I attended a meeting of the Toronto members of the Canadian Society of Civil Engineers when this matter was discussed.

Up to the present time the Canadian Society has ignored the existence of this Association, I believe, and anything that has been said by us. Some few members belong to both, and at the annual meeting of the Canadian Society it was shown what was done.

Mr. Sankey—I rise to a point of order. I do not think this matter is properly before us. The point I understand to be discussed is the question the Council has brought up, the amendments to our own Act. I have no objection at all to the other question being brought up here—I am very much in sympathy with it, personally—but I think the amendments we require in our own Act should come before us first. I do not wish Mr. Chipman to feel I am antagonistic to what he is saying, for I am not.

In regard to our fees and dues and all that, our present Act is not quite in the way it might reasonably be. These are matters of very great importance to ourselves. I believe there are other matters in connection with the Survey Act, pure and simple, that require amendment, that is, an amendment to a section here and a section there. What our Vice-President is talking about is a new Act. I do not think the members of the Association have any hostility to the Engineers, and I hope we will some day or other meet each other on common ground, but at the present time our own matters come first I think.

Mr. Chipman—Yes. I think we can cut this short by appointing a committee. I would move that a committeee on legislation be appointed to consist of the Council of the coming year and the chairman of the committees on land surveying, drainage, engineering, and topographical surveying. Seconded by Mr. Dickson.

Mr. Walker—I would move in amendment that the committee to be appointed be named by the President for the purpose of taking these points into consideration. This may not be a very representative committee and probably a difficult one to get together. I think a committee that would be named by the President would be better; a small committee.

Mr. Sankey—I think in this matter a committee of this kind should be elected by the whole Association. The committee suggested by Mr. Chipman is one which is elective by the whole Association whether they are here to-day or whether they are not, and, owing to the importance of the committee, I think it is one that should be appointed in that way. I have no doubt at all that our President would name a very suitable committee, but I think that the onus should not rest on his shoulders.

The President—I would far rather not be made responsible.

Mr. Sankey—I think the committee at large should take the responsibility on themselves as to these matters. I think the committee named by the Vice-President is the best way of getting this

done. He names a committee of the Council of next year, which is elective, and, the Council being elective, appoints the various other committees. There can be no chance of our missing the best men that we want as an Association, and I think that we are perfectly safe in their hands. But in the near future, what we want is information on the points and subjects that the committee must discuss. It is not wise to appoint a committee and give them general powers. Let the Association give them points, bring up as many as you can, and let the committee discuss those points and come to some definite understanding as to what is to be done about them. I might perhaps be allowed to say that if, as the Vice-President has said, the Engineers' Association or Society are proposing an Act on this line, it may be wise for us to appoint a special committee, in case they do so, between now and next year, with powers to meet and discuss anything with them, and give them powers this coming year.

Mr. E. Stewart—I think it would be almost impossible for any of us here to name the amendments that we know are necessary in the Act. There are so many of them that will occur in going over the Act, that any person here, in the limited time at our disposal, will not be able to name. The committee that is named would be, I think, satisfactory.

Mr. Kirkpatrick—One point, I think, wants amendment, and it touches a good many surveyors very closely, and that is, some amendment which will render municipal surveys when performed incapable of being upset by the courts after having been confirmed. We brought that before the Commissioner of Crown Lands at the meeting of the Council and he was favourable to it. He said if the Association would draft some proper scheme he would be able to get it approved. There is no question that it is a thing that touches my branch of the department very closely. We have had municipal surveys which have been confirmed and have been perhaps ten years undisputed. Some man who finds himself aggrieved comes to court, and the evidence is not the same produced in court as before the surveyor. The judge upsets that instrument. He does not propose any remedy but simply upsets it. A monument has been planted carefully, and it has stood undisputed, for ten or twenty years, after due notice and everything else, and a man gets up, perhaps a grandson of the original owner, and tries to upset it. There are dozens of such cases all over the country, and a scheme should be evolved which would meet with the approval of the House when brought before it. We know the House is composed of a great many different types of men, but I think that with judicious care it could be introduced and pointed out to them that it was more for their benefit than for the benefit of the surveyors who made the survey. This should be final. We always thought that the Act decreed, in as strong words as it could, that the surveys made under the Municipal Act, under instructions from the Commissioner, should be final. The Act says that the survey would be to all intents and purposes what-

soever equal to the original, and then the courts upset that, and say it shall not be. What I want to get at is some word or some proposal by which it shall be impossible to rake up new evidence, and my idea was simply that the survey after being received by the department and examined should be advertised in the local papers of the county in which it was, calling upon all persons who have any evidence which was not submitted, to submit it forthwith, giving them a certain date ; if after that date no evidence was given, that the survey should be confirmed absolutely and irrevocably. If any evidence is given, the Commissioner of Crown Lands will hear it. We had a case like that in the township of Chinguacousy in which Speight & Van Nostrand made a survey. They did the best they could, but of course they could not satisfy all parties Very well. The Commissioner notifies all parties to attend, and they do attend, but there is no new evidence brought out. It was a hard case, but it was absolutely impossible that anything else could have been done than was done, because here was a fence which had been fifty years on that spot and the road was narrow and the Council wanted to open it up sixteen feet wider. This man thought it was very unfair it should come off him, and that man thought it was very unfair it should come off him, for the fences had stood there fifty years. But fifty years would not count against the Crown. And that was confirmed, and we have had no protest since.

Mr. Dickson—Another point to be brought up is the matter of descriptions. I do not think there is anything that has led to more trouble than parties writing descriptions who do not know how to do it. I had a case last Fall of a description dividing a lot which was drawn up by a lawyer. I made the survey three or four years ago, and there was " Hail Columbia " to pay for it. Another surveyor went through, and of course he was right and I was wrong. I think there should be some clause in the Act making it imperative to have all descriptions drawn by some person who will be responsible for it.

REPORT OF PUBLICATION COMMITTEE.

MR. PRESIDENT,—This Committee has had but little to occupy it save the usual routine of business.

Eleven hundred and fifty copies of the Report of the Proceedings were printed by the Presbyterian Printing & Publishing Company, at a cost of $279.35, being a trifle less than last year.

We continue to exchange our Reports with other Societies as in the past.

Members sending in " papers " for publication are requested to have the accompanying diagrams accurately drawn on a scale suitable for insertion in the Report.

It is most desirable that all members of our Association would endeavour to forward the interests of our advertisers in every way in their power.

EXCHANGES SENT TO

Iowa Civil Engineers' and Surveyors' Society	50 copies.
Illinois Society of Engineers and Surveyors	130 "
Michigan Engineering Society	130 "
Ohio Society of Surveyors and Civil Engineers	130 "
Indiana Engineering Society	130 "
School of Practical Science Engineering Society	200 "

Respectfully submitted,

KILLALY GAMBLE,
Chairman.

REPORT OF COMMITTEE ON BIOGRAPHY.

Your Committee has received up to date about thirty sketches of the lives of early Surveyors, including those of Augustus Jones, John Stegman, S. Wilmot, P. Carroll, Samuel Rykman, A. Greeley, T. N. Molesworth, Richard Birdsall, and others, which will be published from time to time as we have room in the Proceedings of the Association. Many of these furnish interesting reading, illustrating as they do the altered condition of men and manners in this century now drawing to its close.

Your Committee ventures to express the hope that the members of the Association will bear in mind this useful feature in our work of self-improvement. In addition to the biographies of some of the old pioneers of our profession now passed away, we have also received, from some of our "active members," sketches of their lives, with photos accompanying, for which our thanks are due. We hope to receive many more such during next year.

Respectfully submitted,

GEO. B. KIRKPATRICK,

Toronto, February 25th, 1896. *Chairman.*

REPORT OF COMMITTEE ON POLAR RESEARCH.

MR. PRESIDENT,—The past year has not been without interest to Arctic Geographers.

In April, Peary again crossed the "Great Ice" of North Greenland, from Inglefield Gulf to Independence Bay, thus repeating his trip of 1892. Owing to scarcity of alcohol and pemmican he was obliged to return, suffering untold hardships on the way back. He returned to the United States via St. John's, Nfld., in September last. His lecture on Thursday evening next will no doubt be of the greatest interest to all the members of the Association.

Dr. Fridtjof Nansen's attempt to reach the Pole by following DeLong's intended route, may be successful, but the rumours from Northern Siberia that he has discovered the land around the Pole and is returning by about the same route by which he entered the "unknown North" is exceedingly doubtful. It is probable that he will be heard from within a few months.

The map exhibited at the last meeting of the Association has been reduced, and is now being lithographed. This map shows at a glance the relation of our Province to the Arctic Regions, the territory not yet fully explored, and the vast field open for examination at least.

The country around James' Bay has a rich soil, a climate more equable than Winnipeg; it is well timbered and well watered, and should support a thriving population. The whale and other fisheries of the north should prove profitable to residents of a seaport on James' Bay, and, as stated in our report of last year, it has yet to be proven that merchantable coal does not exist in Northern Ontario.

The present is no time to spend public money on railways and canals, that cannot pay a substantial dividend, but this period of depression may be advantageously employed in carefully studying these problems, and in exploring the undeveloped country thoroughly. A railway to James' Bay from Toronto is a project worthy of support, but the schemes now advocated are solid enough, in fact immovable at one end, but the other is free to vibrate in any and every direction. Anchor the other end by substantial facts and reasons and the railway will be built.

Until an opportunity offers, the Committee can do nothing towards active arctic exploration, but upon the organization of the next British or American Expedition some of our members should volunteer for the service.

We believe, however, that the Committee should be continued from year to year, as our Association is probably the only Geographic Society in Ontario.

The following table of highest latitudes known to have been attained by man should have appeared in the last Report of the Proceedings:

Explorer.	*Expedition.*	*Country.*	*Date.*	*Latitude.*
Lockwood	Greeley Exp'n	United States	1882	83° 24′
C. Markham	Nares Exp'n	Great Britain	1876	83° 20½′
E. Parry		" "	1827	82° 45′
C. F. Hall	Polaris	United States	1871	82° 15′
Weyprecht & Payer		Austria	1874	82° 05′
R. E. Peary	Private	United States	1895	81° 47′
Scoresby			1806	81° 30′
H. Hudson		Great Britain	1607	81° 30′
B. Leigh Smith	Private	" "	1873	81° 14′
Dr. Hayes	"	United States	1861	81° (?)
Dr. Kane	"	" "	1854	80° 30′
Koldeway		Germany	1868	80° 13′

WILLIS CHIPMAN,

Chairman.

REPORT OF COMMITTEE ON DRAINAGE.

MR. PRESIDENT,—Your Committee on Drainage begs to report as follows:

The Drainage Act of 1894 and the Ditches and Watercourses Act of 1894 have now been in operation two seasons, and though both were the children of promise, and brought into existence by an exhaustive amount of investigation, discussion, thought, and labour, many faults have already been discovered in them and many are the suggestions made for their improvement. At the last session of the Legislative Assembly of Ontario, an amendment of some value was made in Sec. 7 of the Ditches and Watercourses Act, which provides for a party taking proceedings under the Act, and failing to file the declaration of ownership, to do so upon such terms and conditions as the judge may direct. Sec. 36 was also amended as regarding the eastern part of the Province. One or two amendments were also made in the Drainage Act of 1894. The volume of change and amendment will no doubt increase year by year, and by the end of the next decade the drainage laws will have become as obscure and complicated as they were in 1893. The distinction between the assessment for outlet and injuring liability is still a vexed question, and the general impression is that the injuring assessment should be done away with. In this, your Committee concurs. Sec. 16 of the Drainage Act, requiring ten days' notice of the date of the meeting of the Council, at which the engineers' report is to be considered, should be amended by changing the ten days to, say, six, and the amount of the assessment should not be required in the notice. The drainage season is comparatively short, and about two weeks time could be gained by these changes, which would be a matter of much importance.

The term "sufficient outlet" has caused a great amount of trouble in both Acts, and should be more clearly defined. In regard to this, Mr. Halford, C.E., of Windsor, quotes the case of "Mongin *v.* Tilbury West," "where the Engineer in charge carried the work to the edge of the marsh or the water level of the St. Clair River, the marsh being entirely submerged. Suit was brought against the township for nominal damages, and an application for a mandamus to compel the township to carry the water from the drain to a proper outlet. Strange as it may appear, the plaintiff succeeded, and an order was issued against the township, requiring it to extend the drain. This was done, a canal was dredged through the marsh into five feet of water, and a solid bank built on each side, so as to confine and retain the waters in the drain."

Sec. 5 of the Ditches and Watercourses Act, which restricts a drain to seven original township lots, in many cases acts quite satisfactorily; in others, where the lots are very narrow, a great injustice is done, and where the drain does not exceed 200 chains in length, the number of lots should not be limited.

The limit of 75 rods in Sec. 6 detracts from the value of the Act, and should be extended to about 120 rods.

The 12 days required for notice of preliminary meeting in Sec. 8 should be cut down to about 6 days

Sec. 14, which requires the Engineer to fix a date from ten to sixteen days after he receives the requisition, would meet with more general approval from Engineers if the limit were changed to from six to twenty days.

The fifteen days allowed for appeal in Sec. 22 should be cut down to ten days at least.

With regard to trials under the Ditches and Watercourses Act, the Engineer is often placed at a disadvantage, the municipality taking no action; and the party filing the requisition is unrepresented by counsel, the engineer is left to fight the matter alone. No provision is made for paying him witness' fees, and he may even be deprived of his fees and charges for making the award

These and other defects call for remedy; but, as previously intimated, the continual tinkering and patching up of the Drainage Acts is undesirable.

Complaint is also made that qualified Land Surveyors work under the Drainage Acts for less than $5.00 per day, and it is suggested that members doing so should be suspended.

Some notes on decided cases are hereto appended, but cases not appealed are unreported, and members should send in a full report on all cases of importance in which they are interested. A judgment under the Ditches and Watercourses Act of much value is given in full.

Several cases have been tried by the Drainage Referee, some of great importance; and members interested should forward a copy of the Referee's Report. One is given herewith.

The amount of drainage work constructed in 1895 is generally reported to be very much below the average of previous years; but this is probably owing to the dry seasons and short crops of the past two years.

In the Township of Raleigh, County of Kent, however, Mr. Augustine McDonell reports that he has under construction a large drain, 8 miles long, 90 feet wide at the mouth and 50 feet at the head, and averaging 8 feet deep, which will be completed by midsummer at a cost of about $60,000.

He has also reported the successful completion of an embankment scheme under his superintendence in the Township of Tilbury, County of Kent, whereby upwards of 2,200 acres of submerged land has been drained and brought under cultivation at a cost of $28,000. The whole area can be pumped dry in four hours.

Some amendments to the Drainage and Ditches and Watercourses Acts of 1894, adopted by the County Council of Perth and approved by the County Council of Essex, are also appended.

All of which is respectfully submitted.

GEO. ROSS,

Chairman.

Canada Law Times.

FITZGERALD *v.* CITY OF OTTAWA.

Vol. 15, No. 1, p. 7.

Queen's Bench Division, Boyd, C., 23rd October, 1894.

When plaintiff's land was part of a township, he and his neighbours had, with the permission of the township authorities, constructed a box drain in the highway, to carry off surface water therefrom. After the locality had become part of the defendants' territory, this drain collapsed, and the earth-covering of it acted as a dam, which penned back the water on the plaintiff's land. The defendants' engineer then made a cut which carried away the water for a time. This, however, became filled up, and the water came on the plaintiff's land. He notified the defendants, but they did not remedy the matter till after substantial injury was done.

Held, that they were liable. (See appeal on page 34).

Vol. 15, No. 2, p. 23.

Court of Appeal, 15th January, 1895.

GARFIELD *v.* CITY OF TORONTO.

When a sewer, built without any structural defect, is of sufficient capacity to answer all ordinary needs, the Corporation is not liable for damages caused, as a result of an extraordinary rainfall, by water backing into the cellar of a person compelled by by-law to use the sewer for drainage purposes.

Judgment of the Queen's Bench Division reversed.

Vol. 15, No. 2, p. 49

Street, J., 19th November, 1894.

OLIVER *v.* LOCKIE.

The rule is that when an owner creates an artificial watercourse discharging surplus water upon a neighbour's land, he obtains, at the end of the statutory period, a right to continue to discharge it; but the neighbour acquires no right to insist upon the continuance of the flow. The easement arises for the benefit of the dominant tenement. The owner of such a servient tenement is not a "person claiming a right thereto" within Sec. 35 of R.S.O., c. 111.

A defined channel is an essential part of a stream.

Vol. 15, No. 7, p. 171.

Court of Appeal, 14th May, 1895.

CANADIAN PACIFIC RAILWAY COMPANY *v.* TOWNSHIP OF CHATHAM.

Where drainage works for the benefit of lands in two townships prove, as originally initiated and constructed, insufficient, an addition thereto, costing more than $200, must be authorized by petition and by law under the Act, and a contract entered into under seal by one township binding itself to pay the cost of the additional work, cannot, even after completion and acceptance of the work, be enforced.

Judgment of the Common Pleas Division, 25 O.R., 465, affirmed; Osler, J. A., dissenting.

This decision was reversed by the Supreme Court.

Vol. 15, No. 7, p. 172.

Court of Appeal, 14th May, 1895.

FITZGERALD *v.* CITY OF OTTAWA.

Where a municipality makes alterations in, and thus adopts as part of its own drainage system a drain existing in territory acquired from another municipality, it is liable for damages caused by subsequent neglect to keep the drain in repair.

Judgment of Boyd, C., 25 O.R., 658, affirmed; Maclennan, J. A., dissenting.

Vol. 15, No. 10, p. 251.

Supreme Court of Canada, 11th March, 1895.

YORK *v.* TOWNSHIP OF OSGOODE.

This case was referred to in our report last year, page 32.

Decision of Court of Appeal confirmed.

Vol. 15, No 10, p. 256.

Queen's Bench Division, Divisional Court, 27th May, 1895.

IN *re* M'FARLANE AND MILLER.

On an application for prohibition to restrain proceedings on an appeal under the Ditches and Watercourses Act, 57 V., c. 55, on the ground that the appeal had not been heard and determined within two months, under the provisions of Sec. 22, Sub-Sec. 6;

Held, that the provisions of that Section are merely directory, and not imperative;

Held, also, that there is no sufficient declaration in that Statute of an intention to change the law from what it was in R.S.O., c. 220, Sec. 11, Sub-Sec. 5, and prohibition was refused.

Decision of Robertson, J., confirmed.

Vol. 15, No. 12, p. 292.

The Divisional Court, 13th July, 1885.

Where a township municipality has passed a by-law, purporting to be under Sec. 585 of the Consolidated Municipal Act, 1892, for the purpose of making certain alterations and improvements in a drain, and has served an adjoining municipality which is to be benefited by the work with a copy of the engineer's report, etc., showing the sum required to be contributed by the latter as directed by Sec. 579, and the by-law of the initiating township, is as a fact irregular and invalid:—

Held, *per* Rose, J., that the contributary township cannot be required to pass a by-law raising its share till the initiating township has passed a valid by-law adopting the report providing for the doing of the work, including the raising of its proportion of the funds. But in this case the portion of the by-law of the initiating township adopting the engineer's report and directing the construction of the work might properly have been sustained on motion to quash by a ratepayer of that township, and an order quashing have been confined to the portion providing for raising the funds, as to which an amending by-law might have been passed; and therefore the contributory township might well proceed, relying on the good faith of the initiating township to make all necessary amendments.

Held, *per* Meredith, C. J., that the contributory township is nevertheless not only entitled but bound, within the four months prescribed by Sec. 580, to pass the necessary by-law to raise its share of the estimated cost.

Semble, *per* MacMahon, J., that the contributory township had no power to pass a by-law to raise its share of the proposed expenditure until the initiating municipality had passed its by-law for the construction of the works.

Vol. 15, No. 14, p. 327.

Supreme Court of Canada, 6th May, 1895.

LEWIS *v.* ALEXANDER.

Ratepayers of a township petitioned under Sec. 570 of the Municipal Act of Ontario for a drain to be constructed "for draining the property" described in the petition. The township was afterwards annexed to the adjoining city and the drain was thereafter used as a common sewer, it being, as constructed, fit for such use. An action was brought against a householder, who had connected the sewage

from his house with the drain, to recover damages for a nuisance resulting therefrom at its outlet.

Held, affirming the decision of the Court of Appeal, 21 A. R. 613, 14 Occ. N. 499, Taschereau and Gwynne, J. J., dissenting, that Sec. 570 empowered the township to construct a drain not only for draining off surface water but sewage generally, and the householder was not responsible for the consequences of connecting his house with the drain by permission of the city

Held, also, that where a by-law provided that no connection should be made with a sewer, except by permission of the city engineer, a resolution of the city council granting an application for such connection on terms which were complied with and the connection made, was a sufficient compliance with the by-law.

Reports of Supreme Court, Vol. 24, No. 5, p. 622.

Supreme Court of Canada, 22nd, 23rd March, 26th June, 1896.

THE MUNICIPAL CORPORATION OF THE TOWNSHIP OF COLCHESTER SOUTH (DEFENDANTS) APPELLANTS AND DOMINIQUE VALID (PLAINTIFF) RESPONDENT.

An appeal from the Court of Appeal for Ontario.

In an action by V. against a municipality for damages from injury to property by the negligent construction of a drain, a reference was ordered to an official referee "for injury and report pursuant to Sec. 101 of the Judicature Act and rule 552 of the High Court of Justice." The referee reported that the drain was improperly constructed and that V. was entitled to $600 damages. The municipality appealed to the Div. Court from the report, and the court held that the appeal was too late, no notice having been given within the time required by Cons., Rule 848, and refused to extend the time for appealing. A motion for judgment on the report was also made by Valid to the court, on which it was claimed on behalf of the municipality, that the whole case should be gone into upon the evidence, which the court refused to do.

Held, affirming the decision of the Court of Appeal, that the appeal not having been brought within one month from date of the report as required by Cons., Rule 848, it was too late; that the report had to be filed by the party appealing before the appeal could be brought, but the time could not be enlarged by his delay in filing it; and that the refusal to extend the time was an exercise of judicial discretion with which this Court could not interfere.

Held, also, Gwynne, J., dissenting, that the report having been confirmed by lapse of time and not appealed against, the court on the motion for judgment was not at liberty to go into the whole case upon

the evidence, but was bound to adopt the referee's findings and to give the judgment which those findings called for. (Freeborn *v.* Vandusen) 15 Ont. P. R. 264, approved of and followed.

Vol. 24. No. 5, p. 707.

GIBSON *v.* TOWNSHIP OF NORTH EASTHOPE.

22nd March, 1895.

Appeal from the Court of Appeal for Ontario reversing the judgment of the Divisional Court and restoring that of the trial judge in favor of the Corporation.

The action was brought by Gibson to have a by-law of the Corporation quashed, or, in the alternative, for damages for injury to his property resulting from improper construction and want of repair of a drain made under said by-law. The ground upon which said by-law was attacked was that the plaintiff had withdrawn from the petition and there were not sufficient names on without him.

The trial judge held that the plaintiff had not withdrawn from the petition and refused to quash the by-law. He also held that the plaintiff had failed to prove his allegations in the statement of claim on which his right to damages was founded. The Divisional Court reversed this decision on the first ground and held the by-law invalid. The Court of Appeal restored the original judgment.

The Supreme Court, after hearing counsel for the respective parties, dismissed the appeal with costs.

2ND. D. C. PERTH, PLAINTIFF, *v.* CORPORATION OF FULLARTON, AND MR. ROGER, ENGINEER OF SAID TOWNSHIP, DEFENDANTS.

Mr. Goodeve for Plaintiffs; Mr. McPherson for the Corporation; Mr. Thompson for Mr. Roger.

Although the amount involved in this case is not large, yet there are several points of interest raised, and contrary to my usual custom in the Division Court I reserved the case for the purpose of giving a written judgment.

The plaintiff sues for work done by him under contract let by the engineer under Sec. 28 of the D. and W. Act, 57 Vic., Chap. 55, Sec. 28 *et seq.*, the person who was ordered by the original award to do the work having failed to do so, the engineer having been duly required by written notice of a party interested to inspect and proceed under that Section, I should have thought that on this short statement the plaintiff was entitled to recover against the Corporation (See Sec. 30), the award never having been moved against; and that if the plaintiff acted properly and in good faith (and there is no suggestion to the contrary), that even if there were difficulties arising from circumstances not then present to the minds of the parties, it would be more equitable and just that the loss (if any) should fall

upon the township at large rather than on the plaintift who had performed the work and was acting *bonâ fide*. To hold otherwise would be a severe blow to local drainage and render anyone chary of taking a contract under the Act.

The council for the Corporation suggested and argued as a defence, two grounds :—

1st. That the Engineer had not carried the water to a sufficient outlet, and—

2nd. That the ditch or drain passed through or into more than seven original township lots. The Council must, upon a petition of two-thirds of the owners of all the lands to be affected by the ditch, pass a resolution authorizing the work, etc. (See Sec. 5), before it can proceed.

The facts are that the new ditch or drain, moved for by the promoter, is almost entirely confined to one lot, when it connects with an old award ditch which crosses three or four lots where it enters still another old award ditch which carries the waters to a stream or river. The Engineer directed the second named award ditch to be enlarged and deepened, and apportioned the work of enlargement between the promoter of ditch No. 1 and the different parties along the line of ditch No. 2, and found that the point of debouchement into the drain thirdly mentioned was a sufficient outlet.

As to the first mentioned point the award was not, as I have said, moved against, and I apprehend that under Sec. 24 of the Act the award is now "valid and binding to all intents and purposes," and that it is not open to me in a suit of this kind to hear evidence upon the point raised, which could only be properly raised on an appeal under the Act.

Then, on the other point, the argument was certainly ingenious. It was this : All the persons owning land, even on the third ditch, are "affected" by the ditch, inasmuch as a certain, although it may be comparatively insignificant, additional quantity of water is brought upon them, and so thereby they were all entitled to notice, and as the extent in that case is much more than seven original lots, the Council must pass the resolution before the work can proceed (See Sec. 5). If this is so, then the owner of a farm requiring drainage and requiring only 50 or 100 yards of a drain, to connect with a series of drains, constructed under the Act, say, five miles long, must give notice to all the owners right to the river outlet before he can get any drainage works done and run his risk of getting the resolution of the Council. I cannot assent to any such proposition. Sec. 3 (the interpretation part of the Act) defines the meaning of the word ditch. That clause, read with Sec. 5 and other Sections, seems to me to confine the matter to the particular ground and lands covered by the ditch confined to and mentioned in the award.

Sec. 32 may give rise to some little difficulty. It evidently contemplates that a new applicant shall not make use of an established ditch except upon some equitable basis. It seems to me the scope of that Section might be enlarged to meet certain conceivable cases,

but here I think no such difficulty arises. The Engineer has found that the entrance to what I have called ditch No 3, is a sufficient outlet and he has apportioned the work between the promoter of the new ditch and those owners along ditch No. 2 for enlargement thereof, to take the extra water occasioned by the new ditch ; presumably taking into account the amount of work (if any) which those owners along ditch No. 2 may have originally been obliged to contribute to ditch No. 3. He is now enabled to deal with such a matter more at large by reason of the increased powers under the new Act. As to apportioning the maintenance, I presume he has considered all these points and acted accordingly, and it seems highly improbable that even if the promoter had been a party to the original scheme his work would even have been taken lower than the entrance to drain No. 3 At any rate, the award was not appealed from, and I think this matter, too, is concluded by Sec. 24. The person who is understood to be objecting is on drain No. 2. An appeal was open to him of which he did not avail himself. I do not think he (who it is to be observed must have been aware of all these proceedings) or the Corporation on his behalf, can be now heard as a volunteer protector of those living on drain No. 3. I suppose they are able to take care of themselves. It may be that the latter, if wronged, have a remedy by way of injunction or mandamus, but with that I have nothing to do except that, I may say, that I have little sympathy (except in extraordinary cases) with the talk about the "additional" water brought down. If judges and judicial officers would, in ditch cases, take the trouble to visit the places where those controversies arise and judge for themselves, there would be a great diminution of law costs in respect thereof, and a large increase in the important work of drainage.

The Engineer is in no sense a contractor, neither does the Statute impose any obligation on him as it does on the Corporation by Sec. 30. He should not, unless expressly charged with fraud or misconduct, or negligence amounting to fraud, have been made a party. There is nothing of the kind; he seems to have acted in good faith. Besides, as a public officer, acting within the scope of his duty, he was entitled to notice of action, which was not given. The Corporation have endeavored to "unload," as it were, upon the Engineer, and, therefore, in addition to directing judgment for plaintiff for the amount claimed with costs, I further direct [if I have power to do so, as to which the parties had better examine (See Goldie *v.* Johns, 16 A. R. 129)] that the Corporation also pay the costs incurred by Roger in his defence.

May 13th, 1895. JAMES P. WOODS, J.

In the matter of the Drainage Act of 1894 and the Point Abino Marsh Drain, and in the matter of appeal by

THE MUNICIPALITY OF THE TOWNSHIP OF BERTIE *v.* THE MUNICIPALITY OF THE TOWNSHIP OF HUMBERSTONE.

This is an appeal by the Municipality of the Township of Bertie against the Municipality of the Township of Humberstone from the report, plans, specifications, assessments and estimates of George Ross, Esquire, dated the 18th day of August, A.D. 1894, in reference to the Point Abino Marsh Drain.

Pursuant to my appointment, the matter came on before me at the Town Hall, in the village of Bertie, on the 27th day of November, A.D. 1894.

W. M. German, Esquire, appeared for the appellant,

and

R. G. Cox., Esquire, Q.C., and T. D. Cowper appeared for the respondents.

Having heard the evidence and arguments of counsel, I reserved my decision, and now, having fully considered the same, I make this my report, and give my reasons therefor as follows :—

According to the report appealed from, this drain, in reference to which the assessment is now placed upon the lands and roads in Bertie, has been completed in accordance with the profile, plans and specifications prepared by the same engineer, dated the 28th day of June, 1892.

The work was projected, begun and completed prior to the Drainage Act of 1894.

The cost of the entire work was $2,072.38.

The cost of the work in Humberstone, the initiating municipality, was $423.15.

The assessment against Bertie, the appealing municipality, is $1,302.

The report states that this drain is an outlet for seven hundred acres of swamp land and twelve hundred acres of high land in the township of Bertie, and the whole assessment placed upon lands and roads in Bertie is placed there as an outlet liability under section 3, sub-section 4 of the Drainage Act of 1894. The report does not state that these lands so assessed use this drain as an outlet, but it does state that the amount placed upon these lands and roads is for the construction of the drainage work providing an improved outlet. Upon the evidence some of the lands do use this drain as an outlet.

Upon the report of 28th June, 1892, under which this drain was constructed, its estimated cost was $1,848, and that report stated

that seven hundred and fifty acres of low or swamp land in Bertie would be benefited, and that this drain would be an outlet for one thousand and fifty high land in Bertie; but the assessment upon the whole eighteen hundred acres in Bertie was an assessment to the amount of $1,018 for benefit, and there was the further assessment of $250 for benefit upon roads of Bertie, making a total assessment for benefit upon Bertie of $1,268, or within $34 of the amount of the present assessment for outlet.

This report of June, 1892, was made at the instance of Humberstone, in consequence of a petition by W. Davidson, N. C. Michael and others asking for it Some of the petitioners reside in Humberstone and some in Bertie; and on the 16th July, 1892, a by-law was provisionally passed by Humberstone adopting this report, etc. Bertie was served but did not appeal. A Court of Revision for Bertie was established and met on the 5th November, 1892. There were many appeals, but no decision was ever given by this Court of Revision, and Bertie did not within the time limited by section 580 of the Act of 1892 pass a by-law to raise the $1,268, nor has it since done so.

The Township of Humberstone took no proceedings to enforce the raising by Bertie of this sum of $1,268, pursuant to said report.

After the passing of the Drainage Act 1894, the Township of Humberstone sent their engineer again—the same engineer, George Ross—and he made the report which is now appealed from.

The objections to the report and assessment are:—

1st. That as the drain was constructed under the Act of 1892, the present report and assessment cannot stand, and that whatever is done by Humberstone must be done only under the Act of 1892.

2nd. That the Township of Humberstone has no right to make this assessment under either Act of 1892 or 1894.

3rd That upon the facts in evidence there is no improved outlet provided, and there is no user by the lands assessed of this drain as an outlet.

In disposing of the appeal, I do not assume any jurisdiction as to the petition on the report and assessment of 1892, which was not appealed from, or as to anything else done or attempted by either township in the original construction of the drain in question or in reference thereto; and this my report is entirely without prejudice to the rights, if any, which Humberstone has against Bertie by reason of the engineer's report and assessment of 1892 and the construction of the drain pursuant to that report, but the facts in reference to that assessment are material in considering the report of 1894, objected to in this appeal.

The questions presented are difficult ones as questions of law, upon what are in the main undisputed facts.

This drain must be considered as a drain completed by the

Township of Humberstone, and, giving effect to the words of sub-section 4 of section 3 of the Drainage Act 1894, that township, if the facts warrant it, has jurisdiction and may assess. The words of sub-section 4, section 3, are, as applicable to this case—

(1) If the lands of any individual use this drain as an outlet; or (2) If this drain provides an improved outlet for the lands of individuals, such lands may be assessed and charged for construction and maintenance. No petition is necessary.

Section 3, sub-section 1, authorizes the Council of Humberstone, and without the petition in the cases provided for by sub-section 4, to procure an engineer or O.L S. to make an examination of the area to be drained, etc., and to prepare a report, plans, etc., and to make an assessment within the area to be benefited, and of any other lands and roads liable to be assessed as hereinafter provided, i e., for "injuring liability" or for "outlet liability."

There must be, to give the Council jurisdiction, an area to be benefited and lands assessed for benefit, and then, as incidental to this, and as necessary to do complete justice, the engineer is at liberty to assess other lands liable to be assessed for "injuring or outlet liability."

The instructions given to the engineer by the Township of Humberstone are not in evidence, but the report starts as if the instructions were only to find out Bertie's supposed liability. That may have been, and no doubt was, the object; but, to do this, the engineer must first find out the liability of the lands and roads to be benefited within the area to be benefited. In the absence of evidence to the contrary, I shall assume that the instructions by Humberstone to the engineer were simply to proceed under the statute and do as therein directed, and that the engineer has done so. It is true that the report is silent as to any lands benefited, but there was not put in evidence the assessment of 1894 placed upon lands and roads in Humberstone, and as Humberstone is the initiating municipality, and this appeal is only as to assessment of lands and roads in Bertie, I must assume that the engineer has, as to the lands and roads in Humberstone, done what the statute requires.

I am therefore of opinion, and so report, that, as to this drain, the Act of 1894 applies, and the Township of Humberstone could, under section 3, sub-section 4, send on the engineer and make the assessment as therein directed.

I find, and so report, that an improved outlet has been provided for the water from the lands and roads in Bertie.

The amount seems to me very large. I would be much better satisfied with a smaller amount, but, as Mr. Cox argued, there is no evidence before me upon which I could make, with any such certainty as would satisfy myself, any different apportionment. Were I to

make the attempt it would be only by going over the whole assessment parcel by parcel, and practically doing the work of the Court of Revision, and this the statute expressly says I shall not do—see sec. 89, sub-sec. 3.

The scheme does provide an improved outlet. It may not provide a sufficient outlet for the draining of the marsh lands in Bertie. If that is to be done it can only be done by a work much more extensive and costly than the present, and that can be done by the Township of Bertie upon the petition of the majority of owners of lands to be benefited in the described area. If, in doing such a work, other lands are benefited, or if lands should be charged for "injuring liability" or for "outlet liability," the engineer will bring them in. Upon the evidence, even that of the engineer called by the Appellant, I cannot say that this work should be carried to an outlet in the initiating municipality or elsewhere.

To carry it to an outlet in Humberstone, on the west side of Point Abino, would be an expensive work, and it would be very difficult to keep open owing to the action of the prevailing south-west winds and storms upon the sands of the shore on that side of the Point. No evidence was given of the cost of carrying the work to "Nigger Head," and no sufficient evidence that the result of taking this drain there would be more beneficial.

In this case it is important to notice that according to evidence of George Ross, who was engineer for both townships, many people in Bertie who are now assessed were anxious to have this drain made and they signed the petition to Humberstone for that purpose. It is true that some of these signers say they did not suppose the outlet would be where it now is, but that is not important. The outlet was for the engineer to find. These persons who signed the petition for the work, and who got the benefit of it, much or little, by way of improved outlet, now that the work is done, ought not to object. They knew that Humberstone was doing the work, and probably knew that Bertie was not appealing against the report of 1892.

Humberstone went on in perfect good faith with the work.

It is not suggested by Appellant that this work was done at the instance of a few in Humberstone for the purpose of getting any advantage over Bertie, so I do not regret that, although the case presents many difficult questions, I am able to satisfy myself that the report and assessment should be sustained.

In saying this about the petition I am not pronouncing upon its validity or otherwise; I am dealing with the action of the Municipality of Humberstone as upon a completed drain, and upon an assessment as against lands whose outlet is improved.

I report and order that the appeal should be dismissed for reasons given herein. I do not think it is a case in which costs should be given against the appellants.

I report, order and direct that the report of George Ross, engineer, dated the 18th day of August, A.D. 1894, and the assessments made

by him upon lands and roads in the Township of Bertie for an improved outlet be confirmed.

I report and order that each party shall bear and pay its own costs of this appeal.

I direct that the sum of four dollars shall be paid in stamps to be affixed to this my report by the Township of Humberstone.

All of which I report and certify.

Dated at Kingston this eighteenth day of February, A.D. 1895.

(Signed) B. M. BRITTON,

Referee.

STRATFORD, OCT. 31ST, 1895.

DEAR SIR,—

At the last meeting of the County Council of the County of Perth, certain amendments to The Ditches and Water Courses Act and to The Drainage Act, 1894, were discussed, and a committee was appointed to draft amendments to these Acts in accordance with the resolutions of the Council with instructions to forward the amendments to the different County Councils in the Province for their consideration.

I enclose you a copy of each amendment for the consideration of your Council, and ask you to lay the same before them with the request that if the amendments are in the opinion of your Council thought desirable that the members in the Local House representing your County may be instructed or requested by your Council to assist in the Legislature in having the proposed amendments carried through.

In reference to the proposed amendments of section 3, of The Ditches and Water Courses Act, the reason for this amendment is the difficulty now experienced in determining who is or who is not the owner. Under the Municipal Drainage Act an assessed owner whose name appears as such on the last revised assessment roll counts for or against a petition. Why should not the same simple mode apply to ascertain who is the owner under The Ditches and Water Courses Act?

The reasons given for the amendments to section 5, of the Ditches and Water Courses Act, are that numerous drainage schemes have been burked by reason of the 7 lot clause. The Municipal Council should certainly be capable of determining whether or no a ditch should be allowed to go beyond 7 lots.

As to the Municipal Drainage Act of 1894, the amendments to sections 16 and 17 proposed are to set at rest doubts raised as to the necessity of the notice to consider the report in cases where the proceedings are to repair a drain already constructed.

The amendment to section 56 is intended to give finality to a by-

law and put the by-law beyond the reach of the Courts to quash it after the municipality has incurred financial obligations.

The other amendments as to matters of procedure and the last amendment to section 101 is, as you will observe, intended to curtail the number of appeals now possible.

WILLIAM DAVIDSON,
Clerk.

AN ACT TO AMEND THE DITCHES AND WATER COURSES ACT, 1894.

Her Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:

1. Section 3 of The Ditches and Water Courses Act, 1894, is amended by striking out the 8th to the 14th lines thereof, inclusive, and inserting in lieu thereof the following words: "Owner" shall mean and include the owner as appears by the last revised assessment roll, any person authorized in writing by such owner to sell, convey, manage or lease the lands, and a Municipal Corporation as regards any highways under its jurisdiction, but if the owner appearing as such by said roll be dead, or has ceased to be owner, then in case the actual owner file with the clerk of the Municipality a Statutory Declaration that he owns the lands, or in case the executor or executors or administrator of such deceased owner file with the Clerk of the Municipality, a Statutory Declaration of such death, then "owner" shall in such case mean the actual owner or executor, executors or administrator making such declaration instead of the owner as appears by the roll.

2. Section 5 of the said Act is amended by inserting after the word "ditch" in the sixth line thereof, the words, "or after at least three clear days' written notice has been given to the owners of all the lands to be affected by the ditch, of intention to apply to the Council for such authorization."

3. Section 6, Sub.-Sec 1, is amended by inserting after the word "ditch" in the fourth line thereof the words "or such greater distance as the Council on application of the Engineer after notice to all concerned shall sanction."

AN ACT TO AMEND THE DRAINAGE ACT, 1894.

Her Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:

1. Section 16 of the Drainage Act 1894 is amended by striking out the words "within the area described in the petition" in the second line thereof.

2. Section 17 is amended by inserting after the word "and" in the fourth line the words "if there be a petition."

3. Section 56 is amended by striking out the words "notwithstanding the by-law be afterwards quashed or declared illegal in any proceeding" in the last three lines thereof, and inserting in lieu thereof the words "or be made unsuccessfully in whole or in part, and after the issue and sale of such debentures the by-law for the construction or repair of such drainage work shall not be quashed or set aside on any ground whatever."

5. The following sub-sections are added to section 61 :—

(2) After the Council of the initiating municipality has finally passed its by-law for the construction of the drainage work and the ten days limited for giving notice of intention to make application to quash the same has expired, and no such notice has been given, or, if the notice has been given and the application be not made or be made unsuccessfully, the Council of the initiating municipality shall serve the head of the municipality, upon whom the said report, plans, specifications, assessments, and estimates have been served, with a copy of the by-law of the initiating municipality, together with a certificate of the clerk of the initiating municipality that no notice of intention to move to quash the said by-law had been served within 10 days after the final passing thereof, or if served that no application was made or was made unsuccessfully as the case may be.

(3) The head of the municipality so served shall forthwith cause a meeting of the Council of his municipality to be called to hear the report read and considered, and the Clerk of the municipality shall notify all parties assessed within the municipality by mailing to the owner of every parcel of land within the municipality assessed therein for the drainage work a circular or post card, upon which shall be stated that a report and assessment has been served on the head of the municipality assessing the lands of the owner to whom such circular or post card has been sent and the date of the Council meeting at which the report will be read and considered, which shall not be less than seven days after the mailing of the last of such circulars or post cards.

6. Section 62 is amended by striking out the word "four" in the seventh line and inserting in lieu thereof the word "two," and inserting in the eighth line after the word "service" the words "of such copy of by-law and certificate."

7. The following sub-sections are added to section 101 :—

(2) There shall be no appeal to a divisional court from any judgment, decision or verdict rendered in any court in any action for damages or compensation or for an injunction or for any cause of action arising by reason of anything done or to be done or omitted to be done in respect of drainage under this Act, but such appeal shall

be to the Court of Appeal for Ontario, and no appeal shall be allowed from the Court of Appeal.

(3) In case of appeal no printed copy or copies of appeal books shall be necessary or allowed, but type-written copies of the appeal case, as in appeals from the County Court to the Court of Appeal, shall be used instead of printed appeal books.

REPORT OF COMMITTEE ON TOPOGRAPHICAL SURVEYING.

MR. PRESIDENT,—In the Report presented by this Committee a year ago, the Association was informed of the letter of enquiry sent out to the different nations of Europe and to the United States requesting each to give briefly the advantages of having proper topographic maps from a commercial and from an agricultural standpoint. Replies have been received during the year from the United States, Great Britain, Norway and Sweden, Russia, and Germany.

Some of these replies are of little value, while others are important. They are herewith laid before you.

It was found impossible to convene a meeting of the Committee until about a month ago when a draft memorandum was decided upon, and a sub-committee appointed to present it to the Commissioner of Crown Lands.

On February 11th this Committee had an interview with the Commissioner, and laid before him some facts respecting the work done, and being done, by other civilized nations in mapping their respective countries.

We also pointed out the fact that the maps of Ontario now issued by the Department of Crown Lands, and the other Government Departments, were a disgrace to the Province, and not equal in accuracy or in their general cartography to those issued by the Governments of the other Provinces, a large share of which disgrace falls unfortunately upon the Surveyors of this Province, and therefore upon this Association.

The Commissioner was requested to look into the matter, and if possible to urge the Dominion Government to at once proceed with the Primary Triangulation work in this Province, as Ontario would be ready to proceed with the Topographic Survey as soon as the Triangulation work had been commenced.

Ontario is the most important Province in the Dominion, and it should be the first to reap the advantage of a geodetic survey as a basis for Topographic work.

The Committee and the Association are deeply indebted to the Director of the United States Geological Survey Department, Washington, D.C., for a number of sheets, representing portions of the States of New York, Vermont, Pennsylvania, New Jersey and Con-

necticut ; all varieties of topography being shewn in mountainous, level, rural, suburban, and urban districts.

A proper Topographical Survey can be made of our Province on a scale of about one mile to an inch, for less than ten dollars per square mile, this sum including Primary Triangulation work and lithographing. Primary Triangulation work would cost about two dollars per square mile, leaving eight dollars per square mile for topographic work and mapping.

Each member of the Association should constitute himself a standing committee to educate the legislators representing his constituency, the members of County Councils, and the general thinking public, on this important matter.

Half-civilized Japan has now inaugurated such a survey, and we should make every effort not to be the last civilized nation to delineate properly our glorious birthright.

WILLIS CHIPMAN,
Chairman.

REPORT OF THE LAND SURVEYING COMMITTEE.

Your Committee begs to report as follows:—

We regret to say that very few questions, this year, were sent in to the "Question Drawer" for solution; and, as a result, the work has been inconsiderable. The questions and the answers to them are annexed hereto. We would again try to impress upon our members the importance of giving all the facts obtainable about the questions which are submitted to this Committee, or intelligent answers cannot be expected.

We are glad that a special committee has been formed to look after the required amendments to the "Survey Act," etc., at the next Revision of the Statutes of the Province in 1897.

Respectfully submitted,

T. B. SPEIGHT,
Chairman.

QUESTION DRAWER.

Question 1.—What part of a post and board fence should be the division line between lots?

Answer.—"Held that a boundary fence, under R S.O., Ch. 219, should be so placed that when completed the vertical centre of the board wall will coincide with the limit between the lands of the parties, each owner being bound to support it by appliances placed on his own land."

Question 2.—Is there any "legal ruling" defining what particular part of fence a Surveyor shall take in such a case?

Answer.—Cook vs. Tate (Chancery Division), Part III., Vol. XXVI., pages 403, 1895.

Question 3.—Twenty years ago last November I was called upon to run the line between lots 5 and 6, in the first concession of ——— Township. The line was to run from west to east. There was no post to start from; but the owner of lot 5 showed me a post between 4 and 5 which he said was where the original post had stood. He was an old settler. There was no dispute about the post, and I did not feel that I ought to raise any question of its accuracy. There was also an original line between lots 6 and 7. I made an equal division of the two lots, and ran the line between 5 and 6. The concession is 66.67 chains deep. About 20 chains of the west end of the line was through a clearing; and when I entered the woods I found I was on an old line which mine followed to the rear, when I struck what was evidently an original post, and the line between the same lots running from it in Concession 11.

The accuracy of the post between lots 4 and 5 was never questioned till last October, when another Surveyor was employed to run that line.

Both the man who employed me and all the other original settlers are dead, and there is now no one to testify to any original post in the locality; and, because there was no one now to swear to the post, the Surveyor went a lot further south and divided lots 4, 5, and 6, moving the post between 4 and 5 nearly one chain north on to lot 5, and ran between 4 and 5.

I was sent for since, and ran the line from where I had made the survey twenty years ago. The owner of lot 4 now threatens the owner of 5 with a suit. Which is correct?

Answer.—The first survey was probably correct, but the decision of courts is uncertain.

DISCUSSION.

Question 2.—Mr. VanNostrand—The judge held in this particular case each owner had to build half the fence. The man who built the front half, would put the centre of the boards on the line and the posts, or whatever means there was of holding it up, all on himself, and the case would be reversed at the rear half. But the centre of the boards was taken.

Question 3.—Mr. Dickson—Whenever I go to make a survey I do not think it is my duty to travel all over that concession line if I find any dispute. If I find the parties say, "There is where the post stood," I take it at once as being correct, and I do not think the law requires me to take affidavits. In this case I accepted the post as correct and there has never been any question since that survey until last season, when another surveyor was brought along, and no person now could swear that the post stood there.

REPORT OF THE COMMITTEE ON STANDARD MEASURES.

GENTLEMEN,—Your Committee on Standard Measures begs to report as follows: During the past year the Chairman addressed a memorandum to the Inland Revenue Department, setting forth the various difficulties under which the question of a working standard at present rests A reply was received from Mr. Miall, the Commissioner of Inland Revenue, in which an acknowledgment of the difficulty was made, and asking for data as to the most suitable form for a remedy of the trouble. Capt. Deville, the Surveyor-General of Dominion Lands, very kindly explained the procedure in connection with the furnishing of Certified Standards to Dominion Land Surveyors. We shall have to ask that we be continued for another year, as we find that, among other things, we will have to secure a change in the Dominion Act respecting weights and measures.

We have much pleasure in acknowledging the courtesy extended to us by Mr. Miall and Capt. Deville.

Respectfully submitted,

M. J. BUTLER,

Chairman.

When handing in the Report of the Committee on Standard Measures, Mr. Butler said: I feel it is the duty of this Committee to ask the Association to continue their appointment, because they have rather a serious task ahead of them, inasmuch as they will have to ask the Dominion Government to amend an Act of Parliament in order to bring the measure to a rational basis. I was in Montreal two weeks ago in connection with the Committee on Standard Measures which has been appointed by the Canadian Society of Engineers, and examined, at McGill College, a Comparator, made for the express purpose of comparing standards up to 50 feet in length. It is simply a travelling slide mathematically exact, and in perfect line and level with a travelling microscope, so that it is possible to compare, with the true standard, to a tenth, hundredth, or one-thousandth part of an inch continuously from one end of a tape to the other. I do not think any similar instrument is to be found in Canada. Certainly the method described by Capt. Deville is rough in the extreme when compared to that. It, therefore, seemed to me that if in McGill College such an accurate machine is to be had, it is a pity the country should lose the benefit of it, and that the work that could be done is of no use without bearing the stamp of the Government on it. And the same way in Toronto University a good deal of the work has been done. Piers have been put up for a great many years, and they are in a permanent condition in the School of Practical Science. I understand

the University authorities intend to complete that standard 100 feet measure, and mount microscopes and correctly mark and stamp measures. It seems to me we ought to be able to take our measures here in our own Province and at our own University, and have a legally correct stamped measure instead of having to send for our tapes down to Ottawa.

DISCUSSION.

Mr. Sankey—I am very much pleased indeed with the work this Committee has done. Some years ago I looked into the matter myself with regard more to the standards of measures than to the correcting of surveyors' tapes. The information obtained by this Committee is most valuable. I would like to ask Mr Butler if he has any idea what the expense of this testing machine or comparator, as he calls it, in McGill College was.

Mr. Butler—It is put up there at the expense of the University, and they would be very glad indeed to do the work at a very trifling sum.

Mr. Sankey—My object in asking the question was because the Examining Board of our Association is at home in this building, and it is here our meetings are held. And I consider the Board of Examiners or some official of our Association would be the proper authority to grant the certificate. I think, in connection with the School of Practical Science, it would be very easy to make arrangements whereby the tapes that already belong to Surveyors could be examined; or, on the Surveyor receiving his diploma, he should bring a suitable tape and have it tested, and a reasonable fee should be charged. A man should take as much care about possessing a properly graduated or stamped tape as in having a good theodolite. I do not think it is a hardship on any person entering the profession to pay a suitable fee for testing his tape. As far as I am concerned, I would like to insist on getting this standard here in Toronto, either in the School of Practical Science or in connection with the University. The Examining Board of the Ontario Land Surveyors should have access to this for the purpose of testing the tapes. It might be advisable that the Ontario Land Surveyors' Association should apply to our own Government here in Ontario and get a grant, and perhaps the University authorities would also assist; and in that way we can very soon establish a good testing apparatus, and whatever fees may be charged would pay expenses. I would like to hear some expression of opinion from the members present, or later on during the meeting, on this subject.

Mr. Abrey—Some years ago I went to see the Inland Revenue Inspector and had the same conversation with him then that I have had now. At that time he did not think it was his duty to inspect the Surveyors' instruments in any way. However, when this question came up Mr. Butler wrote to me and I went to see Mr. Miall

again, but he has never made any tests of Surveyors' instruments. They stamp steel tapes down here at the Inspection Office. They do not stamp cotton tapes but they stamp those that have wires running through them the same as steel tapes. Have they the right to do so under the Inland Revenue Act? They stamp all lengths. And the only means they have there is a wooden bar something like that furnished the Surveyors here by the Board of Examiners, and they have also one 10 feet long, simply the same thing, only it is a little longer, and the assistant down there stamps everything that comes before him except Surveyors' instruments. The assistant seemed to think Surveyors ought to go there and get them stamped. Speaking with Mr. Miall he did not think so. He suggested I should write to him and he would formally deliver the letter to the Commissioner, and I wrote to him, and the answer I got from the Commissioner Mr. Butler has read. I made several suggestions very much in the line of Mr. Butler's, and although the answers came a little different from what he got yet they were very much the same.

Mr. Sankey—I would move the Committee be asked to continue somewhat on the lines I have suggested. I think it is for us to take the initiative, and whatever proceedings the committee feels inclined to recommend the Association should try to carry out.

Mr. Butler—The only thing is this, it is, in itself, a delicate operation requiring a certain amount of care and it is handling a delicate mathematical instrument, the comparator. I thought if the secretary, for instance, by his mere presence saw that the professor in the college, who has charge of the particular instrument, did his work, though he himself should not touch the screws or attempt to handle it, but to look through the microscope and see the standard there, and he might spend a sufficient time verifying with the college authorities, the basis of standard, and thus his mere presence ought to be sufficent, and the work would be done in the college itself. That is the practical way of doing it. You cannot take and fasten a tape down at one end and the other and then measure it and say that tape is correct or it is not correct. It is well to know, with so many pounds on it, and at such a temperature, what is the exact length of the tape. It seems to me the standard measure ought to be uniform from one end of Canada to the other, without any variation.

Mr. Sankey—I would suggest also that when these details are thoroughly discussed and in proper shape it would be good for candidates who pass the examination, when they get their standard tapes, to be instructed either at the school or wherever the testing apparatus is, as to the proper mode of conducting a comparison between the subsidiary standard and the working tape. This is a matter that can be easily brought before their notice then. A good many of our candidates now are graduates of that school, and it is a matter which I think might come up very properly as a suggestion from this committee.

Mr. George Ross seconded the motion of Mr. Sankey to continue the committee. In doing so he said: I might give a little account of how they do it on the other side of the line. During Christmas holidays I happened to be in the office of the City Engineer in Niagara Falls, New York, and he showed me a standard tape that he had for testing his working chains and so on, his working tapes. This standard tape, 50 feet long, was furnished him by the man who made his working tapes free of charge. To all his customers he sends a little standard tape, and then the Engineer sends this tape to Washington and has it tested by the Department there having charge of that matter, and they send him back the tape which perhaps has a number on it, and a certificate giving the shortage or overplus in the tape. It seems to me if that is done in the United States, we certainly would not be burdening the employees of the Inland Revenue Department at Ottawa by sending down our tapes and having them tested free of charge. It seems to me the machinery is provided now; all we have to do is to insist on their having the standard down there to test these with. It would be much better on going into court to have them stamped by the authorities.

Mr. Sankey—The older tapes of old surveyors have in many cases been broken and have been mended, and a tape of that kind I do not suppose they would attempt to give you a certificate on. You want to have an unbroken 50 foot tape at the very least.

Mr. Abrey—I do not think it would be well to have a small and larger one, but I think the tape should be a new one without a flaw, and handles on it if you wish, and graduated at certain points.

At 4:30 o'clock p.m. adjourned to 8 p.m. at the School of Practical Science.

REPORT OF THE ENGINEERING COMMITTEE.

To the President and Members, Association of Ontario Land Surveyors:

GENTLEMEN,—Your Committee on Engineering begs to report as follows:—

That whereas our Corporation was formed as the Association of Ontario Land Surveyors and protects its members and the public from unqualified persons attempting to practise as Land Surveyors; and whereas the examination for admission to practice already requires a wider knowledge of Engineering than simply that which appertains to surveying of lands; and whereas many of the members of our Association are now acting as Engineers to various county, township, village, town and city municipalities; and whereas, at the present time, any person, whether qualified or not, may represent himself to be a civil engineer and attempt to perform the duties of the engineer under The Ditches and Water Courses Act, The Drainage Act, The Municipal Act, and other Acts of the Ontario Legislature;

and whereas there is no provision in the Municipal Act requiring municipal councils to have an Engineer report upon the necessity for and advisability of any work proposed to be constructed, but said Act requires that estimates of the intended expenditure for certain public works, as, for instance, water-works, shall be published before the passing of a by-law authorizing the construction of the same, and no provision is made that these estimates shall be prepared by a competent person.

Your Committee therefore recommends the consideration of the advisability of enlarging the scope of the Association so as to include all Municipal Engineering, and that your Committee be authorized to enter into such correspondence and take such further action upon the matter as may appear necessary and report to the Association at the next annual meeting.

All of which is respectfully submitted.

HERBERT J. BOWMAN,
Chairman.

Toronto, Feb. 27th, 1896.

In moving the adoption of the report Mr. Bowman said :

In regard to the principal thing referred to, the advisability of some action being taken to improve the standing of the Municipal Engineers in this Province, it of course must be understood that any action taken must not be such that would endanger the standing of our present Association. That, as far as land surveying is concerned, may be considered perfect, but we know that at the present time there is a movement on behalf of the National Engineering Society to gain some official standing throughout the different Provinces of the Dominion, and it seems to me that our Association has already the ground work of an organization to protect the whole of the engineering profession. It has been said that Civil Engineering includes everything except military engineering. Well, it would be manifestly impossible to secure a close corporation to protect, under one class, all the civil engineers, mechanical engineers, electrical engineers, hydraulic engineers, sanitary engineers, and so on, by one association, and it does not seem necessary that that protection should be secured for engineers working for private corporations. Private corporations have their practically permanent heads, and are competent to look out for themselves, to secure men of ability, whereas municipal corporations are not. Their affairs are administered by men who are changed from year to year, and often by an entirely new set of officials, and they are not in a position to guard the interests of the municipalities which they serve. All that is required is some protection for those practising as municipal engineers ; that is, in the construction of water works, sewerage works, road improvements and works of like nature which are paid for out of the taxation of

the different municipalities, and this field could be easily covered by an extension of our Land Surveyors' Association. A great many of the members of our Association now depend to a large extent on their engineering practice. In looking round at the members, we see there are very few indeed who live by their surveying practice alone. In most cases, but a very small proportion of their income is derived from the survey of lands, and it seems to me that the interests of its members both now and still more in the future will be benefited by an extension of the scope of our Association to take in municipal engineering, and secure to municipalities competent men to design and construct the different works. Seconded by Mr. T. Harry Jones.

Mr. Butler—I used to be a member of the Council of the Civil Engineers and one of the Special Committee entrusted with laying before the Ontario Government the proposed Bill for the Canadian Society of Civil Engineers. The purpose they have in view is, of course, to form a somewhat similar corporation to what this now is. That is, that they may be able to control examinations and to proscribe the practicing of unqualified persons as Civil Engineers. There is no immediate intention of asking for a bill. One has been prepared which it is intended to submit to the members of the Government to get their views as to whether such a Bill would be acceptable or not, and this is all that has been done, or is proposed to be done, during the current year in Ontario and in Quebec. I may say that so far as I could gather at the meeting in Montreal nearly all the members present were afraid of it. They felt that engineering is not a profession that is limited to any one Province, or any one country, and what is good engineering in Ontario is good engineering in India, and only the little peculiarities of local knowledge alone would influence a man in practising here or in any other part of the world. It is different from land surveying. Land surveying is purely and simply a local profession. Engineering is not, and it was felt, by the members at any rate, that it was an extremely dangerous thing, that perhaps Ontario would pass one Act, Quebec another, Manitoba another, and it would debar the consulting engineers from acting out of their own Province, and I think perhaps when submitted to a vote, it would be thrown out even in the Society itself, but in the meantime the purpose of it is to acquire some notion as to the feeling the Government has towards such a measure. It seems to me it is an extremely troublesome time to approach the Legislature for anything in the shape of a sweeping change in our Act, but by an addition of three or four words the object might be effected. I have had some experience before the Legislature two or three times in getting Bills through, and sometimes a word or two can be altered without difficulty. If we could get the word "mechanics" and perhaps one or two other words added to our Act for the final examination we will take care of the rest. We can send up from our Board of Examiners men who are qualified for the office, but I do not believe the Legislature ought to, nor do I believe they can, be compelled to force municipalities to

employ one particular man. I had occasion last year to go into the Slides Act very carefully. The Government provides proper machinery for the working of the Act, but there is no provision for enforcing it. I see no reason why our surveyors should not become a similar body to what is known as the Borough Surveyors in England. The institution there embodies every practising engineer of any ability in the country. The fact of the matter is, that the Society there, while it is not a close corporation, is such that a man who is not a member of the Society cannot earn a day's living, but the Borough Surveyors have to pass a stringent examination, somewhat similar to ours, and they are to-day doing all the railroad work in England, and sanitary work even in large cities like Liverpool and Manchester.

The President stated he had been requested to inform the meeting that the widow of Mr. Francis Bolger, an old member of the Association, was anxious to dispose of some instruments. He also stated that Mr. Esten had been requested at the last annual meeting to compile some cases that had been in court. Mr. Esten had done so and had taken a great deal of trouble. He had sent in a report of a good many cases, and he proposed that they should be printed as an appendix to the proceedings, and that the thanks of the Association be given to Mr. Esten for his work. The President also referred to the opinion held by the Hon. Sir Oliver Mowat on the Bill relating to Boundary Commissioners presented to him. He could not agree with its provisions in every point, and thought it was rather a dangerous thing to refer to one surveyor alone, but at the third reading it might be put into some shape to make it workable.

REPORT OF ENTERTAINMENT COMMITTEE.

MR. PRESIDENT,—Your Committee on Entertainment for this year has to submit the following report:—

An invitation having been received from the Secretary of the School of Practical Science to hold one or more of the sessions of this annual meeting in the School of Science building, and the Repository of the Association having been sufficiently furnished for a small session, arrangements were made, with the consent of the Council of Management, to hold the committee meetings and the first session at the Repository, the second at the School of Practical Science, and the remaining sessions at the Canadian Institute as usual.

This arrangement was, we believe, satisfactory and served every purpose, giving the members the benefit of the attractions at the two former places of meeting and at the same time allowed the business sessions to be held in the most central part.

The attendance at the annual dinner, held at McConkey's, suffered somewhat from the counter attraction of the Peary lecture, but all present appeared convinced that this enjoyable feature of the annual meeting of our Association should not be omitted unless for urgent reasons.

The chair was occupied by the President, Mr. M. Gaviller, and the vice-chair by Mr. Willis Chipman, Vice President. The invited guests present were: Messrs. Aubrey White, Assistant Commissioner of Crown Lands; A. Blue, Director of Mines; Kivas Tully, Government Architect; Prof. Coleman, Geologist for Ontario Government; Mr. G. M. Campbell, President of the Engineering Society of the School of Practical Science; Mr. Willison, of *The Globe*; Mr. McKeshnie, of *The Mail and Empire*; and Mr. Canniff, of *The Buffalo Express*.

Letters of regret at their inability to accept the invitation of the Association were received from the Hon. A. S. Hardy, Commissioner of Crown Lands; Messrs. Walter Beatty, M.P.P., E. A. Little, M.P.P., Robt. Paton, M.P.P., Thos. Monro, Past President of the Canadian Society of Civil Engineers; H. B. Gordon, President of the Ontario Society of Architects; Henry Montgomery, Professor of Science, Trinity University; Dr. Parkin, Principal of Upper Canada College, and Mr. E. H. Keating, City Engineer, Toronto.

Due appreciation of the bill of fare provided by our host was succeeded by the following programme:—

Toast, "The Queen," proposed by the Chairman.

Toast, "Canada," proposed by the Chairman, responded to by Mr. Kirkpatrick.

Toast, "Ontario Legislature," proposed by the Chairman, responded to by Messrs. White and Blue.

Toast, "Engineering Societies," proposed by the Chairman, responded to by Mr. Kivas Tully, Prof. Galbraith, Dr. Coleman and Mr. Campbell.

Recitation, "My Boys," by Mr. T. Harry Jones, Vice-President elect.

Toast, "Our Association," proposed by the Vice-Chairman, responded to by Mr. Sankey, Chairman of Council, Messrs. Niven and Butler, Past Presidents, and Mr. VanNostrand, Secretary.

Song, "Bonnie Dundee," by Mr. Niven.

Volunteer Toast, "The Inspector of Surveys, Mr. Dickson," proposed by Prof. Galbraith, responded to by Mr. Dickson.

Volunteer Toast, "The Polar Committee," proposed by Mr. VanNostrand, responded to by Mr. Chipman.

Volunteer Toast, "The Entertainment Committee," proposed by Mr. Butler, responded to by Messrs. Ellis, Walker and Murphy.

Toast. "The Ladies," proposed by the Vice-Chairman, responded to by Messrs. Whitson and McMullen.

Chorus, "Auld Lang Syne," closed the evening's entertainment.

Your Committee takes this opportunity of expressing thanks to the "Peary Lecture" Committee for a donation of $24.00 towards defraying the extra expenses in connection with the dinner.

A statement shewing receipts and expenditure of this Committee, together with vouchers, has been filed with the Secretary of the Association, where they may be examined by any member.

All of which is respectfully submitted.

H. D. Ellis,
Chairman.

PRESIDENT'S ADDRESS.

GENTLEMEN,—It is my pleasant duty, whilst welcoming you to our fifth annual meeting since incorporation, to congratulate the Association on its satisfactory progress, as to increased membership, financial condition, and the activity of the individual members. We have to regret the removal by death, during the past year, of two of our fraternity—Leander M. Bowman (a withdrawn member) and Francis Bolger. A tribute to their memory will be found in our obituary notices.

Whilst the prosperity and fellowship of an association such as ours depends largely upon the judgment shown by the executive; its life and development depend, if anything, still more upon the activity of the different committees.

The importance of sending in questions to the Land Surveying Committee for decision must be patent to all, as most useful both to the old and new members of the profession.

The effect of the several Drainage Acts being now in a workable form instead of chaos, has resulted in their being better understood by the township councils and applicants for drainage. This is a great help to the township engineer, and also reduces the chance of appeal from awards made in these cases.

The importance of having a topographical survey of our Province made has now become pretty generally understood. Your committee having the promotion of this work in hand have taken steps to advance the project, and their report may be looked forward to with interest. Steps have been taken by your Committee on Standard Measures to have the apparent conflict of regulations as to this matter settled.

The Committee on Polar Research, from recent dispatches, may be forestalled in being the first to arrive at their long-looked-for destination, but undoubtedly, even should this prove to be the case, they will still find many and useful developments to instil continued warmth into their laudable desire for research. That the efforts of your other committees have been successful is best manifested by the increased interest shown in our annual dinner, by the attractive and improving pages of our Annual Association Report, and the several reports submitted.

And now a word as to the Board of Examiners. The report and published examination papers give all information as to examinations, number of applicants, and expenses incurred, but it should, I think, be better understood that there is an important difference between the duties of your examiners and those holding a similar office at other public examinations: in that the papers for an O.L.S.'s examination have to be all looked over and reported upon, and each candidate's standing decided, during the term of the examination; whilst other examiners, as a rule, have several weeks in which to

perform this duty. This entails the attendance of a quorum of the Board during the progress of the written and oral examinations and gives constant work during their continuance. It is most satisfactory to bear record to the high qualifications of the candidates for admission to our profession.

Would it not be as well for us to add to our Special Committees one to compile "cases" connected with our profession that have been decided in court? A number of such cases are kept on record by the older members, and these, if collected and published, would be most useful to the profession generally.

Our biographical researches record what a land surveyor was in bygone times, and what were his experiences. Does not the trend of the papers published in our Annual Report, and the prominent positions now occupied throughout the Dominion by members of our Association, bring clearly before us the subject of evolution as applied to the land surveyor? This popular topic now being studied in connection with so many different subjects, and the principle of change and advancement being so universally recognized, we cannot but find it an interesting subject for consideration in connection with the development of the O.L.S. of the future. Of their loyalty to their Queen and country, land surveyors have in the past given ample assurance. May we, whether it be to define or defend our boundaries, be all found faithful at the post of duty.

M. GAVILLER.

PAPERS.

[*This Association is not responsible as a body for any opinions expressed in its Papers by Members.*]

THE USE OF CONCRETE FOR BRIDGE FOUNDATIONS.

BY J. DEGURSE, C.E., O.L.S.

Windsor.

THE great value of concrete as a sub-stratum for stone masonry in foundations upon damp and yielding soils, and where foundations are built in water, has been universally recognized; but many Engineers are now using concrete for the entire foundation of bridges, such as piers, bridge seats, copings, etc.

When properly made it possesses the qualities of strength and hardness, in an almost equal degree with the best stone masonry, and is superior to second class masonry in these respects, while it has been known to stand the disentegrating effects of the atmosphere, and the abrasion of running water, much better than some of the harder specimens of stone.

The prejudice against the extensive use of concrete for foundations that so generally prevails has doubtless been due to failures caused by improper mixing and handling, or to lack of care in the selection and proportioning of the ingredients

In bridge foundations the concrete is composed of cement, either native or Portland, and the aggregate which is usually sand and broken stone or gravel.

"Trautwine states, that in a heap of stone piled loosely or in dry sharp sand the voids occupy from thirty to fifty per cent of its mass. To get the best results from concrete the voids in the aggregate should be slightly more than filled. A proportion very generally recommended by text books, is one volume of cement, three of sand and five of broken stone or gravel. But in most cases and especially where the concrete is exposed and is above the surface of the ground I would recommend an increased quantity of cement.

Owing to the limited number of quarries in Western Ontario, where suitable stone for bridge masonry can be procured, the owners of which, practically control prices for such work, and in accordance with their likes and dislikes of the Engineer employed, are tempted to fix the prices arbitrarily for stone masonry. I therefore believe

that the Engineers of Ontario owe it as a duty to their clients to study carefully the merits of properly made concrete, and to apply it in place of stone masonry wherever it is possible. If this practice was followed it would only be a short time before the owners of quarries would recognize the fact that strong competition lay within reach of every Engineer At present the price is at least thirty per cent lower than the masonry. And if once convinced that it is as good for all practical purposes, it should require no further argument to induce Engineers to use it.

During the summer of 1895 I was requested to prepare plans and specifications for three steel viaduct bridges on the London and Port Stanley Railway.

No. 1, over Kettle Creek, consisted of fifteen plate girder spans, each thirty-six feet in length, excepting the two end spans, which were twenty-eight feet in length, and one truss span of eighty-five feet over the Creek. The girders rested on columns braced together transversely to form bents, each pair of which was braced together to form towers, the bents varying in height from sixteen to sixty-two feet.

No. 2 was over Mill Creek, south of St. Thomas, similar to No. 1, but had no truss span.

No. 3 was over Zavitt's Pond, near Port Stanley, and has a total length of 228 feet.

The sub-structure for each of these bridges consisted of a masonry abutment at either end, and a pier or pedestal under each column. The abutments were composed of stone masonry to the depth of ten feet beneath the bridge seat, resting on a bed of concrete of sufficient depth to reach a hard clay foundation.

Each of the pedestals was composed of concrete surmounted by a stone cap four feet by eighteen inches in depth, and pierced with two anchor bolts one and one-eighth inches in diameter, and four to five feet long.

I should have perferred to have dispensed with the stone cap, but had to give way somewhat to prevailing prejudice. The concrete pedestals varied in depth from five to nine and one-half feet, and were in the shape of a frustrum of a pyramid with a batter of one in six, the surface under the stone cap being three feet nine inches, by three feet nine in all cases, except those on either side of Kettle Creek, which were larger, likewise the stone cap surmounting them.

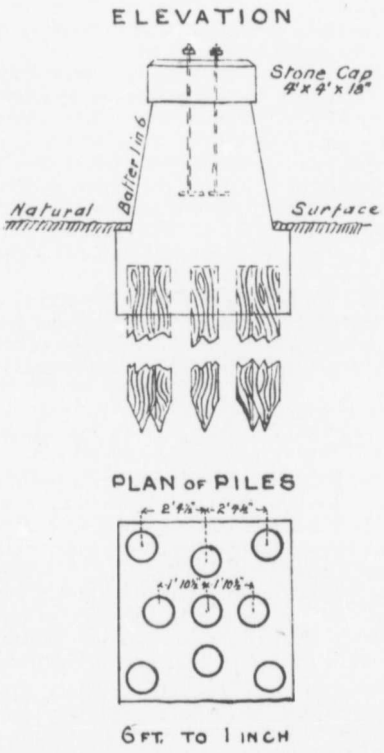
The pedestals were made as follows:

The ground was excavated to the required depth to reach a hard clay or gravel foundation, when a strong box having the required batter and proper dimensions was lowered into the excavation, securely braced and properly centered. The concrete after being mixed was shovelled into the box and rammed.

As soon as sufficiently set, the box was removed, after which the concrete was kept wet for about a week, and until no further damage was anticipated from the outer layer drying too quickly and robbing the mortar of moisture which is so essential to crystallization. After which a mortar bed, composed of one part of cement to two parts of

sharp sand, was placed, of sufficient depth to receive the stone cap, and bring it to the proper elevation.

The concrete used in the pedestals and beneath the stone abutments was composed of one part Portland cement, two parts of sand and three parts of broken stone. The cement specified for the work was star brand Napanee Portland, but on account of the great demand for this brand, the contractors, except in the case of the



latter bridge, were unable to secure this cement, and imported brands were used.

The specifications required that there should not be more than 5% residue on a sieve of 1,000, and that the tensile strength at the end of 7 days, one day being in air should be 350 lbs. per sq. inch. That the sand used should be clean, sharp, and on the coarse side, free from loam, and of a silicious nature. That the stone should be good hard limestone, broken so as to pass through a two, inch ring-

and just before being used, sprinkled with sufficient water to remove all dust and thoroughly wet the entire surface.

The mode of preparing the concrete was as follows:—

Two barrows full of sand were spread evenly over a platform twelve feet by twelve feet, on this one barrel of cement was evenly spread, when the two were turned over at least three or four times while dry, enough water was then added to form a stiff paste; after being levelled the three barrels of broken stone were evenly spread over it, and repeatedly turned over until the ingredients were thoroughly incorporated; it was then put in place as quickly as possible and evenly and sufficiently rammed.

In Bridge No. 3 six of the pedestals were found over quicksand foundation, and with these I proceeded as follows:—

I procured nine piles of sufficient length and spaced as per annexed sketch for each pedestal, had them driven to a refusal with a 2,000 pound hammer, and sawed off two feet below the surface of the ground. Instead of following the more general practice of capping and flooring, I had the soil excavated, from two to three feet below the top of piles, and had the concrete rammed between, around, and on top of the piles until sufficient height had been obtained to receive the cap stone.

By this method the bearing power of the soil between the piles was utilized, as well as the bearing power of the piles themselves, and the whole formed a monolothic mass which cannot fail in part.

With reference to the durability and resistance of concrete to abrasion, I may refer you to a paper by C. D. Purdon, Esq., A.M., Soc.C.E., in *Engineering News*, Vol. 19, page 413, where the writer, after referring to the mode in which the concrete piers were built, adds:

"On May 7th, I had an opportunity of inspecting them after a most extraordinary flood in the river, caused by a water-spout, in which flood the river rose one and four-tenth feet above the highest water known, the current being estimated at from eight to nine miles per hour with large quantities of drift running. Among the drift were cotton wood trees two feet to three feet in diameter, many of which I am informed broke on the piers from the force of the current. No damage whatever was done to the piers, and no greater marks left by the drift than could be made by a stick held in the hand and dragged across the surface.

"It was the opinion of the Bridge Inspectors of the St. Louis and San Francisco R. R., who watched the bridge during the flood, and who were men of considerable experience, that had the piers been built of masonry of such stone as could have been obtained, they would not have been able to withstand the drift and the bridge would have been destroyed.

The testimony of many other Engineers who have had large experience might be added, but would be altogether outside the sphere of this short paper, which is written with the sole object of provoking discussion and bringing out the views of the members of the Association present.

[*This Association is not responsible as a body for any opinions expressed in its Papers by Members.*]

SOME NOTES ON PORTLAND CEMENT CONCRETE.

By M. J. BUTLER, O.L.S., C.E.

Napanee.

In that quaintly written book, "Scamping Tricks," by John Newman, under "Concrete," occurs the following:—

"Have you managed to squeeze any extra profit on the quiet out of Concrete?"

"Yes; twenty or thirty years ago, but there is not much to be got now since a few engineers took to writing upon the subject. They have reminded or informed others pretty well what to look after, but there were not many thirty years back that knew how it ought to be made, and you see, although one receives the materials, the Concrete has to be made with them, manufactured, as it were, on the works, and you can spoil the best Portland Cement that is, was, or ever will be made, in the proportioning, mixing and blending it with bad sand and gravel, or dirty broken rock."

With the above quotation for a text, it will be attempted to show what good concrete is, how it is made, and to what work it is peculiarly adapted. The first essential is to secure good Portland Cement. It is believed that the following specification will insure good Cement.

SPECIFICATION FOR PORTLAND CEMENT.

1st.—*Fineness:* Not more than 10% residue will be retained on a sieve of 1,000 holes to the square inch, nor more than 25% on the silk sieve of 2,500 meshes per square inch. Other things being equal, the finer the Cement is the better. The residue on the 2,500 sieve has no cementitious value.

2nd.—*Specific Gravity* shall not be *less* than 3.09 for freshly burned Cement (it should be 3.13). This is the only known reliable test for density and proper burning of the Clinker. Weight per bushel is unreliable and misleading, as a very slight or imperceptible difference in method of filling the measure seriously alters the result.

3rd.—*Hot Bath Test:* For the purpose of testing the soundness of a Cement, unsoundness being caused by the presence of an excess of Caustic Lime, samples are taken and made into thin pats on glass or other impervious material (as per samples submitted herewith). These samples are left in the air from three to six hours or

until set. They are then placed in a covered tank on a rack over water so as to be enveloped in hot vapor for from 6 to 12 hours, after which they are immersed in hot water at a temperature of 110° to 130° F., and allowed to remain for periods of from 12 to 24 hours. Sound samples will not crack or leave the glass. Note, if the sample is prepared with a large excess of water it is quite common to find a crack at the top of the little ridge, due to the evaporation of the excess of water while in the air.

4th.—*Tensile Strength:* Usually this test is the one which receives the greatest attention, and unless taken in connection with the preceding ones is apt to be misleading. The usual plan being to test Neat Cement; samples are prepared by carefully weighing out a sufficient quantity to make five briquettes (about 26 ozs.) to which is added 25 to 30% of its weight of water. The Cement having been placed on a slab of glass or slate, it is then rapidly worked up into a plastic mortar and the moulds are rapidly filled, taking care to press the mortar in carefully with the fingers so as to exclude the air. The briquettes are then struck off evenly with the trowel, and are then left in the air until set, usually 24 hours, covered with a damp cloth to check evaporation. They are then carefully removed from the moulds and should be immediately placed in the water until the period for breaking arrives. It is of more importance that a proportionate increase of strength be shewn at periods of three and seven days than that a high test be secured at short periods. It is now an easy matter to secure Portland Cement that will stand 400 lbs. per square inch at the end of seven days, provided the operator understands the work of testing, for it is by no means the easy simple task it appears; to properly test a Cement, it requires experience and care. It is usual and necessary that the temperature of the room and water be kept as nearly uniform as possible, say 70°F., in order that comparable results may be had. Professor Unwin, in a recent paper, questions the utility of such rigorous conditions, claiming that Cement is subjected to all sorts of conditions in work and that the test ought to conform to the use to which it is to be subjected. Other able men have doubted the benefit of the hot water test. It is obvious that usually Cement will not be used where hot water is flowing freely, hence the query naturally arises, why test Cement with it. The answer is: That hot water accelerates the weak points in developing, that what would require several weeks, or months, to be learned from cold water can be had from 24 to 36 hours by using hot water. Further: In this country it is frequently necessary to use hot water and heated sand in building during the winter months. The extraneous conditions affect small samples to a greater degree than in the large masses in works and, after all, tests are merely for comparison, it being rightly considered that the best samples will give the best results on a large scale. Other points, such as color, etc., have really no significance. Here are two samples of the same Cement, and a slight difference in treatment has produced a marked difference in

the color. One was immersed in a vapor bath immediately after mixing, the other was first allowed to set in the air before being placed in the vapor bath ; the first one is very light and the other quite dark.

Sand : The second ingredient of Concrete is sand, and it is quite as important to use good sand as good Cement ; it should be clean, sharp and of varying sizes of grain, largely silicious, excluding rigorously Mica, Pyrities, Loam or other soft friable material. Calcareous sands are seldom or never fit for concrete.

Gravel : May be clean, pit gravel, or lake shore pebbles, or better, broken syenite, trap, granite or hard limestone. The principal point requiring care is to have the materials clean and that the size shall not be larger than what will pass a ring of 2½ to 3 inches in diameter for the largest pieces and from that size down to the size of a pea or lima bean. A varying sized aggregate will give a more economical and denser Concrete

DESCRIPTION OF PROCESS IN CONCRETE MAKING.

The Concrete described below is such as is advised for bridge piers, abutments, chimney foundations, engine beds, etc. Proportions to be, by measure : One part Portland Cement, two parts clean sharp sand, and five parts broken stone or clean gravel. The *modus operandi* found to give successful results has been as follows : Spread evenly on boards or in a water-tight box, two barrels of sand ; on this spread one barrel of Cement ; mix thoroughly by turning over the sand and cement at least three or four times, do not heap it ; then add water, mixing as you do so. It is best to use a Rose in putting on the water, until enough is present to make the mortar such that it will retain the impress of the hand when rolled into a ball. Spread into an even layer, then add the gravel by spreading it as evenly as possible. Turn the whole mass at least three times ; it is not well to heap it to the centre as is usually done, the larger stones always work to the into side and do not receive the proper complement of mortar. Load into barrows or sacks and place in position as quickly as possible ; now ram thoroughly to place ; if the concrete is too wet it will work up around the rammer and will not pack. The proper test is that after being well rammed it should jelly, better have it too dry than too wet, as it can be easily wet down. The coping course should generally be made of richer material, one part of cement to two parts of sand giving good results. Usually the coping course is from two inches to four inches thick, depending upon the whim of the Engineer in charge.

During the past season the writer constructed two bridge abutments as follows : First, piles were driven, the tops being cut off four feet below low water mark. The piles were then capped with 10x12 hemlock and rag bolted to each pile with three-quarters inch square by 20 inches long iron rag bolts, runn ng transversely with the cap-

ping ; a floor of hemlock 10 inches was laid, the floor being fully rag bolted to the caps ; curbing was then built on the floor to temporarily retain the concrete ; corner pieces were 4x6 inches, studding 2x6 inches, spaced two feet centres ; the whole being lined with two-inch plank at the corner, 6-inch strips were nailed in to give a bevel corner, and at the coping a bevel piece was nailed to the sheeting so as to leave a wash edge ; the abutments were 4 feet 6 inches thick by 20 feet long and 5 feet high to the bridge seat ; a ballast wall, 5 feet high by 18 inches thick, completing the abutment. Three days after the coping was laid on the abutment a heavy steel bridge was placed upon it, and ten days later it was crossed with a work train. A second example was an old abutment which had to be renewed. It was scoured out in places three feet below the stone work ; the work of repairing was first to carefully build a strong curb about two feet away from the abutment ; an effort was made to deaden the current with puddle ; bag after bag of Concrete was then carefully lowered into the holes and pushed to place, the bags were slitted and in a short time it became a homogeneous mass ; a toe was then formed to the curb, and it is believed all possibility of future scouring had been checked.

A third example was as a foundation for a brick chimney ; no curbing being required, the side of the excavation serving the purpose of a curb. The concrete work merely stood one day when the brick work was immediately started. Although the completed chimney weighs some 200,000 lbs., giving a pressure of about 4,900 lbs. per square foot, and has been subjected to some very high windstorms, it has given a very satisfactory job, not a crack or appearance of settlement having occurred.

Another example of the advantage to be had from Concrete is in engine beds or foundation for generators in electric power and light work, a number of which have been built under the writer's supervision. In fact, wherever stone or gravel can be had Concrete can be economically made. It is peculiarly adapted to trying and difficult locations, as in bridge piers, abutments, chimney caps, foundations under water, for dams, docks, wharves, etc. A less section can generally be taken than is required for stone from the fact of its monolithic character, greater weight and strength. A principle for guidance is to so design the work as to never leave a sharp or thin corner.

In conclusion, a description of a recent test made under the writer's direction will be given as a proof of its unsuitability for fireproofing. A small slab of first-class concrete 2 feet wide, 3 feet long and 3 inches thick, was very carefully made about ten months ago ; the slab has been kept in an office since it was built and was therefore very hard and dry ; for the purpose of the test a small chamber was built of terra cotta blocks with three closed sides and an ordinary stovepipe chimney. The slab was used for a cover. A slow easy fire was kept going for about three hours, when the slab had grown quite warm, say about 130° F. It was then fired hard with

dry pine for about twenty minutes, when three or four pails of water were thrown on the under side of the slab. The result was a great many cracks appeared in the slab ; it was then carefully turned over when it broke into a great many pieces. Upon further drenching each piece again broke up into smaller ones, which would go to show that Concrete is an unsafe and unreliable material where it is liable to be heated and then drenched with water, as would be the case in any building where a fire might occur. Within the past two years a good many buildings have been "fireproofed" with Concrete, and it would seem that it is a dangerous material for such service. Further experiments on a larger scale and with the usual conditions incidental to city buildings are required before much faith should be given to Concrete as a fireproof material. It merely remains to be said that the cost of Concrete is much less than good stone or brick work ; requires little or no mechanical skill in the work, one expert mason for a foreman, the rest of the work being done with common labor.

The items that go to make up the cost of a cubic yard of Concrete are as follows :

1¼ bbls. Portland Cement, average cost in car lots $2.30 per barrel.....	$2 87½
½ cubic yard of sand (average conditions) say..	37½
1 cubic yard of gravel or broken stone (average conditions) say.....	75
Labor—Common labor $1.25 per day, foreman $3.00, 10 men in gang.....	1 50
Curbing. ordinary simple work as in Highway or Railway Bridges, without specially difficult foundations etc., per cubic yard of Cement.	72
Total	$6 22

The writer has had piers and abutments erected complete in place at as low a cost as $5.00 per cubic yard and as high as $6.50, local conditions affecting the cost slightly.

DISCUSSION.

Mr. Chipman—I have used during the past five or six years a good many thousand barrels of cement, and the greatest portion of it was English Portland. It is gratifying to learn that Canadians are making as good a cement as can be imported. But it would not have paid me in the beginning of my professional career to have experimented, as we are not paid highly enough for our services to warrant the necessary experiments. When in Nova Scotia and New Brunswick two years ago, and again early this winter, I was surprised to find that they used there concrete to a much greater extent than we do here, and the climate is certainly as severe there as it is here. They are using concrete for bridge piers, abutments, copings, parapets, retaining walls, and for sewer construction ; and in places where they are using it generally there, here it is scarcely ever used in those structures ; and I saw some work there that had been up for many years, stood several severe winters, and was apparently as good to-day as when put up. I could see no crack or defect in it,

and the cement that was used, was, I am told, not equal to what we can get here to-day.

Mr. Warren—I have had a good deal to do with concrete. The proportions given here may be slightly different from what we use. We do not put in as much broken stone as referred to here. We mix it just the same, and there should be great care taken in mixing it. A great many make it too wet. It is better to mix it rather under, than over, and then the pounding or ramming it well will tend to bring the water out and make it more homogenous.

Mr. Bowman—In the specification for asphalt pavement, it struck me the kind of screen used was much smaller than it was in this case—that is, in Niagara Falls, N.Y. American Portland Cement was used of very excellent quality, and I believe that first rate cement is now made in this country This concrete was formed of one part of cement, five parts of sand, and with that was mixed ten parts of broken stone, and the Engineer has taken that up and is perfectly satisfied with it The concrete resulting from that admixture, he says, is superior to that made by using one part of cement and two parts of sand to a considerably less quantity of broken stone They have tested the two, and that is their standard specification—one part of cement, five parts of sand, and ten parts of broken stone.

Prof. Wright--Mr. Chairman, unfortunately I have not heard all of Mr. Butler's paper; but, judging from the part I had the pleasure of listening to, and the reception given to some of the remarks made, it would seem that to some of you it is a surprise to find that we have a good Portland cement manufactured in Ontario. As far as the laboratory results at the School of Practical Science are concerned, I should like to say that the best cement we have had in the laboratory during the past three years has been of Canadian manufacture. (Hear, hear !) The samples I refer to are those which have been selected from stock on the market by parties who were not interested in its manufacture, and came from all parts of the Province. I would like to say further that I believe the reason why we have not a still better article manufactured in Ontario is largely the fault of the engineering and architectural professions. You will insist on specifying an inferior article, and you cannot blame the manufacturer for making as cheap an article as the specification will allow. Not only are you satisfied with a very low specification, but in many cases you will not even take the trouble to see that the cement is up to your standard. When an unscrupulous agent is aware that cement is being used untested, he is only too anxious to unload his storehouse of the worst stuff he may have or be able to find in the market. This failure to test cement before using it occurs not only on small work but on jobs using very large quantities. I happen to know of one case at least during the last season, using thousands of barrels when no attempt was made to examine the cement. The only safeguard they

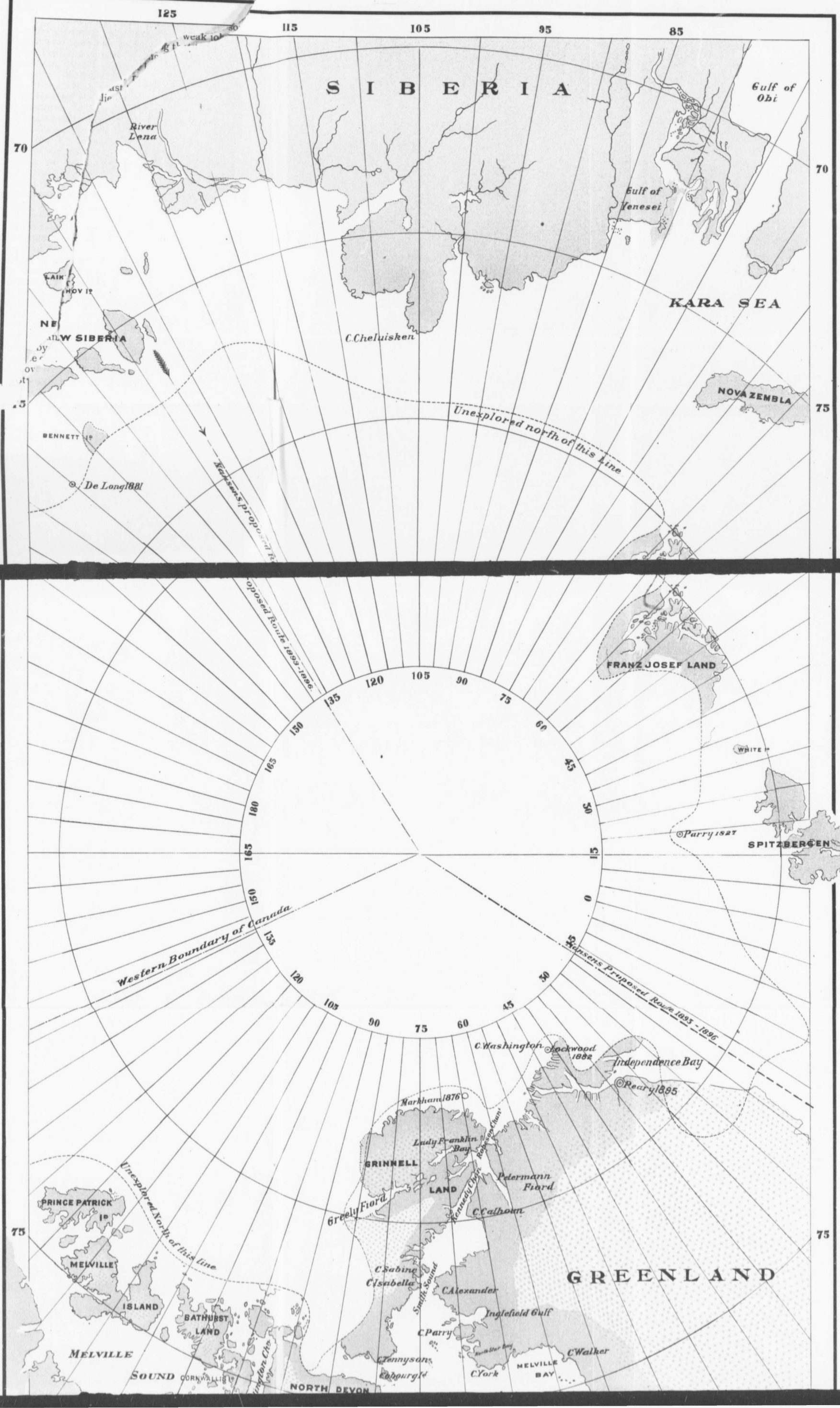

Hopedale
55
Hamilton Inlet
Lake
Melville
BRADOR
C

PLAN OF THE NORTHERN POLAR REGIONS.

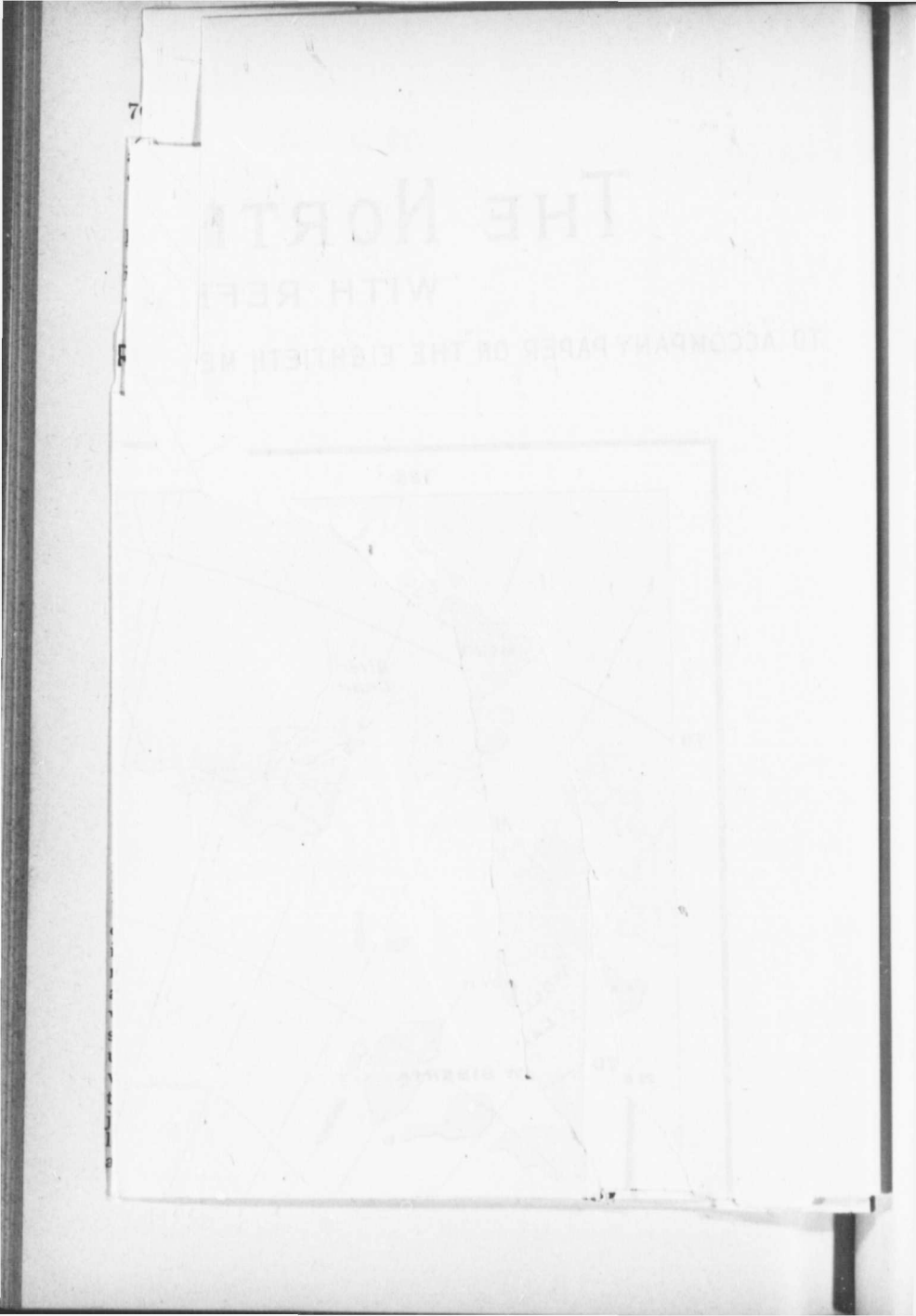
WITH REFERENCE TO EASTERN CANADA

TO ACCOMPANY PAPER ON "THE EIGHTIETH MERIDIAN." PROCEEDINGS OF THE ASSOCIATION OF ONTARIO LAND SURVEYORS 1895

PREPARED BY WILLIS CHIPMAN & L.B.STEWART.



GREENLAND
C Sabine
C Isabella
Smith Sound
C Alexander
Inglefield Gulf
C Parry
North Star Bay
C Walker
C Tennyson
Edwards
C York
MELVILLE BAY
ISLAND
BATHURST LAND
MELVILLE SOUND
CORNWALLIS I.
Wellington Chr.
NORTH DEVON
PRINCE OF WALES ISLAND
Peel Sd.
NORTH SOMERSET
Barrow Str.
Lancaster Sound
WOLLASTON LAND
Upernivik
70
Regent Inlet
Franklin Str.
Bellot Str.
Ponds Inlet
BAFFIN BAY
BOOTHIA
Gulf of Boothia
COCKBURN ISLAND
NORFOLK PEN.
DISKO
KING WILLIAM LAND
Fury & Hecla Str.
Christianshaab
BAFFIN LAND
Committee Bay
MELVILLE PENINSULA
Back R.
Thelon R.
ARCTIC CIRCLE
Fox Chan.
DAVIS STR
65
Repulse Bay
Chesterfield Inlet
Baker L.
SOUTHAMPTON ISLAND
Cumberland Sound
Gordon Bay
BELL Is.
Salisbury Is.
Frobisher Bay
Ferguson R.
Marble Is.
COATS Is.
MANSELL Is.
HUDSON STR
Wolstenholme
Stupart Bay
Tyrrells Beacon
White Str.
60
C Chudleigh
Mosquito Bay
Payne Is.
Ft Churchill
Churchill R.
Ottawa Isls.
HUDSON BAY
UNGAVA BAY
C Dufferin
Hebron
Okkak
Nelson R.
Hayes R.
Ft York
Ft Severn
Langlands R.
Ft Chimo
LABRADOR
Eastapoka R.
Richmond G.
L. Whale R.
Hopedale
55
Severn R.
Henrietta Maria
Great Whale R.
Hamilton Inlet
C. Jones
Salmon R.
Lake Melville
JAMES BAY
Attahwapiscat R.
Big R.
Winnipeg
Albany R.
Ft Albany
East Main R.
Belle Isle Str.
NEWFOUNDLAND
Lake Nepigon
Moose Fac.
Rupert R.
Rupert Bay R.
Waswanipi R.
ONTARIO
QUEBEC
Port Arthur
ANTICOSTI
Lake Abitibi R.
Detus R.
L. St. John
R. St. LAWRENCE
Duluth
LAKE SUPERIOR
NEW BRUNSWICK
Sault Ste Marie
Sudbury
Quebec
45
Georgian Bay
North Bay
Ottawa
Montreal
St. John
NOVA SCOTIA
C. P. R.
LAKE MICHIGAN
LAKE HURON
Toronto
LAKE ONTARIO
Portland
Halifax
Chicago
Detroit
Buffalo
Albany
Boston
LAKE ERIE
ATLANTIC OCEAN
UNITED STATES
New York
40
Explored
Partially Explored
Unexplored
85
80
75
70
65



have in this work is the fact that the cement was of home production. The reason that under these conditions our home production is better than foreign, is obviously that its reputation will rise or fall according to its value on the work. It is an easy matter to trace the difficulty home when the cement is of Canadian manufacture, whereas it is impossible to hurt the name of the imported material among the many different brands, and there the cement may have been adulterated by any or all of the several middlemen. On account of this difficulty agents are more ready to sell an article which is certainly very inferior if not worthless than they would if it were of home manufacture. In this connection I should like to say that within the last season I have had samples from four large shipments worse than worthless, absolutely injurious to any work they were used on—three of them were German and one of English cements—or at least were so reported. These were all condemned on the particular works they were intended for, but there is no doubt that they have been worked in somewhere, somebody has used this cement and there is a weak job somewhere.

I have seen several specifications stating that "the cement to be used shall be good Portland cement of English manufacture," as you will observe specifying directly against home production, when if the engineer had noticed carefully the record in the different works throughout the Province for the last three years, and at the same time wished to do the best for his client, the specification should read of Canadian manufacture. In any case the clause ought at least to be left out of any reasonable specification. I suppose that the main reason why many engineers never think of making tests of the cement they are using is that they consider an extensive laboratory, with a large equipment of apparatus, a necessity, but while this may be desirable, it is not an absolute necessity in order to make a much needed improvement. If you will, instead of writing an elaborate specification—and never again looking at either it or the cement—make your requirements simple, and then see that the material is fully up to them, you will have made a very great improvement, and encourage the honest manufacturer. First of all be sure to determine the grinding of the cement, and as most of you call for a No. 50 sieve, *i e.*, 2,500 meshes per square inch, I would say that the residue should not be greater than 5 per cent. This means that certainly 5 per cent, and most likely considerably more of the material, is inert and no better than sand. If the specification calls for not more than 5 per cent. of a residue, a cement which contains 5.5 per cent. ought to be rejected, because it is not properly ground even if the cement is sound in every other particular. Secondly, you should make the hot water test for blowing, but as you are all familiar with the method of making the test, I shall not repeat it here. Both of these determinations can be made by anybody without requiring any extensive apparatus, and if applied by every engineer in Ontario, it would save many a weak, inferior piece of work. If in addition to the sieve and scales necessary for the above experiments, you have an opportunity to make tests for tensile strength, etc., I would refer you to the suggestions of

the Canadian Society of Civil Engineers. In any case, however, you are in duty bound to your clients to do the best you can to see that good material is used throughout the work in your charge.

Of late a great deal has been said in favor of using Portland cement as a fireproof covering, and in order to determine the value of it in this connection we have made a very careful set of experiments during the year in the school. The work has been done by Mr. Dobie, who is taking a post graduate course, and the results will be of interest to most of you. We made elaborate preparations in the way of constructing special apparatus to determine the condition of the concrete while hot, but this was not a success on account of the early failure of the concrete. You will find a short report of the tests in the report of the Engineering Society of the School.

[*This Association is not responsible as a body for any opinions expressed in its Papers by Members.*]

MAINTENANCE OF A SEPARATE SYSTEM OF SEWERS.

By T. HARRY JONES, O.L.S.

City Engineer, Brantford.

The Brantford Sewerage System was designed by Willis Chipman, Civil and Sanitary Engineer, Toronto, in 1889, and constructed in 1890, 1891 and 1892, Mr. Chipman being the Chief Engineer, and the writer Resident Engineer.

During the past three years, the system has been in charge of the writer as City Engineer, and all work in connection with the extension and maintenance of the system has been performed by the City by day labour.

The following summary will give an idea of the extent of the system:

Population of the City of Brantford	16,314
Assessed Value	$5,760,410
Total expenditure on sewers, including cost of steel portion of house sewers and maintenance to end of 1895	$137 314
Total length of main sewer 15in. to 24in. in diamater	2.1 miles.
Total length of sub-mains and laterals, 9in. to 15in. in diameter	11.2 "
House sewers. On streets 4.3 miles. On property 5.1 miles. Total	9.4 "
About 1 per ct. of the above is of 6in. pipe and the balance 4in.	
Number of connections with sewers	497
Population using sewers	3,000
Average annual increase of population using sewers	500
Number of manholes	168
Number of lamp-holes	75
Number of flush tanks	52

The general character of the soil is sand and gravel, with clay and quicksand in a few sections.

FLUSH-TANKS.

Of the 52 flush-tanks in use, 9 are the Van Vranken and the remainder a compound of the Field and Van Vranken, consisting of the Field syphon and the Van Vranken tilting tank. The best results we have obtained from the Van Vranken.

Monthly inspections are necessary in order that they may be kept properly working, it being generally found that on each visit two or three require some slight attention, such as regulating the water or giving air. We have found that during the year some three or four

need repairing, the chief difficulty arising from the rusting and catching of the tilting tank

Each tank holds about 200 gallons of water and is set to discharge once a day.

FLUSHING.

The flush-tanks are generally found sufficient to keep the 9-inch sewers clear, although it is occasionally found advisable to turn the water in the flush-tanks on to the full extent.

It has been found necessary to pass the plunger, through only two of the 9-inch sewers during the past three years, each of these sewers having been flushed once in this manner.

There are two of the 12-inch sewers which require flushing about once in every three months. In one of these the sewage backs up owing to a fungous growth becoming attached to the pipes. The other 12 inch sewer—known as the Clarence Street sewer—was constructed under great difficulties, being laid for a distance of 2,300 feet in running sand, and at an average depth of 12 feet below the ground and 5 feet below the water level, and running parallel to and about 15 feet distant from a line of railway.

In addition to the fungous growth above mentioned, the leakage of sand into the pipes has helped to cause this sewer to back up.

Excepting the 18-inch iron syphon under the canal, through which the plunger is passed twice during the year, none of the sewers above 12 inches in diameter have yet required special treatment in this way.

FLUSHING APPARATUS.

Instead of using the ordinary copper or wooden spherical "pill" which has a diameter 2 inches less than that of the sewer to be flushed, we have found the following apparatus to be much more effective.

It consists of a reel or plunger, formed of two rubber discs of the same diameter as the sewer to be flushed, cut from $\frac{1}{4}$ inch rubber belting. These are backed by wooden discs, from $1\frac{1}{4}$ to $1\frac{1}{2}$ inches in thickness and from 2 to 3 inches less in diameter than the sewer. These discs are strung about 8 inches apart on a $\frac{1}{2}$ inch iron rod, and are kept apart by a piece of gas pipe sliding on the rod, and are held in position by a collar near one end of the rod and a nut at the other end The rod is provided with an eye at one end, and a swivel at the other end, for attaching the ropes, which are each some 25 feet longer than the distance between the manholes.

METHOD OF FLUSHING.

In flushing a sewer the plunger is usually put through twice. The sewer is first flushed block by block, beginning with the lowest block on the sewer, and using the plunger suitable for a smaller pipe. Then the sewer is flushed straight through from the upper end, using the plunger which fits the pipe.

Beginning at the upper manhole of the block of sewer to be flushed, the leading rope is passed through the pipe to the manhole below. Then the plunger follows, and is taken through principally by the pressure of water backed up behind, the trailing rope serving to keep the plunger from going too fast, while the leading rope is serviceable if the plunger is inclined to stick. The usual method of passing the leading rope from manhole to manhole, by means of a float with a string attached, having been found to cause so much delay, we adopted the following plan: Elm strips—2 inches wide, $\frac{1}{2}$ inch thick, and 12 feet in length—are bolted together end to end by two iron straps and four stove bolts to each joint, the straps being 1 inch by $\frac{1}{8}$ inch by $6\frac{1}{2}$ inches and the bolts 1 inch by $\frac{3}{16}$th of an inch.

These form practically one long slat which will reach from manhole to manhole, and will bend readily, and can be pushed down the manhole and through the sewer. To this the rope is attached.

These strips can easily be pushed 400 feet through a 9-inch pipe, and 100 feet through a 4-inch pipe, and are of great service in locating faults and stoppages.

RATE OF FLUSHING.

A gang of three men will flush about 700 feet in a day.

HOUSE SEWERS.

The sewer assessment adopted by this city of $79\frac{1}{16}$ cents per foot frontage or 4 cents per foot for 40 years, covers also the cost of the construction of the house sewers by the city to the street line. The lot portion of the house sewer is usually put in by the plumber, but all under city inspection. We have found that in street mains 10 feet in depth or over, that T junctions laid on the back with stand pipes carried straight up, are preferable to the Y junctions, as the house sewer can then be carried out to the main on its ordinary grade, and connected with the stand pipe by a T junction. When bends are used to make connection with the main, it is important to see that they have not become contracted or flattened in burning.

STOPPAGES IN HOUSE SEWERS.

These generally occur at the junction with the main, which formerly had commonly been made with a bend, and are usually caused by foreign substances from the buildings having been allowed to enter the sewer.

In two or three instances stoppages have occurred from the roots of trees having forced themselves through the joints. We have found that the roots of soft maple, elm, poplar, and willow are inclined to follow the sewer on account of the dampness, and will work through any joint not well cemented. When even almost invisible root fibres once find an entrance into the sewer, they will spread rapidly and soon completely fill the pipe.

One 9-inch sewer, which was laid in a shallow trench, became

completely blocked by the roots of trees, some of which stood forty feet from the sewer. If all joints are well made with good cement, the pipe being clean before the joint is made, there can be no trouble from this cause, and when it occurs the only remedy is to re-lay the pipes.

We have had on an average about fifteen stoppages per year, and the cost of removal has been about $4.25 each

In the great majority of cases the cost of this work has been repaid the city, the householders having been shown to be at fault.

INSPECTION.

The more important manholes are inspected every fortnight, and the iron gratings placed at the foot of the sewers from the Ontario Institution for the Blind, the Hospital, and Grand Trunk Railway station are cleaned every two weeks. The flush-tanks are inspected monthly, and the whole system twice a year.

RECORDS.

Plumbing plans are filed by licensed plumbers, and the plumbing tested before connection is allowed with the sewers, a fee of $2.00 being paid with each plan. A working and final plan of each sewer is prepared.

Permits are issued for each connection with the sewer, and a plan of each connection entered in a specially prepared book. Complete plans and records are kept of all work done.

MAINTENANCE ACCOUNT.

	1893	1894	1895
	$	$	$
Stoppage in house sewers	30	25	33
Flushing with the plunger	127	97	68
Repairs	128	130	144
General maintenance	225	223	224
	510	475	469

About 50 per cent. of the cost of flushing and repairs is chargeable to the Clarence Street sewer.

The rate of wages paid has been $1.60 for a working foreman, and $1.25 per day for the men.

The prices given in the above table do not include any allowance for engineering or inspection.

The following notes from construction account in connection with the extension of the system by the city may be of interest :

9 inch sewer—dry trench—average depth 9 ft. cost 63 cts. per lin. ft.
Manholes, including iron frame and cover, depth 10 ft., cost $33.
Flush tanks " " " " " 9 ft. " $65.
Lamp holes " " " " " 9 ft. " $9.
4 inch street portion of house sewers 7 ft. " 23 cts. per lin. ft.
6 " " " " " " 7 ft. " 28 " "

DISCUSSION.

Mr. Butler—This is an exceedingly interesting paper. In it is a lot of valuable data no one else in the Province could furnish, so far as I know, except those from Brockville. It is the only place which is wholly sewered by this system, and the best person to hear from on this subject would be Mr. Chipman, who first introduced the system into Canada. I think Mr. Jones is deserving of our thanks for his interesting paper.

Mr. Abrey—I may say Toronto Junction has been sewered in the same way, under the same circumstances, and Mr. Chipman was Chief Engineer of that. I would like to ask Mr. Jones if they used the agricultural drain tiles alongside the mains.

Mr. Jones—Yes. The ordinary agricultural drain tiles were used, and the glazed tile substituted for them in places where there was any likelihood of the drain tiles being choked up with sand. I might say, however, that in Brantford there have been very few connections with the drain tile. We have a gravelly soil there and we have found where it has been necessary to use the drain tiles we have had no difficulty with them whatever.

Mr. Abrey—You have not had them stopped up?

Mr. Jones—No.

Mr. Abrey—Our main sewers in the Junction have stood first rate, but we have had some trouble with some portions of the system. Perhaps it has not been attended to as it should be. Our town has about 4,500 of a population and we have had a good many connections made, I think as many in proportion as in Brantford, but everything has answered first-rate except those small agricultural drain tiles. From our experience there I do not think they have proved altogether a success, and that is the reason I was anxious to hear from Mr. Jones how they worked in Brantford. The soil there seems to be very similar to what we have. In the Junction we have largely abandoned them. We have made a good many cellar connections for the sake of getting rid of the surface and ground water. My own idea would be to use socketted pipes; I do not care whether they are glazed or not, so that they can keep them better in position. In trying to clean them we have perhaps damaged them in having men that are not skilled, but to a certain extent they have been misplaced, and in plenty of places they have been found full of sand, in places where the soil was quite firm where they were laid.

Mr. Jones—When I referred to glazed pipes it was the ordinary sewer pipe with a socket, as a substitution.

Mr. Abrey—With the glazed pipe socketted it is not necessary that they should be fastened. In reference to the agricultural drain tile, one of the difficulties we have had is through inexperienced persons getting at them with the hose, and the result is the water breaks

them between the tiles, and forms a sort of cesspool and washes away the sand. From what I have seen in the Junction in such soil as we have I think it would have been better to have used the socketted pipes universally.

Mr. Warren—In Walkerton last summer we had something like that, but unfortunately we could not get the people to accept the separate system. I was very much pleased with the way Mr. Jones suggests of flushing out with these rubber discs, and that is really very valuable information. The flushing out should be attended to very regularly. Unless it is done there is danger of these stoppages, and there is a difficulty too, sometimes, in finding out where the stoppages are. Our system was only opened up last February, and everything has gone right so far, and the tank that has been used is the same as Mr. Jones referred to, the Van Vranken Tank, and has worked very well, and we flush out; it runs up every three days, I think. And in connection with the gaol and courthouse the system empties out into the tank, and a 9-inch pipe connects with the main. It goes down to the main sewer and that is an 18-inch pipe. I was very much interested in the paper as there are a great many practical points in it.

Mr. Chipman—How many miles of mains have you in Walkerton, and how many flush tanks?

Mr. Warren—We have only about four or five thousand feet altogether as yet. Of this there is 2,000 feet of 18-inch pipe laid on the main street, with the intention of extending it by-and-by with a 15 or 12 inch pipe, and one side street with a 9-inch pipe running in.

Mr. Chipman—It afforded me much pleasure, indeed, to listen to Mr. Jones' paper. I had the honor of introducing the Separate System of sewerage into Canada in 1887. Before that there was not a town sewered according to that system. There appears to me to be a popular misunderstanding of the meaning of the term, "Separate System." I find many Engineers also think it means two separate pipes, one for sewage and one for cellar drainage. That is not the distinction between the "Separate" and "Combined System." The term is used to show that the "Separate System" was for conveying the storm water and the sewage in separate pipes; it did not refer at all to cellar drainage. That is one mistake that I find is very common in the popular mind. The Brockville System was the first one constructed in Canada, and was commenced in 1887 and practically completed in 1891 or early in 1892. There was something over eight miles and a half, I think, built under my superintendence there, and we adopted the Warring method of draining the cellars, laying agricultural drain tiles beside the pipes for the drainage of cellars and the lowering of sub-soil water. There we had every variety of soil, I think, that was ever found in any town, from granite rock to running quicksand, clay, loam, boulders, everything that you could name, I believe. I am sorry the Town Engineer is not here, as he could

vouch for what I say. They have practically had no trouble with these small pipes. In the first two years we found two sections that we were obliged to abandon in the running quicksand; two sections in the whole town, I believe. All the remaining small pipes have worked successfully from that time to this.

The next town to adopt the Separate System was Cornwall, which I designed, and the third, I think, was Brantford. In Brantford we adopted the same system as in Brockville, but we used larger drain tiles for sub-soil drainage, and we used, to a greater extent, socketted pipes instead of the porous farm tile pipes. The next town was Barrie. In that town we used the same system exactly as in Brantford, and I have heard of no complaint, whatever, from Barrie, and I have endeavored to keep posted on the action of these drain tiles in the different places, as they have been most unfavorably criticized when the people saw them going into the ground. The average ratepayer thinks the drain tile is of no use.

The next place to adopt this system, I believe, was Toronto Junction, and in that town we made a further concession to the popular prejudice. We put in a larger quantity of glazed pipe, substituting them for the unglazed, and we introduced there a socket over the joint of the porous pipe. But, unfortunately, the contractors could not furnish them rapidly enough, and in a great many instances they were omitted. I am pleased to find Mr. Jones in his experience in Brantford has found the maintenance account so low; in fact, it is remarkably low. I think it is lower than in any town on which I have designed the system. In Toronto Junction the drain pipes have not been so successful as in the other places, but I think if the matter were fully investigated by a competent tribunal of Engineers they would find that a great portion of the fault rests with those who had the sewers in charge; in fact, they were left to take care of themselves for about a year, with no superintendence worthy of the name, and worse than that, men were employed who knew nothing whatever about the system and were not in sympathy with it; in fact, they were opposed to it, opposed to the introduction of the system in the first place, and opposed to any system. And it was natural they would make it appear as bad as possible. The amount charged in Brockville for maintenance, repairs, etc., has been, I think, slightly greater in proportion to the extent of the system than in Brantford. I think they have between twelve and thirteen miles now, but the City Engineer of Brockville writes to me that everything has been working perfectly during the last year or two, since he has been in charge, and that the amount for repairs is practically nothing.

The "Separate System" when introduced into Canada was not looked upon with favor. It was supposed the flush tanks might freeze up and the slush on the streets could not be taken care of through this system; that it might do for Memphis or some of the cities in the Southern States, but not for Canada. I think the success that has attended it in Ontario is evidence that it is quite well suited for this climate if properly designed, and we take advantage of the

experience of the towns where it has been put in. In my opinion there is no greater objection to connecting cellars directly with the sewer under the "Separate System" than in the "Combined System."

Mr. Jones—We have extended the system somewhat since it was originally constructed, and we are not putting in any pipes for cellar drainage. Probably we might do so if we had wet cellars, but they have been practically dry, and I think in such cases the difficulty could be got over by using iron traps and connecting with the main sewer.

Mr. Abrey—I might say in connection with this that Toronto Junction soil scarcely requires any cellar drainage, but when they first commenced to make the house services they were put in all the same. Since then they have not been putting them in, but a year ago or more a by-law was changed and we have since, when required, been connecting directly with the main sewer. There is not much difficulty about it.

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THE FIELD OF AMERICAN ENGINEERING.

By ALLAN ROSS DAVIS, C.E., O.L.S.

Napanee.

THE rapid growth in wealth and population, and the remarkable expansion of the trade and commerce of this north half of the American Continent, in past years, have been unprecedented in the history of nations.

Our engineers have always taken a prominent part in the development of the resources of the country. In the various departments of the engineering profession they have faithfully performed the duties devolving upon them. To their wisdom and devotion to the problem of guiding the potent forces of capital and labor may be ascribed, in no small or stinted measure, the honor due for the degree of success that has been attained.

In the early Colonial days the land surveyor was the most important personage identified with the profession of engineering. When the Atlantic States became too small for the demands of settlement, the interior, the Great West and the wilderness north of the St. Lawrence and the Lakes, opened wide their doors for the sturdy pioneers.

Foremost amongst the latter were the Government Surveyors, who, boldly pushing their blazed lines through interminable forests, opened the pathway for the entrance of the varied influences of civilization. Other engineers superintended the building of highways and bridges, and structures of various kinds. Considerable attention was given to the improving of navigation in the harbors, lakes and rivers, and to the building of vessels. Afterwards the introduction of steam as a motive power gave a wonderful impetus to the engineering profession. Mechanical engineers were employed in increasing numbers to design an infinite variety of machinery demanded on every hand. Civil engineers, in addition to the work already in hand, found a broad avenue opening up in railroad location and construction. Mining engineers responded to the call of capitalists to open up the hidden wealth of nature, when steam power rendered the task of boring into the bowels of the earth comparatively simple and inexpensive. Chemists were called into requisition by the manufacturers, and have become indispensable adjuncts of the great hives of industry of this vast country in general, and of the New England States in particular. The demand for architects gradually increased from decade to decade, until the science of architecture in America

to-day is developed to such an extent that it commands the respect of European countries whose architectural monuments are the products of many centuries of the most careful and intelligent study.

Bridge building developed into a special department of engineering in recent years as an offshoot from railroad construction.

Electrical engineering is a department of the profession as yet in its infancy. Although most wonderful progress has been made in the application of the subtle force of electricity to meet the varied demands of our people, electricians confess their inability to thoroughly understand the force, or to measure the possibilities of its future development. However, a large number of engineers are engaged in electrical work at the present time

Thus we find that in the departments of engineering alluded to, as well as in several kindred departments, not enumerated, there has been a continuous expansion, demanding the employment of increasing numbers of engineers throughout the continent in past years. While this has been most satisfactory in a general way, still the excessive demand for engineers in certain departments, at certain periods, led to injurious results to the engineering profession from which it has not recovered, nor is likely to recover from for a considerable period

It is quite well understood that engineering has not been a closed profession similar to law or medicine. In the latter, members can enter only through the front door by passing specified examinations and obtaining duly authenticated certificates. In the former, however, members have flocked in through the back door, with no theoretical knowledge of the profession ; which, unfortunately, still continues to leave its rear door unbolted.

Especially has this been the case in railroad construction, one of the largest engineering departments in this country for fifty years. Rodmen, chainmen and even axemen, with scarcely an ordinary public school education, earning from one dollar to a dollar and a half per day, rapidly succeeded to positions of levellers, draftsmen, transitmen and engineers in charge of a party without seeing the inner walls of a college or passing a single examination. They took the place of college-bred engineers and immediately commanded salaries equally as large as the latter. The practical knowledge of the subject obtained during apprenticeship in the various spheres of work enabled them to perform their duties quite satisfactorily when placed in charge. Pocket Field-Books, supplied by enterprising publishers, gave the general principles governing location and construction and the adjustment of instruments. Illustrations and formulæ for laying out simple, compound and reversed curves were given. Tables in abundance, the theory of staking out work and calculating cuts and fills, how to locate a turnout, crossings, frogs and switches,—all these and other subjects, *ad infinitum*, were compressed into small pocket books, compared with which " Trautwine," the present standard engineering field book, is of giant proportions. Such books were convenient and useful in their place, facilitating calculations and expediting field work ; but

their contents afforded a meagre stock in trade to a man wholly dependent thereon for his knowledge of railroading.

The ordinary salary of $75.00 to $100.00 per month and expenses was a veritable godsend to men who had earned wages since entering the field, had been subject to no expenditure, and were honored, or at least honored themselves with the title of engineers

We cannot but admire the pluck, application and ambition of many of these men who have risen to distinction in various departments of engineering, despite the fact of having received no university preparation for the work; but while doing so we lament the other fact of vital importance to the profession, that the latter is overcrowded and the scale of remuneration for faithful services lowered, owing, in part, to the admission of unqualified members.

Moreover, a certain degree of opprobrium is attached to the profession, not only because men are privileged to call themselves engineers who possess but little knowledge thereof, but also because the work performed by such has frequently proven unsatisfactory. There are several other causes for the overcrowded condition of engineering at the present time:

(1) The general financial depression we have recently passed through led to the abandonment, for the time being, of numerous enterprises in all sections of the United States and Canada. New projects were simply out of the question during a period of stringency in the money market. While all professions and trades were influenced by the hard times, yet there is no doubt that projects upon which engineers depend for a livelihood are more sensitive to the chilling influences of a financial crisis than are the regular trades and professions. We are recovering rapidly from the severe shock, it is true, but it may be some time before the engineering world becomes restored to its wonted activity.

(2) Diminution of railroad construction has materially affected engineering. The bustle and strife of competing railroads gridironing the interior of the country or throwing their mighty systems across the continent has gradually died away. Those who witnessed the herculean efforts of the "Santa Fe," the "Great Northern" or the "C. P. R." in recent years, when building several thousand miles over expansive plains and through rugged mountain passes to the Pacific, have formed some adequate conception of the work performed and the number of engineers employed. When we remember that nearly 200,000 miles of railroads have been built in the United States and Canada, and that the "Santa Fe" alone, during one period of its construction, employed one thousand engineers, we begin to comprehend the magnitude of this department of engineering. But railroad construction has reached its meridian in this country. Its decline began upon the completion of the systems of railroads alluded to above and is perceptibly diminishing from year to year.

The result is that railroad engineers are forced to roam from "Dan to Beersheba" to-day in quest of employment, while many very competent men find little or nothing to do.

(3) Surveying of public and private lands is likewise decreasing from year to year in proportions. Surveyors were in great demand when the granaries of the Great North-West opened for settlement. The subdivision of public lands in the United States and Canada has been a lucrative field for a large number of surveyors in Government employ. These opened the way for a still larger number whose employment, in a private capacity, has been required for a variety of purposes in every community. But the public lands are now, practically, all sub-divided; and the boundaries of private properties are so well defined, both in urban and rural districts, that the service of one surveyor answers to-day where several were required in former times. Many are consequently compelled to enter other engineering fields, or to combine other branches, such as drainage, irrigation, sewerage, etc., with surveying, in order to make a livelihood.

(4) Government work in general, such as canal construction, harbor improvements, geodetical and geological surveying, etc., is not affording the employment to engineers and surveyors to-day on this continent that it should. There still remains an abundance of work to do by our Governments along these lines; but the excessive cost of public works in the past, combined with the many demands elsewhere upon the revenue annually collected, act as deterrents to the liberal grants demanded from time to time for such purposes.

(5) Municipal work has not only diminished in the line of surveying, but in the other ordinary branches of engineering as well. The highways, as a rule, no longer receive the attention of engineers. The bridges are supplied by bridge companies, which, employing comparatively few engineers, are nevertheless capable of catering to the demands of an extensive area. The City Engineer, with a small staff, is now enabled to plan and superintend all the engineering work of our largest cities with comparative ease.

Thus we find the demand for engineers perceptibly declining in several departments of the field owing to a cause over which they have no control, viz., the partial completion of the aggregate of engineering work. But this alone does not account for the overcrowded state of the profession.

More engineers are entering the field to-day than ever before in our history. This is due to three causes: (1) the increasing popularity of the profession; (2) the very excellent provision made by our universities for the training of engineers thoroughly, in practice as well as theory, in the several departments; (3) the broadening of the profession along new avenues as fresh discoveries in the realm of science are made. Several hundred young men graduate in engineering annually from our universities to swell the membership of the profession. The number is increasing from year to year, and there is no prospect of any diminution in the near future. Our universities are worthy of the very best commendation for their enterprise in meeting the demands of this progressive, scientific age.

What of future engineering possibilities on this continent? We look forward with bright anticipations if certain conditions be com-

plied with by the membership of the profession, and by the universities through which such membership is attained. The present is doubtless a prominent turning point in the history of American engineering.

Owing to causes referred to above, many capable engineers, in the prime of life, or in more advanced years, will be compelled to enter some other field of engineering than that in which they have been engaged, or to leave the profession entirely.

New fields are opening their doors in this extremely elastic profession, but sufficient time has not yet elapsed however to adjust old matters to the new order or condition of things generally in the engineering world. It would be as easy for a leopard to change his spots as for an engineer who had done nothing but build railroads, or a surveyor who had always been engaged in running meridians and base lines, to turn about in a day and construct a dynamo, or make an accurate chemical analysis of some article of commerce.

Reference has been made to several departments—mining, mechanical, bridge, chemistry, electrical—that are continually expanding in dimensions and in all probability will continue so to do for a considerable time in the future. Structural iron work is likewise developing into a department of considerable magnitude, the future possibilities of which are simply illimitable.

The standard of architecture will doubtless continue to be elevated higher and higher; and as the population and wealth of the country increases, architects, in increasing numbers, will find a more profitable field for employment.

As the construction of steam railroads decreases in proportions, it is safe to assume, from the tendency of to day, that electric railroads will be brought more and more into requisition.

Aerial navigation offers a field for the development of the ingenuity of engineers. While the subject of flying air ships frequently provokes derisive smiles and jests from the thoughtless, the scientific mind will continue to investigate and experiment and finally solve the problem.

Other prospective departments in the field of engineering could be cited to prove that while contraction is taking place in some quarters, expansion is going on in others, but these must suffice for the present. Certain it is there will continue to be a wide field for engineering enterprise in this country for many years.

Our young men need not hesitate to enter the engineering faculties of the universities fearing there will be nothing for them to do after graduation. The universities need not relax their splendid efforts to turn out men thoroughly grounded in the principles of the engineering profession. Even should the supply exceed the demand, the world is wide; new fields are opening in the numerous states of the southern half of this continent, in Africa and China, for ambitious young men. An engineer in the vigor of manhood and free from family ties, with the transportation facilities of to-day, thinks nothing of traveling several thousand miles to find employment. He can do

so and still not be subject to a tithe of the dangers attending engineers in the earlier history of our country in going a few hundred miles from home Still the adage "a rolling stone gathers no moss," is applicable to engineering as well as to other professions and trades.

A young graduate in engineering may be forced to wander far from the familiar roof tree to start in life; but in order to attain success he must not continue to wander. He should settle down in his chosen field of work and remain steadfast and immovable until he acquires a strong grasp upon his future calling, making remuneration for services a secondary, instead of—as is too frequently the case—a prime consideration. Wandering to and fro over the Continent, in the employ of one corporation one year and another the following year, has been the bane of many an engineer's life. Railroad construction, especially, in this way, has kept many an engineer poor, although at times receiving a large salary.

This leads to the vital point we wish to emphasize, viz., that the authorities of our universities and the engineering student in attend ance should invariably select some particular branch of engineering out of the general course, which best suits his inclination and for which he is best adapted, and thereafter make a specialty of that line of work. The professions understand the necessity for this far better than the inexperienced student. After selecting a certain department for his life work the student should be impressed with the fact that he must follow that line of work, and that alone, after leaving college. Moreover, he should be made to realize that any humble position in the employ of a firm or corporation at a merely nominal salary in his chosen line of work, will be far more beneficial ultimately, than receiving a good salary at the beginning at something he knows but little about. Possibly, our universities could do considerably more than they are doing towards assisting their graduates in engineering, to secure employment when going out from the halls of their "Alma Mater." The fact is well known that many engineers leave college with no fixed idea of what line of work they purpose following. Frequently they roam about for several years doing little or nothing, losing their inspiration and enthusiasm in a fruitless search for employment at a salary becoming the dignity of engineers Some fatherly advice from their professors, along the line indicated above, would doubtless have proved invaluable to many of such.

Finally, in order to make the engineering profession on this continent a grander success in the future, those entering the various departments should join those already employed in such departments in an association for mutual protection and assistance. It is true there are many societies and associations connected with engineering such as the "American Society of Civil Engineers," the "Canadian Society of Civil Engineers," etc., all doing excellent work in disseminating a technical knowledge of useful subjects and cultivating an *esprit de corps* among the members. But *all* the practising members of any one department of engineering do not belong, at present,

to any such society or association. Herein lies the weakness of the engineering profession, as already stated above. We should endeavor to close up our ranks so that none may be permitted to practise who are not members. Our surveyors of Canada have thus closed their ranks. Even a graduate in engineering must pass a preliminary and final examination prior and subsequent to a year's apprenticeship before he is allowed to practise as a surveyor. Anyone presuming to do so without the legal certificate becomes amenable to a most stringent law of fine and imprisonment.

We do not cite this as a model for other societies to adopt, but as a move in the right direction What we require generally is a law governing every department of engineering, rendering it necessary for every practitioner in that department to be a duly qualified member thereof. Such an arrangement, although including the membership of the societies now in existence, need not interfere with the latter in any respect. Doubtless, it would eventually help the existing societies, by encouraging many to join them who have not hitherto been persuaded so to do.

The standard of engineering has been perceptibly raised during the past decade, and everything points towards a higher elevation thereof, as well as a broader field in which to operate before the close of the century.

An organization combining all the forces of engineering, such as that outlined above, but which space forbids to enlarge upon, would, without doubt, materially contribute towards placing the profession of engineering upon that elevated plane that every man worthy of a place within its membership should be proud to see it occupy.

DISCUSSION.

Mr Butler—I think this is an extremely well written paper. It is perhaps not purely a technical paper, it is more a literary paper, suitable for a magazine, than such as we have in the proceedings of our Society. However, it touches on a matter of considerable importance, in my judgment, and Mr. Davis has seen fit to hold out, I might say, some encouragement for the young men that are crowding into the colleges; I fear he is quite unwarranted in doing so by the present position of the profession in America. It seems that notwithstanding the fact that there are perhaps between two and three hundred engineers in Ontario, without a day's work ahead to them, and no place to go to for employment, nevertheless the colleges are turning out hundreds more into the already overcrowded field. Great progress has been made in electricity, but there is nothing mysterious in it any more than in light and heat. Who can define what light is? It is vibration, wave lengths. Electricity, light and heat have been identified as manifestations of the same thing, but with different wave lengths only. I think in a technical paper like this we should not give currency to such words as "subtle force" because we do know what electricity is. It is a manifestation of the force of energy, and we

know as much of it as of what constitutes light and heat. With reference to the rising practical man in the field of electricity it is admitted that some of the most able men in the world have arisen without the aid of a college education. It must not be forgotten that a college education is not essential for the purpose of educating engineers. It is true that valuable instruction is given in colleges, but the real education which develops the man's energies and abilities is got in practical work in the field and not in studying books The most learned scholars who fill the highest positions in the colleges, as a rule, are complete failures when at practical work in the field. With reference to the other point I have nothing to say except to compliment Mr. Davis on preparing for us an exceedingly interesting and instructive article, and I therefore think it should be received and published in our transactions.

[*This Association is not responsible as a body for any opinions expressed in its Papers by Members.*]

NOTES ON SOME NEW JERSEY ROADS.

By T. B. SPEIGHT, O.L.S.

Toronto.

Blazed routes through forests, and trails across prairies, answer the wants of the Indian, but in civilized countries improved roads are an absolute necessity. The better the roads, the less the cost of transportation and travel, the more remunerative are the products of agriculture and the cheaper to the farmer are his necessary supplies.

The inhabitants of sparsely settled districts must, of necessity, submit to the inconvenience of poor roads; but as the country becomes more populous, and the area of cultivated lands is increased, and the products of human industry multiplied, with the increased wealth that these conditions produce, the roads can and should be improved and perfected.

There is no reason why every thickly settled and productive county in Ontario should not be furnished with good roads. Improved roads benefit all classes of the community and stimulate every branch of productive industry.

In most cases, I am satisfied that the reason why the roads in this Province are not better is not that the necessary cost of construction and maintenance is beyond the ability of the people, it is rather the indifference of the parties interested, and the lack of some well-devised plans for their construction and improvement, such as are in force in the principal countries of Europe and are now being carried out in the State of New Jersey, to the south of us, with such marked success, under the system of State Aid, legislation for which was passed in 1891. So complete has been the success of this law that many of the thinking people in the adjoining States are now agitating for similar systems as a means of securing better highways.

Farmers are not now the only class that are interested in good roads. A new factor has arisen in recent years, which promises to take an important part in the educating of public opinion as to the advantages to be derived from better public roads in this Province. I refer to the wheelmen, who are in a position to know of the defects of some of our roads from sad experience. The annual increase in the number of those who ride the wheel is enormous, and the silent steed is no longer regarded simply as a sportsman's hobby, but has also become the easiest and quickest means of transit for the busy man. Hundreds of professional men, clerks, mechanics, laboring men, now go to and from their work on the bicycle.

During the autumn of 1895 I visited Essex County, New Jersey. I was so favorably impressed with the uniformly fine roads over which I frequently travelled on my wheel, that I sought to discover how these roads had been brought to such a state of excellence.

It may be truly called the wheelman's paradise, and any traveller who does not become enthusiastic about such roads as these must indeed be hard to please.

The construction of a complete and thorough system of country roads in any district has many advantages; it increases the marketable value of all lands, and often leads to the improvement of lands hitherto so inaccessible as to be considered almost worthless, while the inhabitants soon reap all the advantages that the improved conditions of locomotion give rise to. Besides which, when the construction of roads is carried out according to some regular system, the expenditure is less than when it is carried out in a fitful or irregular manner and in the end a more satisfactory result is ensured. The conditions of social life are also much improved through the facilities afforded for coming together, and thus one of the great objections to country life—its isolation—is removed.

In Essex and Union counties, New Jersey, where a new system of Telford and Macadamized roads was adopted some years ago, and the roads constructed by funds borrowed upon bonds, the practical result has shown the policy to be most beneficial. The property throughout these counties has increased in value far more than the cost of the roads, and not only in the case of sale and exchange, but upon tax levy. The actual increase of values of lands benefited by the improved roads, it is said, meets the increased taxes requisite to pay the interest upon the bonds issued for the improvement. I might say that these counties are largely wealthy suburban communities and they could well afford to bear the burden of the road tax, but even in those townships that are occupied entirely by a rural population, the increased value was quite as marked as in the suburban centres.

In many of the townships, before good roads were constructed, the assessment of farms had been practically stationary for the previous twenty-five years. Essex County was the pioneer in this movement and a special law for the county was passed about the year 1868.

I am much indebted to the writings of Mr. James Owen, C.E * (who was appointed about that date), also to his assistant, Mr. A. H. Snow, and to Henry I. Budd, State Commissioner for Roads, as well as to "Good Roads Magazine" for information concerning these far-famed roads. In Essex County alone, they have about two hundred miles of Telford and Macadam highways.

The people were quick to see the advantages of good roads after a few miles were constructed, and it was not long before the major part of the farm produce that formerly went to the city of Elizabeth was diverted to Newark, where the farmers could draw four times as

* "An Address on Highway Construction in New Jersey," by Jas. Owen, C.E.

much over the new country roads to Newark as they had formerly done on the old mud roads to the city of Elizabeth, Union County; so, in self defence, the city of Elizabeth and Union County set about to follow the good example of Essex County in the matter of better roads, to try to regain the lost trade.

I cannot do better than to quote here the words of Mr. C. C. McBride, Editor of the Elizabeth *Daily Journal*, concerning the roads of Union County, which adjoins Essex, when he states: "They are famous to every citizen of the county. They have increased our wealth, enlarged our commercial relations, built up new industries, and new places of residence, brought into market locations practically unknown and inaccessible, and have diffused a new spirit of enterprise and progress throughout the whole country. They were built in faith and what some men considered exaggerated expectations, but they have in every respect more than realized every promise. There is not a man in the county, of sound mind and reasoning faculties, who would return to the old roads if this were possible. They are as beautiful as they are useful and they have demonstrated to the supreme satisfaction of all whose lines have fallen within the pleasant borders of our county that they have been the best investment the county ever made. And they have only begun to exercise their beneficial influences. They are permanent, they are an unceasing joy, and they are daily increasing our wealth and decreasing our tax rates." These words will apply with equal force to the Essex County roads.

To come now to the practical construction of the roads. After they have been carefully graded, with a maximum gradient rarely exceeding four feet in one hundred, the road bed is well rolled with a two to five ton roller, particular attention being paid to the crowning—ten inches is found sufficient in a thirty foot pavement. The following might be taken as a standard specification of the pavement in the County of Essex.

TEN-INCH PAVEMENT.

"Foundation to be a single layer of any hard, durable stone (except water-worn stone), six inches deep, to be set by hand in the form of a close pavement. The stones to be laid with their largest side down, in parallel rows, across the street, the joints to break as much as possible. The breadth of the upper edge of stones not to exceed eight inches and not less than four inches. The interstices are then to be filled with stone chips firmly wedged by hand with a hammer and the projecting points broken off, and the whole surface to be subjected to a thorough settling or ramming with a heavy sledge hammer.

On the top of the foundation a course of broken trap-rock, to be either Orange Mountain or Bergen Hill or Palisade trap, not larger than two inches in diameter, is to be laid and spread and thoroughly rolled. Sufficient stone is to be spread to make a depth of two inches when consolidated.

Packing. Good loam or clay is to be placed in a thin layer on top of the two-inch stone and thoroughly rolled. Only the packing necessary to bind the stone is to be used and according to instructions.

On top of the two inch stone, a course of broken trap-rock, either Orange Mountain or Bergen Hill or Palisade trap, not larger than one and one-half inches in diameter and not less than one inch in diameter, is to be spread and thoroughly rolled Sufficient stone is to be spread to make a depth of two inches when consolidated. On top of this course spread another layer of packing, similar to the first course.

When the broken stone is thoroughly rolled and consolidated a coat of screenings to be spread, of sufficient thickness to make a uniform surface to the road when rolled."

The price originally paid, say, about 1892, for a Telford pavement was about $2.25 a square yard twelve inches thick. This has been gradually reduced by the improvements in drilling and blasting, by increased perfection in the stone-breaker and last of all by increased knowledge in the laying and building the road itself, to an average price of 60 to 80 cents per lineal foot for an eight-inch Telford road, 16 feet wide or 56 cents per square yard, showing a very large reduction due to improved machinery and improved methods of construction.

The stone-breakers now in use break about 350 tons per day. The stone is procured in the northern part of the State in what is known as the Orange or Palisade Mountains. The average crushing strength of this metal is about 20,000 lbs. per cubic inch. "Roads built as above," says Mr. Owens, "now cost, in Essex County, 60 to 80 cents a lineal foot, on a roadway 16 feet wide, according to their thickness and the distance the material has to be hauled, including quartz stones for foundation and local help in hauling, and, as much as possible, local labor, and also reducing on many roads to 14 feet, and even 12 feet, I think the cost throughout the State might be placed at $2,500 per mile, provided due economy and wise administration are secured. The cost of repairs, a proper re-coating of the surface, can be put on in the same locality from 20 to 25 cents per lineal foot, for a 16 foot road. This,by reducing the width and supposing a renewal every 5 years, would amount to about $159 per mile on the average. While these estimates are based on present prices and present practices, the cost of the original roads of Essex County was far greater, experience with that work was limited, the machinery had not been brought to the perfection that it has to-day."

The excellence of the roads we have alluded to has been so far-reaching in its influence on the community that, in order to foster and encourage the construction of such roads, the State of New Jersey has passed what it known as the "State Aid Law," setting apart $100,000 a year to be given to the different counties on certain conditions. Some of the salient features of this beneficent measure are as follows:—

"The Governor of the State appoints a State Commissioner of Public Roads, who must report to the Legislature what roads were constructed with State aid for the year ending on the next preceding 31st day of December; and the amount of their cost and in general the operations of his office for said year.

The Board of Chosen Freeholders of any county in this State to acquire, improve, maintain and assume full and exclusive control of any public road or roads or parts thereof in their county so far as may be necessary for the purpose of improving and maintaining the same as a road and roads for carriages, etc., but for no other purpose, except such roads or avenues as are now under the control of any County Road Board; then, in order to acquire and assume such control in any county with power to improve and maintain the same, the said Board shall cause a map to be made, or adopt a map already made on which the principal public roads or highways of the county shall be or are laid down and shall cause the roads or parts of roads which the said Boards intend to acquire and assume such control of, to be indicated thereon, and shall file the said maps when so marked, in the office of the Clerk of the County; whereupon the roads or parts of roads so marked or indicated on the said map shall become and be known as 'County Roads' and shall thereafter be improved, maintained and kept in safe and convenient condition for public use, etc.

The Board of Chosen Freeholders shall employ a competent engineer, at a reasonable compensation, to survey the county roads, or any part thereof, when necessary, to prepare specification for pavements or other improvements, intended to be made in pursuance of this act, and to supervise the work and materials used; after such improvements or any part thereof shall have been completed the same shall be kept in repair at the expense of the county; and some competent person shall be employed by the said Board annually at a fixed compensation to inspect the condition of the county roads, etc.

Such Inspector shall have power to cause the necessary repairs to be made or other improvements under this Act. Whenever the Board of Chosen Freeholders of any county in this State shall by resolution have declared their intention to cause any particular road or section thereof within such county to be improved under the provisions of this Act, such Board shall cause all the necessary surveys to be made and specifications to be prepared; the specifications shall require the construction of Macadamize road or Telford or other stone road, etc. And after said specifications have been prepared they shall be submitted to the Board of Chosen Freeholders for their approval or rejection; and if such Board shall approve them they shall then be submitted to the State Commissioner of Public Roads for his approval or rejection; it shall be the duty of the Commissioner of Public Roads, before approving the specifications for any road so submitted to him, to ascertain by personal examination or otherwise, the natural character of the soil upon which such road is proposed to be constructed; and all other facts that he may deem important, and if after examination of the specification and facts so ascertained he shall be of the opinion

that the specifications provide for the construction of a road that will, with reasonable repairs thereto, be firm, smooth, and convenient for travel at all seasons of the year, and if he shall be of the opinion that one-third of the cost of constructing the road or section of road to which such specification relate, together with one-third of the cost of constructing all other roads and sections of roads in this State under specifications previously approved by him, will not in any one year exceed the sum of $100,000.

If one-third of such cost shall appear to the State Commissioner of Public Roads to exceed the sum of $100,000 then, and in such event, the said sum of $100,000 shall be apportioned by the Governor and State Commissioner of Public Roads amongst the counties of the State, in proportion to the cost of road constructed therein for such year as shown by the statements of costs filed in the office of the State Commissioner of Public Roads; the Governor and said State Commissioner of Public Roads shall certify to the State Comptroller the amount to be paid each county for such year.

In every case where a contract shall be awarded, after the presentation of such petition as aforesaid, the Board of Chosen Freeholders, instead of certifying to the County Board of Assessors two-thirds of the estimated cost of the work, as prescribed by this Act, shall certify two-thirds of said estimated cost, less one-tenth of the said estimated cost, which sum the County Board of Assessors shall include in their assessment of county taxes."

It will be observed that under this Act the property owners fronting or bordering on the road pay one-tenth and the State one-third of the costs. These payments are practically a free gift to the county, which pays the balance and thereafter must keep the roads in repair.

So far this Act has been most advantageous and has been the means of stimulating public sentiment in favour of improving the highway throughout the State. Fourteen of the counties, out of a total of twenty-one, in the State, are now taking advantage of the State aid. The demand for stone roads is decidedly on the increase, especially in sections where they have been partially enjoying their benefits.

We are all agreed that improved roads are a prime necessity and it would appear that that which is so desirable, and which everyone must favor, can, with proper effort, be secured.

The fact that "better roads" is in the air and is being discussed in many parts of Ontario, and the existence of an influential organization, such as the "Ontario Good Roads Association" for the purpose of educating the public, generally, to the advantages to be derived from the improved condition of our highways, both indicate progress. The Department of Agriculture is doing a good work in distributing literature along these lines. All this gives promise that the people are at last beginning to be awakened concerning this important subject, and we trust that something will soon be accomplished to wipe out the reproach of the average Canadian country road.

DISCUSSION.

Mr. Bowman—The paper last night was to show the possibilities of getting good road metal in Ontario, and the two work together very nicely. Unfortunately, owing to the limited time last night there was practically no discussion. I have been looking round for some time to get a geological map and I discovered a pretty good one upstairs. It is labelled, "A Strata Map of the United States." It happens to take in Ontario with the United States. This map represents the different strata in the order in which they stand, the Laurentian being the lower, of course It is a sort of raised map showing the disposition of the different formations. The pink is the Laurentian below, running from a point near Gananoque across to the mouth of the Severn River. In that area there is no difficulty in getting any quantity of trap rock, so the geologists tell us. Up in the Huronian formation, coming down to about Bruce Mines and along towards Sault Ste. Marie, the very best of trap rock can be had, and that is now being shipped from Bruce Mines down through Lake Huron, and by Lake Erie to Cleveland, and was used there last summer in their streets There are beautiful roads being constructed by the Park Commissioners of the City of Cleveland. It cost them nearly $4 a square yard for the road constructed, $3.75 or something like that. The specification is very much like what Mr. Speight gave for these roads in New Jersey. There is a course of ten inches of other stone, limestone, on top of which there is a depth, in different layers, of six inches of trap rock. They do not consider any brick pavement is at all equal to a trap rock macadam road, and that is shown by their willingness to pay about twice the money for the latter. It is for the purpose of park roads, driving roads, not city streets. Trap rock is put down as the first in order of excellence for road metal, trap, or basalt. I have the best authority in Canada for saying that the gneiss of Canada is far superior to the granites.

Mr. Butler—Most of our granites are taken from the vicinity of Granite Island, down in the St. Lawrence River, where it is very largely crystalline, feldspar through it, and more or less mica, so that I know from practical experience and from working where it has been used, that it breaks up quickly and causes mud on the road, in fact I had about forty pounds of it ground up into dust and used as a fertilizer on land last year to test it.

Mr. Bowman—In regard to the relative values of gneiss and granite, I will quote the words of Dr. Dawson, the Director of the Geological Survey. He says: "In comparing the gneisses and granites of our Laurentian country, I would place the former before the latter in point of resistance to wear or crushing, although exceptional cases no doubt may occur in a reverse order."

Looking at the geological map, after we get out of the Trenton formation, and get west into what would be the Devonian, the western part of the Peninsula, we cannot expect any hard rocks, even in

the Trenton, hard limestones are the only valuable rocks, and are much better than you get west. From Hamilton up to the Peninsula between the Georgian Bay and Lake Huron, west of Toronto, there are no hard rocks That is there are no trap rocks, there is no granite to be got at the surface, or anywhere near the surface. We have to depend on limestones and sandstones; sandstones such as we have in this formation are utterly useless for macadam purposes. The sandstone is very soft indeed. The limestone is what we have to depend on, if we want to take quarried rock. In this limestone will be found cherty bands of very great hardness, and these appear in different quarries opened. In the Hamilton mountain there is a band they will not touch for building purposes it is so hard. It would make excellent material for macadam roads. So in Western Ontario we have to depend on the cherty bands in the limestone, unless we bring in rock some hundreds of miles from the Laurentian area.

Mr. Gibson—I have had a great deal to do with making roads. There is no dispute amongst Engineers as to how we should make roads if we can only get the money to make them. There is one great difficulty that Engineers have at the first start, and that is to get drainage. It seems almost impossible to persuade the public at large that laws should be made to give Engineers a chance to drain the roadways. As a rule the public at large drain all their lands on the public highway, but as soon as you wish to divert the water from the highways to private property you have a law suit. Until the Government makes a simple rule by which an Engineer has a right to turn the water in a roadway and have a simple method of determining the damages, it is almost impossible to improve our ordinary roads. In cities and towns the whole matter is settled up very quickly and they put it on as a frontage tax.

In making roads in the first place we want drainage, because the frost penetrates from three to four feet in the Province of Ontario, and after the water is removed from the roadway you have a bog in the spring. I know Yonge Street is considered one of the best roads in the County of York. Very frequently in the spring it is a quaking bog, and sometimes the heavier wagons cut through the covering of macadam which is frequently six to nine inches, but sometimes only four or five, and thus actually impede the stage lines. This is from want of good drainage to carry off the ordinary rainfall of the country, and sometimes it is impossible to get rid of the water. In the Township of York now they have two or three cases of damage on account of the flow of water, and it is very serious One case in the County cost the Council $3,000, for turning the water back out of what they considered its natural course, the only possible course, and in this case it is where there is a swale, and a drain was made. There is never any difficulty in getting the judgment of the court for damages. Some action must be taken, and I think a resolution or suggestion on the part of our Association should be made memorializing the Government, that a Commission should be sent through the Province

to consider the question of how to get proper drainage. The roads in the County of York which have been kept up heretofore by the county are now to be thrown upon the townships. They say they do to pay. Toll gates having been relinquished, the people are fighting very strongly against the roads being left as a burden on the local municipality. Now, the scheme that has been given us by Mr. Speight on the New Jersey roads is a very excellent scheme and the very thing we want in Ontario; that is, that the Provincial Government pay about one-third of the cost of these roads and the local residents, those who have frontages, and the county two-thirds.

In the case of a macadam road, I lay a foundation of good cedar, if the soil is damp or wet. That is consolidated until it is a first class corduroy road. After the cedar is laid, clay is put on, and then upon that is macadam which is consolidated and then gravel, and that is again consolidated. Finish it with a coating of fine gravel, and have it graded to a proper curve and you will have a very good road.

Mr. Speight—What struck me most was the cost of these roads. I find in this year's report of the Inspector of Roads for Burlington County, where the stone had to be brought a hundred miles or so by railway, a 16 feet pavement was constructed for $3,240 a mile, one-third of which sum was consumed in freight charges on material. So Mr. Bowman's estimate of $2,500 is well within the limit.

About Provincial aid, I think we never will get a really good system of roads until we get something of that kind, Provincial or Federal. I think $3,000 a mile is given by Governments towards railways in the various parts of the Province. If they would give $1,000 a mile towards main highways, it would be a great benefit to the people. Nearly every country in Europe assists in the construction and maintenance of highways. France alone expends twenty million dollars at least a year on roads, and that adds more to the wealth and thrift of the people than anything else does.

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"ROAD METAL."

By HERBERT J. BOWMAN, O.L.S., C.E.

Berlin, Ont.

The term "Road Metal" is used to designate the material forming the impervious covering of roads, and may be composed of broken stone, blast furnace slag, gravel, or even burnt clay.

Gravel.—This is the most common material used in making the country roads of Ontario, and where good pit gravel can be obtained close at hand, it is without doubt the most economic road metal. There is considerable difference in the quality of gravel, that found in the eastern part of the Province making a harder wearing surface as it is composed of fragments of much harder rocks, than those found in western Ontario. This, no doubt, partly accounts for the excellence of the gravel roads of the County of Hastings. In the western part of the Province where gravel is found at all, it is chiefly composed of pebbles of soft limestone which quickly grind to powder under heavy traffic, and in some districts no gravel is to be found within a reasonable distance. For these districts burnt clay may be found to be the most economic material for the road covering, but so far its use seems to be confined to the Western States For ordinary country roads, unscreened gravel of a depth of ten inches may be used with the larger stones broken by hand, and a road covering formed good enough for all practical purposes, but for leading roads a better road may be formed by screening the gravel, although there is some difference of opinion as to the number and size of screens to be used. The following quotation from a treatise on "The Science of Road Making" by Clemens Herschel, M. Am. Soc. C.E., is worthy of note:—

"In gravelly soil all the materials that are needed for a good road are frequently on the spot; they only need sorting out and relaying. For this reason a common gravel sieve often constitutes the principal instrument, whose judicious use will make a good road out of a miserable string of ruts and cobbly elevations. It would only be necessary to sift out and separate the soil under the road to a sufficient depth, into cobbles, coarse gravel, fine gravel and sand; then replace them in the order named and with the proper thickness of layers of each; wet down and roll, and the result would be a good road."

Where gravel is scarce or has to be hauled a long distance, an excellent road may be built having a Telford foundation of field stone, on top of which screened gravel is placed in two layers, each to be thoroughly rolled. In this method six inches in depth of gravel is quite sufficient. Roads of this nature are the favorite ones in Central Park, New York, where Rhoa Hook gravel is used and " it being more than ordinarily clean and hard, bears an intermixture or adulteration of twenty to twenty five per cent. of inferior material to perfect its binding properties."

BROKEN STONE.—For leading country roads and town or city streets a better road metal is required than the gravel found in most parts of Ontario, and broken stone will best meet this requirement. Blast furnace slag is also an excellent road metal and is being largely used in the construction of the Rochester, N.Y., boulevards, but the supply of slag in this Province is limited to the product of the new smelting works at Hamilton. Rocks suitable for breaking up into road metal should be hard and tough and proof against the action of the weather, qualities not always found together. Co-efficients of quality for various road materials have been obtained by the engineers of the French " Administration des Ponts et Chausées " as given in the following table, where the co-efficient twenty is equivalent to " excellent," ten to " sufficiently good " and five to " bad."

Materials.	Co-efficient of Wear.	Co-efficient of Crushing
Basalt	12.5 to 24 2	12.1 to 16
Porphyry	14.1 " 22 9	8.3 " 16.3
Gneiss	10.3 " 19.	13.4 " 14.8
Granite	7.3 " 18.	7.7 " 15.8
Syenite	11.6 " 12 7	12.4 " 13.
Slag	14 5 " 15.3	7.2 " 11.1
Quartzite	1 .8 " 30.	12.3 " 21.6
Quartzose Sandstone	14.3 " 26.2	9.9 " 16.6
Quartz	12.9 " 17.8	12.3 " 13 2
Silex	9.8 " 21.3	14.2 " 17.6
Chalk flints	3.5 " 16.8	17.8 " 25.5
Limestone	6.6 " 15.7	6.5 " 13.5

A rougher classification of rocks in the order of their value for road metal is as follows: (1) Basalt or Trap, (2) Gneiss, (3) Granite, (4) Limestone, (5) Sandstone; and it will be interesting to investigate where these may be found in Ontario.

The first three rocks are found in unlimited amounts at most points north of a line drawn from Gananoque to the mouth of the Severn River. Upon reference to a Geological map, the best one being that attached to the Report of the Royal Commission on the Mineral Resources of Ontario issued in 1890, it will be seen that this line represents the southern edge of the Laurentian area in Ontario. Trap rock, which is no doubt the best for road metal,

is said to be found in dykes from a foot or two to forty or fifty feet wide in the gneiss near Gananoque and could, no doubt, be found at many points in the Laurentian of Northern Ontario, but is most common in the Huronian. In this latter formation near Bruce Mines an excellent trap (quartz diabase) is found and is shipped to cities in the United States to be broken up into road metal. It was used last summer in the construction of the Telford roads constructed in Cleveland, O, for the Board of Park Commissioners of that city.

South of the Laurentian area trap, gneiss and granite are found only in the shape of boulders brought down during the Ice Age and dropped as moraines. Thus along the band of moraines, or rough stony hills, stretching from Trenton to the lower end of the Georgian Bay, plenty of material for road metal may be obtained good enough for ordinary purposes. Scattered over a large part of the western peninsula of Ontario, large boulders may also be found, and if care is taken to exclude the soft limestone and disintegrated granite and gneiss, a fair road metal may be made, often the only kind that can be obtained at a reasonable cost. Plenty of limestones, often hard and fairly durable as road metal, may be found among the Trenton limestones stretching from Kingston to about Bowmanville, and across to the Georgian Bay. Some good material may also be obtained from the Niagara limestones along the "mountain" or escarpment between Niagara Falls, Hamilton, and a point near Collingwood, also from the Guelph limestones between Niagara Falls and Southampton. In many of the limestones in this part of Ontario there are cherty bands which would produce excellent material for road metal, and in many of the more rapid rivers considerable accumulations of hard cherty boulders are found.

Although small cobble stones are not desirable for broken stone on account of the smooth water-worn surfaces of the greater part of the product, this objection only holds good to a limited extent when large boulders, often several hundred pounds in weight, are used.

Conclusion.— As the best obtainable material for road metal is often the cheapest in the end, further information is required as to where the best rocks are found. No complete geological survey of Ontario has ever been made, and the only information as to the older part of the Province that can be obtained is from Sir William Logan's "Geology of Canada" (1863), and this publication of the Geological Survey is quite out of print and is found only in a few libraries.

The thanks of the writer are due for much valuable information to Dr. George M. Dawson, Director of the Geological Survey of Canada, to Professor A. P. Coleman, of the School of Practical Science, and to A. Blue, Esq., Director of the Ontario Bureau of

Mines ; and it is hoped that the members of the Association of Ontario Land Surveyors will, in the discussion, give much additional information as to the qualities of road metal in actual use throughout the Province.

DISCUSSION.

Mr. J. W. Tyrrell—As to the use of gravel placed at the depth of ten inches, do you think that would be good ? It appears to me a depth of comparatively fine gravel such as that would make too heavy a road, that wheels will sink into it to a considerable extent.

Mr. Butler—Perhaps I may repeat one or two things from Trautwine's pocket book. One of the questions asked is, how to make a good road. The first thing necessary is drainage. And what was the next thing necessary ? Better drainage. And what is the next thing ? A little more drainage. That seems to have been left out of Mr. Bowman's suggestion. Other than that I think his method is all right, but if it is intended to be a road it would be well to suggest this.

The Chairman—I think the title of the paper is " Road Metal," not the making of a road.

[*This Association is not responsible as a body for any opinions expressed in its Papers by Members.*]

THE DITCHES AND WATERCOURSES ACT, 1894.

By B. J. SAUNDERS, O.L.S., C.E.

Brockville.

In the preparation of the following paper, the writer has been guided by the Draft Bill sent out by the Local Legislature to municipal councils, surveyors, public officers, etc., etc., in the year 1893; by the discussion before this Association at its annual meeting in 1894; by the Ditches and Watercourses Act as passed by the Local Legislature in 1894; and by experience gained in the working of the Act since its passing, and by experience with the former Act of 1883 and its amendments.

In 1893, when the Draft Bill was circulated throughout the Province, there was a general feeling of relief expressed by the many persons—including surveyors and engineers—who had had something to do with the Act of 1883, and it was hoped, and in many cases almost fully realized, that a new era in ditch construction was about to dawn in this Province. What that is which was hoped to be realized, those who have had any experience at all with the Act of 1894 can probably best answer.

That the question of ditch making and the proper drainage of land are important matters to the agricultural portion of our population, is being felt by all classes, especially by the agriculturalists themselves, also that the random construction of ditches and drainage works, which has prevailed to a great extent in the past, is both unwise and expensive, is beginning to impress itself more fully upon the farming community, and not until this class realizes that it is just as important, if not more so, to have their ditches and drains properly and systematically laid out as it was for their side lines to be accurately run, can we expect to see a general advance.

In the Province of Ontario our laws with reference to the division of lands are in a very satisfactory condition; but, unfortunately, the same cannot be said with reference to our drainage laws. The question naturally arises, Who are to be the movers in bringing about a better condition of affairs? Is it the Legislature of the Province? Is it the judges who try appeals? Is it the lawyers who find flaws, real or imaginary, in the Act and awards and proceedings under the Act? or is it the people themselves who have the most need of drainage laws such as are workable for a fairly intelligent man? The

answer to one and all of these questions will undoubtedly be an unequivocal No. Who, then, you ask, are to bring about the desired change? The people themselves who want the ditches are to-day insufficiently organized, and in many cases insufficiently educated, to make a move for themselves for their own betterment, and the only class of men who can intelligently assist them must consequently be the surveyors and engineers of the Province, who certainly have an interest in the matter, and this Association should make itself a unit in effecting a change and impressing its views tangibly upon our Legislature. But this is somewhat away from the subject in hand.

Let us consider the Act of 1894 as it stands, up to and including the time for hearing appeals against awards made in pursuance of the Act:—

Passing Section 1 and 2 by, we find in Section 3 interpretation clauses for a number of expressions and words used in the Act. These have removed many difficulties existing under the former Act, but do they go far enough? Does the word "owner" include a leaseholder, who, so long as he pays an annual rental, controls certain lands, and who has power also to convey his leasehold? also does the word "highway" embrace road allowances controlled by the municipality but which are unopened?

In the 4th Section of the Act we find that every municipal council (1) shall appoint by By-law (Form A) "one person to be the Engineer to carry out the provisions of this Act," and (2) shall by By-law fix the fees of the Clerk and Engineer.

Frequently cases arise where the Engineer will find on his attendance that irregularities have occurred in the preliminary stages of the proceedings, and the only sensible thing to be done is to advise the parties to that effect; but there appears to be no provision in the Act for the payment of any costs already incurred. Whether or not it would be strictly legal to add such preliminary costs to any future proceedings, it, in the writer's opinion, is difficult to say, although it has been his practice to do so.

SECTION 5, LIMIT OF WORK.

The writer has had only one case in which it was necessary to extend the work into more than seven original township lots, and in this case the necessary petition and resolution under this section were obtained. There seems to be more or less absurdity with this Section in limiting the work to seven original township lots, as township lots vary so in width and length, and then the section allows you to extend the ditch along or across any road allowance indefinitely so long as you keep within the $1,000.00 limit in cost provided by sub-sec. 2 of sec. 5. Again the direction of a proposed ditch might be lengthwise of lots, in which case the limit of $1,000 00 would undoubtedly be reached long before the limit in length defined by the seven lots. It seems that the suggestion of the Drainage Committee, as recorded in the report of the Association of 1894, had the right way of coming at

the settlement of the extent of work to be done under the Act. The basis of any measurement should be by a definite quantity applicable to all localities alike, and not by any such sliding scale as so many lots, etc. Section 5 also provides that every ditch to be constructed under this Act shall be continued to a sufficient outlet, but the Act does not say what a sufficient outlet is. An interpretation of this expression is found in the interpretation clause of the Drainage Act, 1894, but whether the same meaning is to be placed under this Act is not for the writer to say.

The Act of 1883-permitted the discharge of water upon any owner's land providing the consent of said owner be obtained. Under the present Act the Engineer has to take chances on sufficient outlet in a great many cases, especially in those sections of the Province where drainage work is only in a state of embryo, and between "sufficient outlet," "seven lot limit" and "$1,000.00," the working of the Act is very much hampered and sadly perplexing.

LANDS LIABLE.

Section 6. We now come to Section 6, in which is found a number of matters which are deserving of close attention.

In the first place, where is the point of commencement of a ditch and who shall fix it? The Act does not state anything definite with regard to the point of commencement. It has been the writer's practice, whether rightly or wrongly, to fix this point so as to give the greater benefit to the owners of the lands higher up than the mover in the particular case. Of course much depends upon local conditions and as to whether persons above the mover have been notified in the first instance or not. The limit of Assessment of lands is fixed at 75 rods on either side of the ditch and the same distance from the point of commencement, with a reservation made with respect to lands through which the ditch does not pass, and which lands also adjoin a road allowance traversed by the ditch. Such lands shall not be liable except when directly benefited and then only for the direct benefit. What did our Legislators really mean? It is almost unnecessary to state to an Association of Surveyors that there are a great many road allowances throughout the Province that are not used for roads, and many of them that never will be opened up as roads. Again we have many roads used by the public that are not on road allowances and nowhere near a road allowance in the usual sense It would be possible to conceive of an application of this clause were all roads on road allowances and all road allowances used as roads, but under existing circumstances it does seem that the clause is only a stumbling block, and then something not heard of before in the Act is introduced, namely, direct benefit. Why not exempt those lands altogether or assess them as any others. There is also a word "traversed" introduced. How is this word to be applied? Must the ditch traverse one foot of the road allowance or its whole length, or the portions adjoining the lands that are not to be assessed? To some the answers

of the questions here asked may seem simple enough, but to the writer they have proved a source of great trouble, and the only appeal he has ever had was on account of these latter clauses of Section 6. In the draft bill of 1893 this Section was left in good condition, but for some reason or other our lawmakers saw fit to add certain clauses which render it difficult of being clearly understood.

Sub-section 2 of Section 6 is somewhat indefinite with respect to the meaning of "East of the County of Frontenac." This County does not extend from the St. Lawrence River to the Ottawa nor is its easterly boundary a meridian. The description, "Any County lying east of the County of Frontenac" is, to say the least, not as definite as would be expected in an Act of Parliament.

In the matter of assessing lands a good deal of trouble is experienced in assessing timbered lands and lands which owners say they do not wish drained, for no particular reason other than that they have an abundance of other land to work. It is even held by some of our judges that timbered lands should not be made liable for the construction of any portion of the work. If such be the case and the true interpretation of the law, the Act in nine cases out of ten is almost valueless as a means to assist an enterprising man to drain his low lands, for more or less timbered land will be found along every work of this kind, of any extent.

OWNERSHIP.

We have now arrived at that portion of the Act, when the work of making, or attempting to make, a ditch under it is begun. Section 7 is a wise clause, providing for the filing of a declaration of ownership, thus preventing unqualified persons from getting themselves, their neighbors, and the engineer into no end of trouble.

Under Section 8, the owners endeavour to reach a settlement among themselves, and if it appear at the meeting that other parties, who are not notified, are interested, they may adjourn to give such other parties the twelve clear days' notice required by Section 8 of the Act. If an agreement be not arrived at by the parties at the meeting or within five days thereafter, then the owner requiring the ditch may file with the clerk of the Municipality, the requisition (Form E.) requesting that the engineer, appointed by the Municipality, fix a date, etc., when he will attend at the locality, etc., and make his award. The engineer fixes his date and notifies the clerk, who notifies the owner requiring the ditch, and he, the other people. Let us halt for a few moments and look over the procedure up to this point.

(1) Municipality appoints Engineer by By-Law (3, 4).

(2) Municipality fixes Engineer's fees and Clerk's fees (4).

(3) Engineer takes oath of office (S. S. 2, S. 4) (S. S. 3, S. 4).

(4) Owner requiring ditch, takes declaration of ownership and files with Clerk (Form B) (S. 7).

(5) Owner requiring ditch calls friendly meeting (Form C) to endeavour to effect agreement, not less than twelve clear days' notice

to be given ; possibly other parties not notified, must now be an adjournment to give them twelve clear days' notice ; result, no agreement (S) (S. 9.) (S. 11).

(6) Wait five days more ; result, still no agreement (S. 13).

(7) Owner requiring ditch files requisition with Clerk requesting attendance of Engineer (Form E , S. 13).

(8) Clerk sends copy by registered letter to Engineer (S 13).

(9) Engineer notifies Clerk of date he will attend, not less than ten or more than sixteen clear days from date of receipt of copy of requisition (S. 13).

(10) Clerk notifies owner requiring ditch by registered letter of date of attendance of Engineer (S. 13).

(11) Owner requiring ditch serves notice on all the other parties named in requisition of date of attendance of Engineer, not less than four clear days (S. 13), (Form F).

(12) Owner requiring ditch delivers a copy of service (Form F) to Engineer, at least one day before date of attendance by Engineer.

Gentlemen, in the name of common sense, where are we? Here are twelve distinct operations to be gone through with before the Engineer leaves home to make the examination, and if number twelve is not complied with he need not start out at all, and the owner requiring the ditch can only start back at, well it is difficult to say where, and begin operations in a manner again.

It does seem that there should be a simpler way of getting down to business in this matter of ditch making, and the members of this Association should think it over and devise some means for simplifying this procedure. It surely is not all strictly necessary to sound jurisdiction. Of the twelve foregoing operations the only one which can be left undone for even a time is that of the declaration of ownership, and it is only by an amendment in 1895 that this was permissible.

Let us suppose that the Engineer attends at the time and place named by him. He examines the locality (in which operation he is not limited), also the interested parties and their witnesses, but he does not seem to be provided with any means of compelling witnesses to appear before him and giving evidence, such as the power with which surveyors are clothed.

In the writer's opinion it is a very wise measure to take the evidence of the parties themselves, reduce it to writing and have it signed by them, as an offset to their swearing differently in the event of an appeal. In this way the Engineer puts himself in the safest position possible, and has a guide as to the wishes of the parties themselves as to how and where they want the ditch constructed and located, leaving himself as an arbitrator when opinions of interested parties conflict, and not open to the accusation in the event of an appeal of being unwilling to listen to the opinion of those most deeply interested in the work. Should the engineer find that other owner's lands than those already notified will be affected by the proposed ditch, he may adjourn proceedings, so that such owners may

receive the notice prescribed by Sec. 14 of the Act, namely, four clear days' notice, while the owners themselves required twelve clear days to bring in other parties. Why not let the engineer bring every owner in on the four days' notice and save time if nothing else?

In the preparation of his award the engineer should be very explicit in describing the point of commencement, the termination of the ditch, also its course, general dimensions, etc., etc. Plan and profile, with cross sections of ditch, should generally be prepared and filed with the award They will be found very useful in case of appeal, and form a better record for future reference as to the location, grade, etc., of a ditch than a mere written description.

In the event of an appeal tried before the judge, the greatest care should be given by the engineer to the manner in which he prepares his evidence to back up his award, hence the necessity of the greatest care being observed in making the award in the first place. Dissatisfaction will, in fully seventy-five per cent. of award cases, be expressed by some owner or owners affected by the award, and if one half that is told about the unfortunate engineer be true, he is a very dangerous person indeed. It is on account of this dissatisfaction that the evidence of owners affected should be taken in writing at the examination of the lands, by the engineer. It will also often be found upon appeal that the grounds of appeal alone are not tried by the judge, but that the whole proceedings from beginning to end are most minutely gone into. Whether or not this is strictly as it should be, the opinions of the members of this Association from different parts of the Province will be found invaluable to the profession at large.

In conclusion the writer would suggest that efforts be made—

(1) To simplify the procedure.

(2) To found jurisdiction in a simpler manner, and give Engineer power with the consent of parties to amend irregularities, such as insufficient clear days in service of notices.

(3) In the trying of appeals to have the points on which the appeal is based alone tried, and not the whole question from beginning to end upturned.

(4) Records of appeals kept so that uniformity of work may be more nearly arrived at than at the present time.

(5) The question of costs settled in the event of awards being set aside, amended, or referred back to Engineer; at the present time the mover, who has done just as the Act specifies, is often saddled with the whole of the costs of an appeal.

The suggestion of a former meeting of this Association, that appeals be tried before a different court, was a good one. Further appeal might then be made to the county judge.

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ONTARIO BOUNDARIES.

By A. NIVEN, O L.S.

Haliburton.

That part of Canada now known as Ontario and Quebec was formerly called Quebec, and on the 18th June, 1791 a Royal Proclamation was issued dividing it into the Provinces of Upper and Lower Canada, and the following is the description of the division line given in the Proclamation :

" Commencing at a stone boundary on the north bank of the Lake St. Francis at the cove west of the Pointe au Baudet, in the limit between the Township of Lancaster and the Seigneurie of New Longueil, running along the said limit in the direction of north, thirty-four degrees west to the westernmost angle of the seigneurie of New Longueil ; thence along the northwestern boundary of the seigneurie of Vandreuil, running north twenty five degrees east, until it strikes the Ottawa River, to ascend the said river into the Lake Temiscamingue, and from the head of the said lake by a line drawn due north until it strikes the boundary line of Hudson's Bay ; including all the territory to the westward and southward of the said line to the utmost extent of the country commonly called or known by the name of Canada."

The above described line clearly defines the eastern boundary of Upper Canada, and now called, since the Confederation Act of 1867, " Ontario."

The southern boundary east of Lake Superior is fully set out in the commission issued to the Earl of Durham, 30th March, 1838. " Beginning at the said stone boundary between Lancaster and Longueil, by the Lake St. Francis, the River St. Lawrence, the Lake of the Thousand Islands, Lake Ontario, the River Niagara, which leads into the Lake Erie, and along the middle of that lake, on the west by the Channel of Detroit, Lake St. Clair, up the River St. Clair, Lake Huron, the west shore of Drummond Island, that of St. Joseph and Sugar Island ; thence into Lake Superior.

The portion west of Lake Superior was finally located under the Ashburton Treaty of 1842, and may be quoted from the treaty :

" Through the middle of the sound between Ile Royale and the northwestern mainland to the mouth of Pigeon River and up the said river to and through the north and south Fowl Lakes to the lakes of the height of land between Lake Superior and the Lake of the Woods, thence along the water communication to Lake Saisaginaga and

through that lake; thence to and through Cypress Lake, Lac du Bois Blanc, Lac la Croix, Little Vermillion Lake, and Lake Namecan, and through the several smaller lakes, straits or streams connecting the lakes here mentioned to that point in Lac la Pluie, or Rainy Lake, at the Chaudiere Falls, from which the commissioners traced the line to the most northwestern point of the Lake of the Woods" This line was determined by the commissioners appointed under the 6th and 7th articles of the Treaty of Ghent, December 24th, 1814; thence along the said line down Rainy River and through the Lake of the Woods to the northwest angle thereof, being in latitude 49°-23′-55″ north and in longitude 95°-14′-38″ west from the observatory at Greenwich. At the northwest angle of the Lake of the Woods, a monument was planted by David Thompson, July 25th and 26th, 1824.

We shall now proceed to travel over the northern and western boundaries of Ontario, and I cannot do better than read the award of the arbitrators appointed by the Government of Canada and Ontario a number of years ago to determine these boundaries, and which, as you are aware, was confirmed by the Privy Council when the case was carried to England.

AWARD OF THE ARBITRATORS.

To all to whom these presents shall come:

The undersigned, having been appointed by the Governments of Canada and Ontario as Arbitrators to determine the northerly and westerly boundaries of the Province of Ontario, do hereby determine and decide that the following are and shall be such boundaries, that is to say:

Commencing at a point on the southern shore of Hudson's Bay commonly called James' Bay, where a line produced due north from the head of Lake Temiscamingue would strike the said south shore; thence along the said south shore westerly to the mouth of the Albany River; thence up the middle of the said Albany River, and of the lakes thereon, to the source of the said river at the head of Lake St. Joseph; thence by the line to the easterly end of Lac Seul, being the head waters of the English River; thence westerly through the middle of Lac Seul and the said English River to a point where the same will be intersected by a true meridional line drawn northerly from the international monument placed to mark the most north-westerly angle of the Lake of the Woods by the recent boundary commission; and thence due south, following the said meridional line to the said international monument; thence southerly and easterly, following upon the international boundary line between the British possessions and the United States of America, into Lake Superior.

But if a true meridional line drawn northerly from the said international boundary at the said most north-westerly angle of the Lake of the Woods, shall be found to pass to the west of where the English River empties into the Winnipeg River, then, and in such case, the northerly boundary of Ontario shall continue down the mid-

dle of the said English River to where the same empties into the Winnipeg River, and shall continue thence on a line drawn due west from the confluence of the said English River with the said Winnipeg River, until the same will intersect the meridian above described ; and thence due south following the said meridional line to the said international monument ; thence southerly and easterly following upon the international boundary line, between the British possessions and the United States of America, into Lake Superior.

Given under our hands, at Ottawa in the Province of Ontario, this third day of August, 1878.

(Sd) ROBT. A. HARRISON,
(Sd.) EDWD. THORNTON,
(Sd.) F. HINCKS.

Signed and published
in the presence of

(Sd.) E. C. MONK,
(Sd.) THOMAS HODGINS.

In other words the western boundary of Ontario will be a line drawn due north from the monument planted at the north-west angle of the Lake of the Woods until it either intersects the English River or a due west line from the confluence of the English and Winnipeg Rivers as the case may be.

The *west boundary* will probably be about 55 miles in length and has not yet of course been defined on the ground.

The northern boundary, as we have seen, is for the most part a natural boundary. The English and Albany Rivers with Lac Seul and Lake St. Joseph, there being a straight line to run between the two lakes a distance of perhaps 15 miles. If these 70 miles or so of line were run, the northern and western boundaries of our Province would be defined, unless in the case of islands in the rivers or lakes, where it might be necessary to determine upon which side of an island the deep water channel would be. Dr. Bell says there are such in the Albany River.

The eastern boundary of Ontario is in part a natural boundary, and the remainder made up of straight lines.

Commencing at the south-east angle of the Province so to speak on the St. Lawrence River at the stone mentioned in the proclamation of 1791, two lines of about 30 miles in length bring us to the Ottawa River, at what is now called Point Fortune.

These lines were, I believe, run a number of times, and as usual when lines are run magnetically they differed, no two running in the same place. The boundary was finally established in the year 1862, under instructions from the Commissioner of Crown Lands to E. T. Fletcher, P.L S., dated Quebec, 15th July, 1862. From Point Fortune on the Ottawa to the mouth of the Mattawa River, a distance of about 250 miles, the survey plans of the Engineers of the

Ottawa Ship Canal Company were reduced in 1866 by the Crown Lands Survey Department and adopted by the Government of Canada as a correct plan of the Ottawa River, showing the boundary between Upper and Lower Canada, now Ontario and Quebec. This plan was approved by Alexander Campbell, Commissioner of Crown Lands, at Ottawa, June 29th, 1867.

From Mattawa to the head of Lake Temiscamingue the boundary was surveyed jointly by the Governments of Ontario and Quebec. The survey was made by Mr. J. L. P. O'Hanley on behalf of Ontario, and by Mr. W. W. O'Dwyer on behalf of Quebec.

Instructions were issued October 1st, 1872. They commenced at the junction of the Mattawa River with the Ottawa latitude 46°-16'-30"N and traversed the west and east shores of the Ottawa and Lake Temiscamingue to its head, each surveyor taking his own side of the river and lake. They connected their survey occasionally for purposes of comparison, and made a joint plan at the close of the work. Mr. O'Hanley says he left Ottawa on the 6th November, 1872, arrived at Mattawa, November 13th, and after forwarding supplies, commenced work December 2nd, completed the survey to head of the lake, March 25th, 1873, and returned to Ottawa, 5th April, having been away 156 days, made up as follows:

65 days running the line.
18 days so stormy that no work could be done.
22 Sundays.
3 holydays.
18 moving camp.
14 forwarding supplies.
16 travelling.

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The distance is about 110 miles, which, with offsets, islands and triangles, make a total of about 160. Of the distance run, one-seventh was in the bush along shore, and the strength of the party was 16—12 men and 4 of a staff.

On October 16th, 1873, the same surveyors were instructed to run the due north line from the head of Lake Temiscamingue to the boundary line of Hudson's Bay, and to plant stone monuments at every mile.

Orders were subsequently sent Mr. O'Hanley to stop at 50 miles unless he came to the height of land sooner. They left Ottawa, 4th November, 1873, reaching Fort Temiscamingue on 23rd of same month. The part of the lake north of the Fort having frozen over on the 20th, and the ice not being strong, they camped at the Fort till the 8th of December, when another start was made and they reached the head of the lake with their supplies on the 12th.

After determining the "head of Lake Temiscamingue," as described in 38th Vic. Cap. 5, Statutes of Ontario, and getting the

necessary observations, the line was run north astronomically to Labyrinth Lake (tributary to the Abbitibbe waters flowing to James' Bay), a distance of about 45 miles. The height of land was crossed at 42 miles 24c. 85l. The initial point on the boundary line is a point bisecting a line drawn due east from where the north side of the " Chenail du Diable " intersects the east side of the Blanche River, to the River de Quinze, the latitude of this line is given as 47°-33′-48″. 37 North, and its length as 86c. 64l.

From this point the boundary was run south to Temiscamingue Lake across some islands—at 25c. 77½l. south of the initial point, and on the bank of " Chenail du Diable," a large stone monument was planted, marked as follows :

On the South...." December, 1874 "
On the West ...." Ontario "
J. L. P. O'Hanley, Boundary Commissioner.
On the North...." Latitude 47°-33′-31″ N "
On the East ...." Quebec "
W. W. O'Dwyer, B. C.

This stone was made the zero of all measurements north of this point, and the point on the ice of Lake Temiscamingue adopted as the zero for levelling to this stone is 78c. 68l Another large stone was planted on Wright's Island marked " Ontario " on west, and " Quebec " on east.

The line was run with the transit ; stones planted at every mile marked on south side from 1 to 42 miles, on east " Quebec," and on west " Ontario." A large wooden post also planted alongside the stones and witness trees at right angles to line, marked W. T. At 42 miles, 24c. 85l. a cut stone was planted marked as follows :

On East ....." Quebec."
On West ....." Ontario."
On South....." Height of land."

Ten links north another cut stone marked :

On West ....." O'Hanley, B.C."
On East ....." O'Dwyer, B.C."
On South....." Latitude 48°-10′-24″ N."

The line was cut out at commencement, 30 feet wide, afterwards reduced to 20 feet, 14 feet, and finally to 8 feet, which width was I believe continued to the close. Levels were taken and posts planted every 200 feet over its whole length, and it was found that Labyrinth Lake was 326 feet higher than Temiscamingue.

The survey was completed on the 18th April, 1874, and the party got back to the head of Lake Temiscamingue on 23rd, and as the ice was then unfit for travel, they remained there, filling in a part of the

time by traversing Blanche River, until the 20th May, when they broke up camp and arrived at Ottawa on the 28th.

Mr. O'Hanley tells us that the boundary line for the first 20 miles is through a clay formation, the 6 miles next the lake low and swampy and partly flooded in spring. Remainder is high and dry, and cut up by gullies. Beyond the clay the Huronian formation extends to the height of land.

The Manitou rock is 475 feet above the surrounding country, or 1,000 feet above Lake Temiscamingue, and there is pine timber on the height of land and 10 miles south.

The 45 miles straight line expedition occupied 207 days as follows:

70	days working on the line.
12	" all hands portaging.
11	" moving camp.
8	" so stormy that no work could be done.
29	Sundays.
2	holydays.
19	travelling up.
10	travelling down.
3	days waiting for observations.
16	" delayed going up
26	" delayed returning.
1	" paying off men.
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The strength of the party was 11 labourers; 1 stonecutter; 4 staff—total 16.

After a great deal of correspondence between the surveyors, joint plans were prepared of the whole work from Mattawa to the head of the lake, and from the head of the lake to the height of land. The red dotted line up the Ottawa River and through Lake Temiscamingue on the former is declared to be the true boundary between Ontario and Quebec, and is signed by the late Commissioner of Crown Lands, T. B. Pardee, on behalf of Ontario, and by H. G. Mahliot, Commissioner of Crown Lands for Quebec, and bears date 27th December, 1875.

The straight line plan has no date, but is signed by Messrs O Hanley and O'Dwyer.

I might say that the two survey parties were together on the due north line, so that the total strength of the united party was probably 32. The men of both parties worked together on the line. The chainmen were supposed to check one another, and the Surveyors and assistants ran the line and took the levels

The following are extracts from Mr. O'Hanley's Report of Survey:—

" From the foregoing you may be able to form some idea of the character and magnitude of the undertaking which the Govern-

ment confided to my charge, and the manner of its performance, but no description without experience can convey the faintest impression of the obstacles to be encountered, the difficulties to be overcome and the hardships borne on an expedition of this kind, in a remote district, in the depth of a Canadian forest, particularly in the inclement winter of these hyperborean regions.

"The important work of permanently fixing the boundary between the great Provinces of Ontario and Quebec deserved all the scientific skill and accuracy that we were capable of bringing to the task, and all the care and attention in its mechanical execution which we could bestow, while observing the strictest economy consistent with efficiency; cost was secondary to precision. With this work our names (that of my colleague and myself) shall be associated so long as these Provinces shall endure, and perchance the boundary we establish will continue to be recognized when 'Ontario' and 'Quebec' shall be spoken of as the ancient names of new and mighty nations."

The remainder of the east boundary of Ontario from the height of land to James' Bay, a distance of about 225 miles, has yet to be defined on the ground. Of the country through which it will pass, nothing is known north of Abbitibbe Lake, the line of travel between Temiscamingue and Moose Factory being by the west end of that lake, Abbitibbe River and Moose River, a considerable distance west of the boundary.

Roughly speaking, the distance round this Ontario of ours, following the boundaries through the lakes, is about 3,300 miles and the area of the Province is estimated at about 200,000 square miles.

It has a seaboard on James' Bay of 200 miles, and the Albany River is probably 450 miles long. The northern boundary of the Province being nearly 1,000 miles in length.

DISCUSSION.

Mr. Chipman.—I think the Government of Ontario should have the easterly boundary of this Province run through to James' Bay immediately. It crosses a tract of territory that has not been trodden by a white man, during the last hundred years at least, and no one knows what is in it; and the same may be said of the western boundary, only that is of less importance to us. Around the head of James' Bay we have a territory as large as half of the settled part of this Province, and from what I have read that land is suitable for cultivation to a great extent, and the climate there is certainly not more severe than in Manitoba, and is more equable.

Mr. Kirkpatrick—Some of you may have noticed in the papers recently that the United States were claiming Hunter's Island. Mr. Niven wrote out the description from the Commissioners' report in 1842, and naming those different lakes, Cypress Lake and those other lakes, and I might say a plan of the route, I think 60 sheets in all, has been in the Department of Crown Lands since 1842, and we assumed it was really the correct one. It was signed by David

Thompson, the Astronomer, but within the last few years it was discovered that some of the islands on the south side of Hunter's Island, apparently Canadian, belonging to Ontario, were really American. We found there were a series of official maps at Ottawa on record, and we had access to them, and found that while David Thompson's maps were true in the main there was a disputed territory even at that time which he evidently was not aware of, and that, according to the lines as run out under the Treaty of Ghent by him, there was a portion which remained in dispute or unsettled until 1842, when Lord Ashburton and Daniel Webster agreed upon the boundary, and they laid down the line; and it was finally determined, and to it both Commissioners affixed their signatures, as Mr. Niven has said, running it up through those lakes.

The Americans, as reported in the newspapers, claim that the line should go north of Hunter's Island, and that Ontario has seized I do not know how many hundreds of square miles belonging to Minnesota, and the President has been called upon to assert his rights, as the trouble in Venezuela was nothing to the injustice the poor State of Minnesota was suffering owing to the greed of the British Government.

I may say, as regards the north-west angle of the Lake of the Woods, Capt. Cameron, as the Commissioner for running the 49th parallel, reports, in his description of that survey, I think it was in 1872, that the Commissioners had great difficulty in finding the monument which was reported to have been planted in 1842 by the Commissioners of that period, but that after a great deal of trouble they found a square block of logs, and it was supposed that this formed the basis of the monument, and the monument really, at the time they were there, was under water; so they determined the North-West angle at this point and planted an iron bar, which I had the pleasure of standing beside a couple of years ago. This monument is a large iron post about six inches square, and has got "Convention of London," on north side, and had the date on the other side, "October 20th, 1818," and showed on the top "Hamilton" where it was cast. I considered it was the true Nort' West angle. There is no trace of a line running north or south from that now, it stands apparently in bush that has been there probably thirty or forty years. The line to be defined will be run between the Province of Ontario and Manitoba from this iron post.

Mr. Chipman—How far is this North-West angle north or south of the 49th parallel?

Mr. Kirkpatrick—I should say it was about 26 miles north.

Mr. Chipman—Does the United States own any land north of the 49th parallel?

Mr. Kirkpatrick—Yes, they do. They own an area of land equal to about 70,000 acres. From this point (indicating it) on the map at the North-West angle the boundary of Manitoba and Ontario will be a straight line drawn up to the English River.

[*This Association is not responsible as a body for any opinions expressed in its Papers by Members*]

SECTIONAL SURVEYS.

By P. S. GIBSON, O.L.S.

Willowdale, Ont.

In treating of this subject the writer will enter into a short account of the two classes of surveys made by the Government prior to the introduction of the sectional system, stating some of the reasons why this system was much to be preferred to the former ones; also giving an outline analysis of the law on the re-survey of sections.

1. Single front concessions are such as have had only a single row of posts planted on the concession lines, and the lands have been described in whole lots.

2. Double front concessions are such as have had posts or monuments planted on both sides of the allowance for road between the concessions, and the lands have been described in half lots.

3. Up to about the year 1819, townships were laid out with single front concessions, and from 1819 up to about 1829 with double fronts; after 1829 sectional surveys were introduced and still continue to be laid out.

4. Single front concessions generally contained 200 acre lots, each 20 chains by 100 chains.

5. Double front concessions also contained 200 acre lots, but they were 30 chains by 66.67 chains.

16. In these two systems of surveys, no side roads or proof lines were supposed to have been surveyed although some may have been.

17. In townships surveyed with single front concessions we find jogs in the side roads at nearly every intersection with the concession roads, and in many cases these jogs would not have been so great had the surveyor in measuring along the fronts of the concessions begun his chaining each time at the same base line, instead of chaining up one concession and down the next to save time.

18. In townships surveyed with double front concessions we of course find no jogs in the side roads at the concession roads, as none by this method of surveying could occur, but, instead, there may be jogs all along the middle of the concessions, and such jogs are very common, sometimes being as great as 10 chains, but only in rare cases. These jogs are very inconvenient, making it necessary for the Municipal Council of the township to purchase land to connect the ends of the side roads at the jogs in order to obtain a continuous right of way.

19. For the above and other reasons the Order in Council of 27th March, 1829, mentioned in section 52 of the Survey Act, was passed, authorizing the dividing of townships into sections.

20. In the Order in Council it states the reasons for these inaccuracies occurring in the old methods of surveying, they being "generally owing to the surveyor employed not having been directed to run transverse or proof lines at the intersections of the cross roads on the several concession lines."

21. And continuing, states that the proposed new mode of surveying "deviates very little from the useful method and form, but most essentially by being scientifically correct." And "that the distance to be run in a township will be about one-fourth less, and the posting and fixing of boundaries about one-half the number that were formerly required, and will at the same time be less expensive and equally beneficial, if not more so, to the settlers."

22. The form of section laid out under the Order in Council contained 2,400 acres, twelve lots of 200 acres each, six lots in each concession and roads were run around the entire block.

23. The Order in Council then goes on to explain how in after years side lines of lots can be much more easily run under the sectional system of surveys. The surveyor would have "well known points to govern him, the intersection of the proof lines will point out the angles of each parallelogram, and consequently the same may be easily divided from angle to angle into six equal parts, even although all the original boundaries of the lots had been lost on the concessions, and then run the side lines of the lots from the front of one concession to that of another according to their respective numbers . . . by a direct line, and the sub-division thereof will of course correctly follow."

24. This method of running side lines by drawing a straight line between the stakes planted on the front of each concession is of course not pursued in Ontario, the correct method being to run the side line from the stakes planted at the front of each concession on the same course as the base line, being the boundary of the section, as stated in section 59 of the Survey Act.

25. In section 52 of the Survey Act we find three different classes of sections spoken of, viz.: those divided agreeably to the Order in Council containing 2,400 acres, and sections containing 1,000 acres more or less, and 640 acres more or less. In the latter roads were not laid out around the blocks.

26. In surveying sections with roads around them the lines are run in the centre of the roads, and stakes planted for the corners of the lots and side roads at the proper distance from the said centre line.

27. In this section 52 an important point arises as to how a surveyor would run a "blind" line, *i.e.*, the line between the two concessions of the section, from the fact that it makes no provision for the running of such a line.

28. Now as the running of a blind line is actually the running of a concession line when it has not already been run, the only course left open for the surveyor would be to accept it as such, and follow up the rule of so drawing it as to leave each of the adjacent concessions of a depth proportionate to that intended in the original survey.

29. Suppose the case of running a "blind" line between two concession lines that are very crooked, and in the original field notes it shows one end of a concession as 50 chains deep, and the other end as 49 chains deep with the adjoining concession of the section 50 chains at each end. The instructions to the surveyor were to run all the concessions 50 chains deep. The question is: How would a surveyor on a re-survey run the blind line? At that end of the section where each concession is 50 chains deep, he would measure the distance on the ground and take half and plant the stake for one end of the blind line? At the other end of the section, where one concession is 49 chains and the other 50 chains deep, he would measure the whole depth of the section, and the blind line stake would have to be planted by proportioning either the 49 and 50 chains, or the 50 and 50 chains, as it was intended that the depth should be in the instructions.

30. This gives rise to another question, as to what is meant by the phrase "intended in the original survey." Let us refer to those sections of the Act where it speaks of the running of concession lines in both alternate single front concessions, and alternate double front concessions which are similar to one case in sectional surveys. Here we find what might be taken as an explanation of the phrase. It says, "to the depth proportionate to that intended in the original survey, as shewn on the plan and field notes thereof of record in the Department of Crown Lands."

31. Although this apparently solves our difficulty, still could not the phrase be taken to mean to the depth of the concession given in the instructions to the surveyor who originally surveyed the township.

32. Coming back again to the question of running the intermediate part of the blind line between its end stakes, as the two concession lines as run on the ground are very crooked, how should we proportion the depths along the side lines to locate the blind line?

33. Some may contend that the intended depth of the lots in the goring concession should be ascertained by proportioning the depths given at each end, and establish the blind line accordingly. Others that the line should be drawn as if all the lots were intended to be the same depth as per original instructions to the surveyor. And still others that the last lot 49 chains deep should be proportioned as shown on the plan and field notes, and all the other lots taken as 50 chains deep, and the blind line drawn accordingly.

34. As to the running of side lines in sections, Section 52 of the Survey Act says, that they shall be run in like manner as the division or side lines in townships originally surveyed before the said day

(27th March, 1829) are governed by the boundary lines of the concession, and shall be governed by the boundary lines of such section or block.

35. Therefore side lines in sections must be run on the same course as the base line if so intended, and where end of concession is wholly bounded by a lake or river, or other natural boundary, or has not been run or was not intended to be on same course, then the line must be run on the same course as the other end of the concession, if intended to be on the same course and if such boundary line was run in original survey. And where side line was not intended to be on same course as base at either end of concession, then to be run at such angle with first base as stated in plans and field notes, provided such line was run, and if not run then at an angle with second base; and if it had not been run either, and if concession was wholly bounded at each end by a lake or river or other natural boundary, then side line to be run at such angle with the course of the line in front of concession or portion of concession as stated in plan and field notes. If a concession that is bounded at both ends by a lake or river has a proof line or lines run in them, then side line must be run on same course as the governing proof line.

36. The above are rules laid down for running side lines in concessions other than sections and which apply also to sections, for side lines in sections must be run in like manner, etc., as before stated.

37. But there is apparently provision made in Section 52 for an entirely different circumstance, viz: that of a base line being *broken* by a lake or river (*i.e.*, where it is not wholly bounded by a lake or river) in such a way that the course thereof cannot *accurately* be determined.

38. Now the question is what cases would this cover? And how are surveyors to tell when the base cannot be accurately determined? If the base line is broken in the middle it does not interfere with the surveyor obtaining the astronomic bearing of it.

39. But suppose a case where one end of a base line is broken or cut off by a small lake in the township, would that end be accurately determined by intersecting the concession line by a line drawn through two or even more side road lines?

40. If the four corner stakes were lost at and adjoining one end of a base line, how should a surveyor proceed to locate that end of the base line? He would of course intersect the adjoining known parts of the concession and side road lines.

41. And so there is no apparent reason why the surveyor should not apply the same method in the case of the end of a base being cut off by a lake or river.

42. A question might here be asked, Does a lake or a portion of a lake which is apparently upon a lot belong to it? In the case of a very large lake, as Lake Ontario, we know that it does not, as it forms the boundary of the township. Now, suppose that such a lake cuts

off the one end of a base line and no monument was planted on the base except at the other end of the section, would not this be a case where the base could not be accurately determined, as the Act does not provide for the producing of lines, and the side line would have to be run upon the astronomical course if the base at the other end of the section were broken likewise

43. We might go on discussing very many probable cases in this way and still get no nearer to a definite understanding as to what extent the base line would be broken so that it could not be accurately located. The whole sentence probably means that if the surveyor should find it an impossibility, or at least a very difficult matter to locate the base or governing lines accurately in such cases that he is to run the side lines on the astronomical course of the side lines of the lots in the township as shewn on the plan and field notes, etc., meaning, it is assumed, the bearing shewn of the side line required to be run.

44. Another question which arises is, When is a line said to be run? Does it require to be permanently marked with monuments? Or would merely sighting and chaining the line be sufficient?

45. And, again, what are the boundaries of a section where it is broken by a lake or river? Would the intersection of the concession and side road lines form the boundary? Or would the boundary of the lake form the boundary of the section?

46. In determining the position of front stakes in sections where they are lost, the distance between the two nearest known front stakes and on opposite sides of the lost stake or stakes in the section must be measured and each lot given its proportionate width as intended in the original survey, as shewn in the plan and field notes thereof etc., and the boundaries of the section shall govern the widths of the lots within that section.

47. Assuming that sub-section 2 of section 60 of the Survey Act applies to sections, then if there is a stake in the centre of the concession road or on the side of the road opposite to the lost front stake it should govern in the place of the lost one. But this law apparently only applies to double or alternate concessions, as these are the only ones mentioned.

48. A question may be asked, What is meant here by alternate concessions? It is evidently intended to be applied to sectional surveys, where stakes were planted on opposite sides of the road.

49. There are double front sections and single front sections, but there is no such thing as double front concessions in a section.

50 Sections containing 2,400 and 1,000 acres or sections in which there are two concessions are surveyed as if they were double front concessions, and 640 acre sections or those that contain only one concession are surveyed like single front concessions.

Many more points of interest in this subject might still be discussed in this paper, but want of time and space will not permit the writer to do so.

DISCUSSION.

The President—There are many points that have puzzled a great many surveyors. I think if the papers were submitted to the Surveying Committee of the House next year and they were to give us a few ideas on the points raised, it might be one way of getting over some of the difficulties, but, as Mr. Gibson says in his paper, there are points very difficult to determine.

Mr. Speight—I think this is an exceedingly fine paper Mr. Gibson has prepared for us. There is no one better qualified than he to lay this matter of sectional surveys before the Committee of the House. In 1897 I suppose there will be a revision of the Ontario Statutes, and it would be well to have a good strong Committee formed to make a revision of the Survey Act, so that we may know what requires alteration.

Mr. Niven—I may say that I suggested a number of years ago the Act should be re-written, and I am of the same opinion still. I think it would be a good plan to get a committee together and see if they can agree upon something that would be less complicated than it is now. I think if you take any half dozen surveyors in the Province and put them together and discuss this paper of Mr. Gibson's for a day or a week, probably they would not come to a right conclusion then.

Mr. Gibson—If there is any law for it you are not responsible then.

Mr. Niven—I have not had time to look at it carefully, but I think I agree generally with what Mr. Gibson has written. At the same time it would be a good thing if the Act could be put in less complicated shape than it is at the present time.

Mr. Gibson then explained from a sketch (on the blackboard) of a township plan illustrating where a base line should be taken up, where it is broken by a lake.

Mr. Kirkpatrick—Many lakes are much larger than some concessions. We sell over and over again every day islands in those lakes. Could we describe those islands as being in any concession? They are in the lake. They are in a township but not in any concession.

Mr. Butler—You issue instructions to the surveyor to lay out the township and you are ignorant of the fact whether there is water there or not. The surveyor proceeds to the ground and has to cross the lake and take the concessions into account. It is true he does not draw his lines through the water, but he must transfer those lines across the lake as instructed, and has to take the distance across the lake to carry his correct chainage.

Mr. Walker—This question about the boundary depends a good deal on the character of the lake it seems to me. If that be a navigable lake the township will stop undoubtedly. But if it is an unnavigable lake the case will be entirely different. If it is an unnavigable lake it will be called a pond, and it will belong to the owner of lots.

Mr. Kirkpatrick—The description for this land stops at the water's edge. We have a case in the County of Waterloo in which there is a marl bed at the bottom of the lake, and a man came down and wanted the land. There is a road running through it, and I hunted up the description and found the road stopped at the lake. The description ended at the lake. What I advised the man to do was to employ a surveyor to survey the land under the water and to apply for that to the Government; then I said if you get the consent of the municipality we will grant you the land under the water. It is an invariable rule that the Commissioner of the Crown Lands will not sell any land which might be utilized for a road allowance. He holds that that has to be kept in the Crown for the municipality. If the man could obtain the consent of the municipality he could get it. The municipality has the first right to it.

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CROWN SURVEYS.

By JAMES DICKSON, O.L.S.

Fenelon Falls, Ont.

Look at the map of the Province of Ontario. The question at once suggests itself, why so many different systems of surveys?

Start out from the east boundary of the township of Alice on the Ottawa River, thence south to the township of Oso, west to the east boundary of the county of Ontario, north on that line to the township of Morrison, thence west, following the Severn River, to the Georgian Bay. One would think that each and every man employed to survey a township south of those lines had done his work according to the dictates of his own sweet will or fancy. The townships are of all sizes, all shapes, and the lines at all conceivable angles with the meridian, and the systems of surveys in sections adjacent to each other differ as widely as though they belonged to different countries. There is no reason why the townships should not all have been the same size or very nearly so, the lots the same acreage, and all lines having the same bearing. And how much better for all purposes it would have been, and how much more uniform the map of Ontario would look to-day, had a system on this basis been established when the first surveys were made and adhered to throughout the whole Province.

It was not until the surveys of the northern townships of the counties of Victoria, Peterborough, Hastings and Addington were begun that anything like a uniform system seems to have been adopted, and it has been adhered to by the different Governments which have succeeded each other since that period, without any variation, until the chain of waters formed by the Mattawa River, Lake Nipissing and French River is reached. In all that vast "Huron and Ottawa Territory," the townships are all the same size, 50,000 acres; the lots 20 chains by 50 chains, except where gross errors have been made by some surveyors—errors which were not known to the Department of Crown Lands until it was too late to remedy them. North of that chain of waters, and all over the other parts of Ontario, a different system—making each township six miles square, and all lines running due north and south and due east and west—has been inaugurated. In those townships the lots are 80 chains by 40 chains, and have an area of 320 acres each.

I believe a majority of the profession prefer this new system of survey to the old; but I am free to admit that I cannot look upon it as any improvement on that of the Huron and Ottawa Territory. A 50,000 acre township is certainly a more convenient size for a muni-

cipality than one of less than half that acreage, and it is quite as easy for a surveyor to run his lines at any given angle with the meridian as it is to run them due north and west.

But there is one point in the new system with which I can cordially agree, viz.: to leave no road allowances, but set apart five per cent. of each and every lot, to be used as public highways; the municipality having the power to locate them wherever the country is best adapted for the purpose. In many parts of our northern counties, the municipalities have had infinite trouble in locating deviations for roads where the original allowances passed over mountains, lakes or marshes; in some instances having to pay a litigious person nearly as much as his whole farm was worth in order to get a road into some sparsely-settled section, an outlay which would have been altogether avoided had no road allowances been laid out in the original survey, but a small percentage of land reserved for that purpose the roads to be located according to the requirements of the settlement.

The policy the Government has adopted of surveying the whole country ought to commend itself to every person, even although the land in some parts may not be adapted for agriculture. The amount it costs, 7 cents per acre, is a mere bagatelle in comparison with the fund of useful information available by means of the surveys. And, moreover, it has frequently occurred that where a township, or part of a township, has, decades ago, been left unsurveyed, it has been found necessary to send out parties to complete the surveys, and besides it not infrequently happens that a poor man may settle in those unsurveyed parts, and, before he can get a deed, must have a survey and plan of his intended purchase made at his own expense, an outlay he can ill afford and ought not to be called on to make.

What has long been known as the "District Line" in the county of Renfrew was begun by the late A. Wells, P.L.S., in March, 1851, and completed a few years later by the late Robert Bell, P.L.S.

It starts at the north-east angle of the township of Palmerston, and running N. 20° 51′ 40″ W. Asty., strikes the Ottawa River a few miles north of the town of Pembroke, at the north-east angle of the township of Alice.

This seems to be the date on which a uniform system of surveys in the Province was first adopted, for we find all the townships laid off to the west of that line are, as nearly as may be, of uniform size and all the lines have the same bearing.

Then we have the Bobcaygeon Roadline starting at the north-west angle of the township of Stanhope, and extending on the same bearing as the District line above mentioned, to Lake Nipissing. This line was begun in the year 1859 by the late John K. Roche, P.L.S., who was accidentally drowned by the swamping of his canoe in a gale of wind on Balsam Lake, on his way home to Lindsay on a visit during the progress of the survey, and completed by the late Crosbie Brady, P.L.S., in the year 1860. The Bobcaygeon line is upwards of ninety miles west of the District line, and seems to have been also a base from which the townships were laid off to Georgian Bay to the

west and towards the east, until the surveys carried on from the Ottawa were met with, and with the exception of two—Preston and Sproule, which are in the Algonquin Park—there is now only one township, Airy, unsurveyed in the whole Huron and Ottawa Territory.

During the summer of 1893 I was sent out by the Department of Crown Lands to run a part of the south boundary of the Algonquin Park. My line started at the north-east angle of the township of Nightingale, and ended on the west boundary of the township of Clancy. It was a connecting link between the surveys carried on east from the Bobcaygeon line with those carried west from the Ottawa side, and was laid down on the projected plan accompanying my instructions, thirteen miles long.

Produced west from where I started, a distance of thirty-three miles, it would strike the Bobcaygeon line seventeen miles north of the initial point of that line. And produced east from my terminal point it would strike the District line at a distance of forty-five miles; and sixty miles north of its initial point, I found the true distance thirteen miles twenty chains and fifty links; an error of only a small fraction over a fourth of a mile. Now, had all those surveys—the District line, the Bobcaygeon line, and intervening townships—been made by one man, I should consider it very poor work indeed. But when we consider that the two base lines were run with a long interval between by men who probably never saw each other, nor had ever had any correspondence, the number of surveyors also having no connection with each other who laid out the intervening townships; and the small army of chainmen amongst whom the work was divided; the mountains and hills to be chained over; the swamps and marshes that were waded through; the ponds, lakes and rivers triangulated; and last, but by no means least, the incessant war which many of the parties had to wage with mosquitoes and flies—I think this shows a degree of accuracy to which we Ontario surveyors can point with honest pride.

It is a well-known fact that nearly all Crown Surveys, previous to forty years ago, were made by compass, without even the formality of an observation to start a line from, and this is generally assigned as the reason why so many of the older surveys are found to be so very inaccurate. This conclusion is certainly wrong. In my practice—and I think other surveyors who have had much to do in those old townships will bear me out in this—I have found a greater number of errors clearly traceable to bad chaining than to all other causes put together; and errors which were of much more consequence than any I have ever found which were occasioned by a line being run on a wrong bearing.

If some concesssions are found five or any number of chains more or less in depth than they should be, all across a township; or lots, which should be—and were all returned—thirty chains wide, without an exception in a whole township, are found in the field to vary all the way from fifteen to ninety chains, one cannot possibly say those errors are occasioned by the use of the compass. They

are clearly traceable to gross negligence or incompetence on the part of the chainmen, but errors from which no surveyor can by any means wash his hands of responsibility. So gross do I find the errors made by the chainmen in the old surveys where I practise, that it is only at very rare intervals the measurement of a lot comes within a chain of what it was intended to be.

I do not wish it to be taken for granted from the above that I am either in favour of, or condone, the use of the compass in making a survey of a new township. On the contrary, I submit that the Government should prohibit its use altogether in laying out the lots, and insist on all the lines being run by theodolite or transit and by no other instrument, and then only from carefully-taken astronomical observations frequently repeated during the progress of the work. I have always failed to see where any great saving of time or labour comes in by using a compass, instead of a proper instrument, if the lines are opened out as per instruction, for I hold that it is just as necessary to get good, accurate backsights with a compass as it is with any other instrument.

I admit that if the country is level, or nearly so, fairly good backsights can generally be had, although the lines may not be well opened out. But, if it is at all broken or rough, everything must be cleared out, in order to secure an accurate backsight. For, to maintain that in one case out of ten, a line can be run even approximately correct by depending upon the magnetic needle alone, is simply absurd. If the country is comparatively level, and trees left in the line are standing perpendicularly, with proper care, good backsights may be had. But if the land is broken or knolly, or if the surveyor has to set up his compass behind a leaning tree on the side of a rise, where he cannot get a sight back along the level, or should a tree stand upon the top of a narrow ridge where he must take a sight, there is nothing for it but to cut everything out of the line if even approximate accuracy is to be achieved.

I have heard a good deal of blowing of trumpets as to the accuracy some men attain with the magnetic compass; but in all my experience, as inspector of surveys in all parts of Ontario, both in wet land and dry land, over mountains and on the level, I cannot recall an instance where a line was run over a hilly country or through thick woods, and not sufficiently well opened out to enable the surveyor to get good backsights, where it came out correctly.

In a former paper on Crown Surveys, I referred at considerable length to the unprofessional manner in which some surveyors did their work. I am pleased to be able to testify that there is now a marked change for the better. But there are still a few who think it the correct thing to run in with an angle to the post if they find their line is coming out wrong, and *forget* to note the change in their returns; who think it the correct thing to show a neat, well-proportioned triangle, to calculate the width of a lake or river, in their field notes, although there may be no trace of any kind of triangle in the field, and, in fact, it was utterly impossible to lay off any such

triangle at all in the place referred to; or to show in their field notes a neatly made traverse of every lake and pond in their township, although not a single line was ever run any place except on paper, *and take a solemn oath that the notes are true and correct.* If such men would perform their work in the same manner when employed by private individuals, they would soon be under the necessity of adopting some other line of business for a living. In a large majority of the Government surveys now being made, the lines are so accurately run, well blazed and posted, that they can be easily found as long as the timber remains standing, or after the timber is all gone, a re-survey made by the original instructions will re-establish the original lines and the position of the original monuments with almost perfect accuracy.

But while there is such a marked improvement in the execution of the new surveys, there is also a flagrant violation of the law which some surveyors either indulge in themselves or permit their men to do so while in the field. The unlawful killing of game I have recently met with myself, and have also heard of other cases, where moose, deer, and even beaver, have been killed; and in nearly every instance portions of the carcasses left to feed the fox and raven where the animal fell. This practice forms no part of their instructions, and it ought to be a point of honour with the surveyor to stamp it out and not allow revolvers and repeating rifles to be taken into camp at all.

It is frequently urged in excuse, "we were short of provisions," or the "lads could not resist the temptation to have a piece of fresh meat." This "short of provisions" tale is worked for all it is worth, with good, decent interest added. I know of one surveyor who is so habitually short of provisions that he nearly always works his men on Sunday. Taking barely supplies enough for a given number of days, and allowing no margin for foul weather or accidents. An extra bag of flour and sack of pork would obviate any necessity for this on a six weeks' trip. And a man who cannot go half-a-mile from camp unless armed to the teeth for fear of a death struggle with the proverbial "she bear and cubs," or a pack of hungry wolves, had better be left at home in the city, where he may have opportunities of doing some good, for he will, to a certainty, be found of exceedingly little service in camp. And besides most of the hunting is prosecuted on the Lord's Day, oblivious to, or utterly regardless of the fact that the Divine command, "Remember the Sabbath day to keep it holy" applies with equal force in the sombre woods and crowded mart.

I cannot close this paper without a passing tribute of praise to those geological surveyors who have penetrated into the most remote parts of the Province for so many years. We might well call them the pioneers of the surveyor. For, go where you will, you wil find you have been forestalled by the geologist.

They have traversed almost every lake and river or creek large enough to float a small bark canoe. They have toiled and packed over the most difficult portages; climbed the highest mountains; paddled or waded up, or, taking their lives in their hands,

run down the most difficult chutes and rapids ; sketching every mountain, and making a rapid traverse of every lake and stream as they went.

Starting from some established geographical point, they have plunged into the heart of the wilderness and mapped out their work with a degree of accuracy which is simply marvellous. So accurate do we find their maps that when we come to make actual surveys of localities which must have been hundreds of miles from the nearest established point when the geologist made his survey, we find the location of a lake or river almost correct It is only at rare intervals they are found to be a mile out. A degree of accuracy which, all things considered, seems beyond the bounds of possibility.

DISCUSSION.

Mr. Kirkpatrick—There is one point in Mr. Dickson's paper that bears out also the necessity of an amendment to the Survey Act, and that is, in the next system of surveys away on the north shore of Lake Huron and Lake Superior, where townships are surveyed out six miles and no road allowances are left, the patents that are issued reserve five per cent. of the acreage and the right of the Crown to lay out roads where necessary. Now the question has arisen, and I do not think it has ever been decided yet, has the municipality the right to lay out roads where necessary ? That was intended to be so, but such a clause will have to be introduced into the Act, giving the municipalities the same unquestionable right, and that will be another amendment that will itself appeal to every man in the Local House to have carried out. I think we are all indebted to Mr. Dickson for his very valuable paper.

[*This Association is not responsible as a body for any opinions expressed in its Papers by Members.*]

NATURAL BOUNDARIES.

By A. P. WALKER, O.L.S.

Toronto.

SCOPE OF PAPER.

1. The scope of this paper is to present, in as condensed form as possible, the legal decisions which have come under the writer's notice, bearing on the proper method of surveying and determining the boundaries of landed property, described as bounded by lakes, rivers, or water-courses only, and from these decisions to draw a few deductions which may open up this important subject for discussion, benefiting thereby the members of the profession generally.

THE COMMON LAW OF ENGLAND.

2 By the Common law of England, on which our law is to a great extent based, the waters of the sea (for a certain distance from land) and waters of navigable rivers, belong to the Crown, subject to the rights of navigation; and according to the same law, the soil under the sea, the sea shore, and the beds of navigable rivers, as far as the tide rises and falls, are also the property of the Crown. On navigable rivers above where the tide rises and falls, it has however been held that the bed of the river belongs to the riparian proprietors, or owners of the bank, on each side to the middle thread of the river, although these owners have no right to obstruct navigation.

COMMON LAW AS APPLIED TO CANADA.

3. The above law, although applicable to the short lengths of rivers above tidal waters in England, is altogether unsuited to the great lakes and rivers of Canada. Under this law an owner of land on the bank might claim out to the centre of the rivers St.Lawrence or Ottawa, or even Lake Ontario, as none of these are actual tidal waters. In the case of Parker *v.* Elliott (1 U.C.C.P. 470) in 1852 it was decided that this law did not apply here, and the lands of the owner extended to high water mark only.

PARKER *v.* ELLIOTT.

4. This case (Parker *v.* Elliott) is of a good deal of interest to Surveyors, and the writer trusts a few words respecting it may not be uninteresting. Parker was the riparian owner of lots 22, 23 and 24

in 1st Concession of Township Pickering, which parcel was described in Crown grant as "Commencing within one chain of the south-east angle of lot 25 on the bank of Lake Ontario." Thence passing around the property and concluding " along the bank of the lake to the place of beginning." The action was brought to decide the ownership of a strip of land, about 4 chains in width above the water level, which crosses in front of these lots and separates the waters of Lake Ontario from a sheet of water within, called Frenchman's Bay, which strip and bay Parker contended formed part of the lots in question. Chief Justice Macaulay, in delivering judgment, says that " the bank as intended in the patent must be taken to mean the land line defined by the high water mark." Justices Sullivan and McLean concurred in this view, although there was some difference of opinion as to how high water mark should be defined.

THE CROWN OWN WATER LOTS OUTSIDE HIGH WATER MARK.

5. As far as the the writer can ascertain this decision has always been followed, and the Crown, represented by either the Dominion or Provincial Government, now appears to have the unquestioned right to the water lots outside the high water mark on navigable rivers or lakes.

DIXSON *v.* SNETSINGER.

6. This decision (Parker *v.* Elliott) was followed by Mr. Justice Gwynne in 1863, in the case of Dixson *v.* Snetsinger (23 U.C.C.P. 235), who went further, and decided that in order to determine whether a certain stream is navigable or not, we must consult the Civil law, and not the Common law of England.

NAVIGABLE RIVER ACCORDING TO CIVIL LAW.

7. This Civil law was the law in force before the conquest of Canada from the French, and was in general replaced by the Common law of England. What then is a navigable stream according to this Civil law? The following is taken from the decision in Gage *v.* Bates (7 U.C.C.P. 116) : " Navigable rivers, in the language of the Civil law, are not merely rivers in which the tide flows and reflows, but rivers capable of being navigated ; that is, navigated in the common sense of the term."

8. In Attorney-General *v.* Harrison (12 Chy. 470) the Sydenham River is decided to be a navigable stream, although at that time obstructed by fallen trees and sunken logs.

9. In Dixson *v.* Snetsinger : A channel of the River St. Lawrence was extremely rapid, but small Canadian boats, 25 feet long, used to pass up, being drawn through the rapids by men with cable. This was held to be a navigable river also.

NAVIGABLE STREAM DEFINED.

10. It would therefore seem that a navigable stream in Canada is one actually navigable by boats or vessels used in the prosecution of commerce.

HIGH WATER MARK DEFINED.

11. As in paragraph 5, it appears that a lot fronting on navigable waters extends to high water mark, we, as Surveyors, may often be called upon to define this boundary. How shall we proceed ? The term " high water mark " should not be taken in its literal sense, nor does it mean the highest known water mark. Mr. Justice Wilson puts the matter very clearly in his decision in Plumb *v.* McGannon in 1871 (32 Q.B. 8) when he says : " The evidence does not shew what the limit of the highest ordinary state of this river is, or was ; as that would seem to be the proper limit of high water mark, and not the highest limit that the water reaches in the course of the year ; for the great flow caused by the melting of the snow and ice, and by the spring rains, or by other unusual floods or causes, is to be excluded in determining the limit of high water mark " " The true limit would appear to be by analogy to tidal waters, the average height of the river after the great flow of the spring has abated, and the river is in its ordinary state." The writer thinks that, basing our work on this decision, there should be no great difficulty in establishing the boundary.

THE LAW OF ACCRETION.

12. But here another difficulty arises, namely the question of accretion, which is the gradual change always going on in the position of the bank and high water mark

Sir John B. Robinson, in the case of Cobourg and Peterborough Railway *v.* Throop (2 App R 212), says, in deciding the case : "When the gain from accretion has not arisen from any sudden and violent change, but has been gradual and imperceptible, according to the sense which is now put on these terms by Courts of Justice, the high water mark as it stands from time to time, influenced by this imperceptible increase to the width of the shore, is what is to be regarded. If it were otherwise, the consequences of such a change by accretion, though to a much less extent, would be most disastrous to proprietors by shutting them out from the water altogether." The judge also quoted, with approval, a previous decision in which it was stated : " If this accretion which was contributed to, or even purposely contributed to by the act of defendants, that would not take the matter out of the ordinary law with respect to the accretion."

BOUNDARIES NOT PERMANENT.

13. Taking these two decisions together it would appear that such boundaries cannot be permanently established for all time, but should be determined annually after the great flow of the spring has abated.

14. Another interesting point is how does this law of accretion affect the width of road allowances laid out of a stated width from the water's edge. Does the natural accretion form part of the lot on op-

posite side of road, or is it part of the road itself, or is it the property of the Crown? The writer has been unable to find a legal decision on this point, but is of opinion that such accretion is the property of the Crown.

OWNERSHIP OUTSIDE HIGH WATER MARK.

15. Outside of this high water mark the land covered by water is vested in the Crown, whether as represented by the Dominion or Provincial Governments the writer cannot say. The matter is now being fought out in the Supreme Court.

BOUNDARIES IN UNNAVIGABLE STREAMS.

16 Taking up the question of boundaries defined by unnavigable rivers, the following are three decisions bearing on this point. In the case of Queen *v.* Robertson (a Supreme Court case), Mr. Justice Strong says (6 S.C.R. 130): "No principle of law can be better established, both in England and America, than the rule which ascribes the ownership of the soil and bed of a non-navigable river, prima-facia, to riparian proprietors of the opposite banks each to the middle thread of the stream."

In Kains *v.* Turville, 1871 (32 Q.B. 17), (a case of removing gravel from bed of Kettle Creek, an unnavigable stream in Township Yarmouth) the following extract from description is taken: After going to the west limit of the road which crosses Kettle Creek, "Thence north along west side of said road 25 links more or less to the water's edge of Kettle Creek. Then keeping along the water's edge of said creek with the stream until the said creek intersects the line or limit between lots." (The rest of description is immaterial.) This description was held by Chief Justice Draper to hold the land to centre of creek, except in the case where the creek was specially excepted in description, as was the case in McArthur *v.* Gillies (29 Chy. 223) when the land on one side of an unnavigable river had been conveyed to one party, and afterwards the land on the other side "together with the whole of the river" to a second party. The decision did not turn on these descriptions, which is to be regretted, but the judge seems, from his remarks, to favour the bank being the boundary in place of the thread of the stream.

BOUNDARY IN THE CASE OF REGISTERED PLANS ADJOINING UNNAVIGABLE STREAMS

17. In the case of Platt *v.* Attrill, which went to the Supreme Court, the judges there say (10 S.C.R. 425) that when a certain "Block F" was laid out on a Registered Plan, and shewn on this plan bounded on one side by the water's edge of the River Maitland (an unnavigable stream), and this Block was conveyed by deed to one Ross, unless specially reserved, the portion of the bed of the river between this Block and middle thread of the river would and did pass by the deed to Ross.

MIDDLE THREAD OF RIVER DEFINED.

18. "The middle thread of the river alluded to in the above cases is the middle line between the shores upon each side without regard to the channel or lowest and deepest part of the stream, and in ascertaining the shores or water lines on each side to measure, it will be proper to find what these lines are when the water is in its natural and ordinary stage, at a medium height, neither swollen by freshets nor shrunken by drought. (Trustees *v.* Dickenson, 9 Cush. 544.) If the river be divided in two courses by an island in its middle, the thread of the river for boundary purposes bisects the island." (Phear "Rights of Water.")

19. Here again the law of accretion makes itself felt, and any gradual change in the course of the stream changes the boundary accordingly.

The writer has pleasure in acknowledging the great assistance given him in the preparation of this paper by Mr. Angus MacMurchy, one of the C. P. R. solicitors, who placed a valuable law library at the writer's disposal.

DISCUSSION.

Mr. Sankey—I would like to ask Mr. Walker whether, in his search in the preparation of his paper, he found any cases which recorded the definition of what a navigable river was, and whether the title to the bed of the river ever passed out of the Crown at all. It is a case of some interest to surveyors. In some cases the bed of a river, as one contended, does not pass in the patent; in other words, "to the water's edge" or to "the bank of the stream" is the wording in the patent Perhaps in a concession farther up the river you find the whole bed of the stream passes in the patent. The lot passes as a full lot. It is one of the points I think there is some dispute about as to whether certain rivers are looked upon by the Crown as navigable when in fact they are not. I see in this paper you say, one actually navigable by boats or vessels used in the prosecution of commerce.

Mr. Walker—I may say in answer that I looked that up as fully as I could, and this was the decision that seemed to throw most light on the subject. I think it would have to be decided in the courts whether a river is navigable or not. There is no way of actually deciding it except in that way. There are a great many rivers there is very little doubt about, but there may be some that may be so nearly on the line between a navigable and unnavigable river they would be unable to decide it without reference to the court.

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A ROAD OR NOT A ROAD.

By M. GAVILLER, O.L.S.

Collingwood.

KENNY *vs.* CALDWELL.

In September, 1875, I was employed to stake out lot letter D, on the east side of the Penetanguishene road, in the 1st concession of the township of Oro, and planted posts for the angles of same. In February, 1876, I was employed by the Township Council, township Oro, to stake out a schoolhouse ground at the westerly end of the gore composed of lots D and E, east of the Penetang road, and located the westerly apex of the gore 74ft. 10in. east of the easterly limit of the Penetang road, and distant one chain each way at right angles from the northerly and southerly boundaries of lots 10 and 11. (See plan I.)

I found that another surveyor had planted a post, for this said point, *on the easterly limit* of the Penetanguishene road, 22ft. 9in. northerly from the north-west angle of lot No. 10, leaving an unaccounted-for strip of land between said lot 10 and lot "D."

The plaintiff Kenny purchased part of lot "D," the following being the description in the deed: "The south-east part of lot letter D on the east side of the Penetang road, being a block of land having a frontage of 80 rods on the eastern boundary of said lot D and 200 rods on the southern boundary thereof."

Caldwell, the owner of that part of lot D north of Kenny's portion, having been instructed that there was no legal road between lot 10 and lot D, put up his fence, as Kenny considered, nearly one chain too far south, alleging that Kenny's purchase should be bounded on the south either by the northerly boundary of lot 10 or the strip of land 22ft. 9in. wide. That part of the road in dispute at Kenny's purchase had been opened and travelled as a township road for some thirty-five years, the westerly part having been opened up for traffic some years later. Hence the suit.

The Penetanguishene road lots, on each side, and front of 2nd concession, were laid out by Deputy-Surveyor Wilmot in 1811, said road being termed "a road of communication between Kempenfeldt Bay and Penetanguishene Harbour on Lake Huron."

The line for said road was run in the centre of a road allowance one chain wide.

On the plan returned by the surveyor no number or letter was placed on the gore lots on the east side of the Penetang road, or on the lots between No. 10 and No. 11 in the 2nd concession.

The suit was tried in the High Court before Ferguson, J., who gave judgment dismissing the plaintiff's action with costs, in 1891.

Then appeal to Divisional Court.

Then appeal to the Court of Appeal.

Then appeal to the Supreme Court, the judgments of the two latter being in favor of the plaintiff, thereby establishing the road in question.

INSTRUCTIONS.

(Extract from.)

SUR. GEN. OFFICE,
York, August, 1811.

Mr. Saml. S. Wilmot, Dept. Surveyor.

S r,—His Excellency the Lt.-Governor having been pleased to order that a road of communication between Kempenfeldt Bay on Lake Simcoe and Penetanguishene Harbour on Lake Huron should be surveyed and laid off into lots for settlement, you will, without loss of time, prepare yourself to perform that service, and having provided your usual party as to the number of hands (for which you will be allowed the accustomed pay and allowance for ration), you will proceed to the north side of Kempenfeldt Bay, near to the place at the head thereof where in June, 1808, your examination for a line for a road commenced, and there select and choose the most suitable position for a town and harbour.

You will then survey the outlines of said town of one mile in length and half a mile in breadth, and return me a rough plan thereof that I may prepare instructions for laying out the same into lots. This having been done, you will proceed to examine and fix upon the most proper ground for a road as direct from thence as may be to the south side of Penetanguishene Harbor, which having ascertained *you will survey and lay off on each side of* your *line or road* (which is to be a chain wide) *lots of twenty chains wide*, and extending one hundred chains in depth, to contain 200 acres in each, *with one chain of allowance for road between every five lots* until you come to within half mile of Penetang Harbor (the site of another town). You will then survey the outlines of this town plot and return to me a rough plan thereof, so that instructions may be prepared for laying out this into lots also, etc., etc. . . .

Your field notes, diary and account you will make out and attest in the usual manner, etc., etc. . . .

EXTRACT FROM WILMOT TO SUR. GEN. DEPT. CROWN LANDS.

22nd October, 1811.

Sir,— . . . Having fixed upon the situation for the village, I opened a line N. 12 degrees east, and allowing half a mile for the depth of the village, I began to lay off lots of 20 chains each with an allowance of one chain for road between every fifth lot to No. 10, where I altered my course to N. 30 degrees, which I continued to No. 17, and found that the line interfered with a swamp that I had not any knowledge of in my tracks in that part of the country. I then thought it advisable to make an offset of 20 chains to the left, at the end of which I produced a line N 30 W. to Penetanguishene Harbor, making a distance of 39¾ miles from Kempenfeldt Bay, my place of departure. . . . The quality of the land on the road of communication is, generally, very good, both for settlement and a road, but not so well watered as it ought to be. Therefore I should advise that the 2nd concession on each side of the street should be surveyed, etc. . . .

INSTRUCTIONS.

25th Oct., 1811.

Mr. Sam. S. Wilmot, Surveyor.

Sir,—I am to acknowledge the receipt of your letter of the 22nd inst., together with the plan of your operations on the line of communication between Kempenfeldt Bay and Penetanguishene Harbor, . . . and, for the reason you assign, think it advisable that you survey and lay off the front of the 2nd concession on each side of the road or line of communication, as this will complete the survey of each 1st concession and lay off the front of the 2nd . . .

P.S.—You will continue to lay off the lots at right angles to the road, and should there be a gore between the village and the first lots on the road, you will leave it for further disposition. . . .

T. G. RIDOUT, S.G.

EXTRACT FROM C.L.D. TO WILMOT.

28th Oct., 1811.

. . . You will find by my instructions to you on 25th inst. that you are to survey a 2nd concession line on each side of the street, and which is to be performed on the same principle as the 1st concession. . . .

T. G. RIDOUT, S.G.

DESCRIPTION FOR PATENT OF LOT "D."

CROWN LANDS DEPT.,
27th April, 1839.

Grant to Catherine MacDonal. . . . All that parcel of land in the township of Oro, in the county of Simcoe, in the Home

District, being lot lettered D on the east side of the Penetanguishene road, that is to say, commencing on the eastern side of the Penetanguishene road at the intersection of allowance for road between lot lettered E and lot No. 11, and between lot lettered D and No. 10, then north about 79° 30′ east to the allowance for road in rear of the said lot lettered D, then south 9° west to the allowance for road between lot No. 10 and lot lettered D, then north 81° west, 100 chains more or less, to the place of beginning, containing 200 acres, more or less. . . .

DESCRIPTION OF LOTS 4 AND 10.

27th April, 1839.

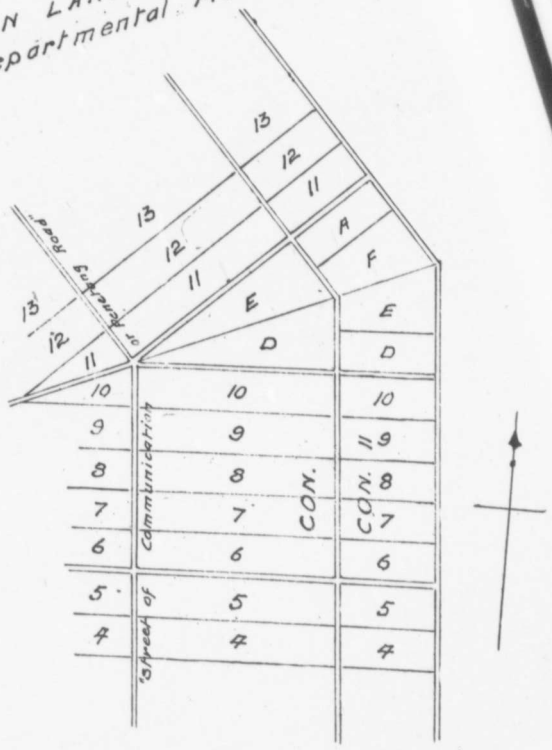
Commencing on the east side of the Penetanguishene road at the westerly angle of each of said lots respectively, then south 81° east 100 chains, more or less, to the allowance for road in rear of the said lots, then north 9° east 20 chains, more or less, to the limit between lots 4 and 5 for lot No. 4 and to the allowance for road between lot lettered D and lot No. 10 for lot No 10, then north 81° west one hundred chains, more or less, to the Penetang road aforesaid, then south 9° west 20 chains, more or less, to the place of beginning in each lot, containing 400 acres, more or less, etc. . . .

Gore lot E was not described for patent until 24th March, 1840.

PLAN

CROWN LANDS OFFICE

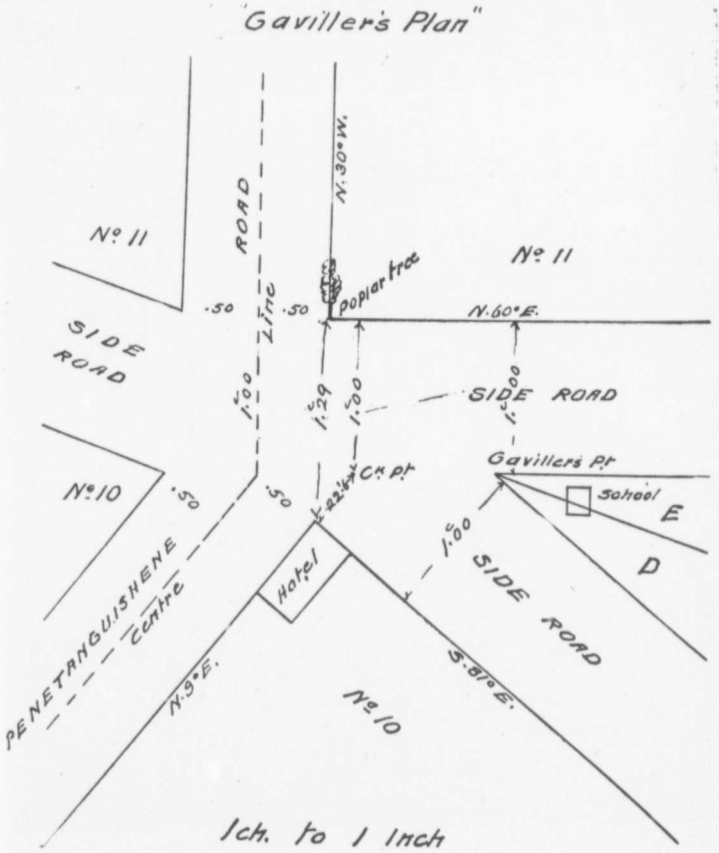
"Departmental Plan"

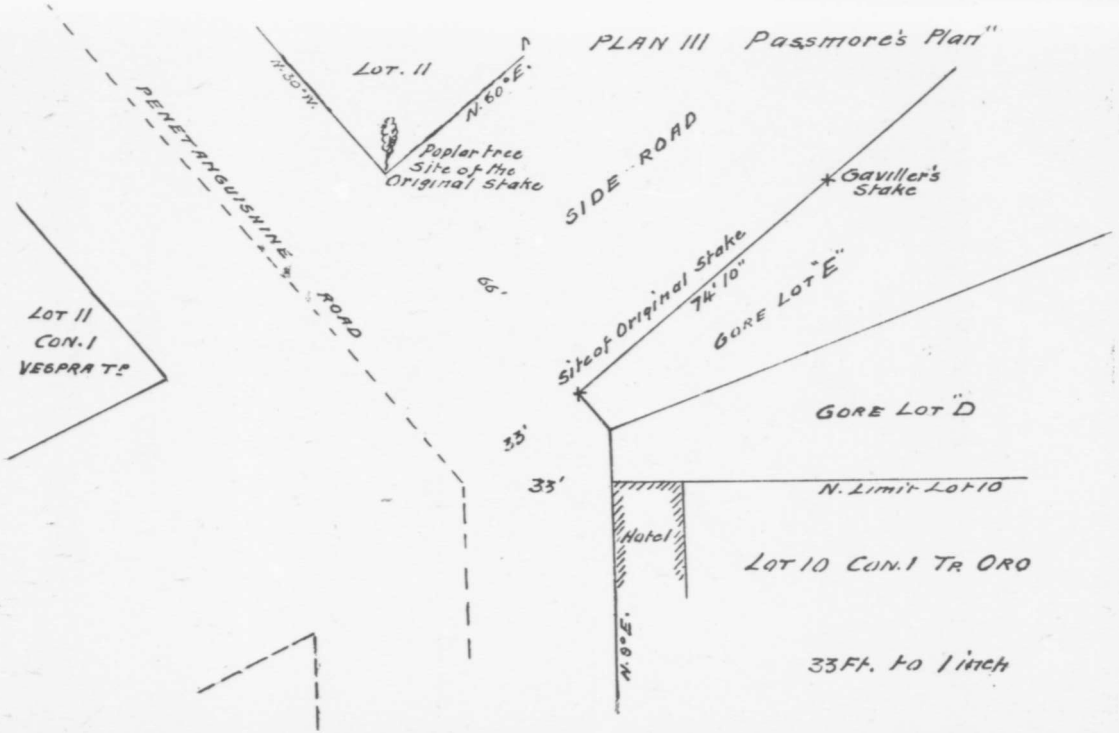


80 chs. to 1 inch

Note: On Sam. Wilmot's Plan, Lots lettered, Rave no letter or number on them

PLAN III


"Gavillers Plan"
No 11
ROAD
N.30°W.
No 11
Poplar tree
N.60°E.
.50
.50
Line
SIDE ROAD
1.00
1.29
1.00
SIDE ROAD
1.00
Gavillers Pt
No 10
.50
.50
±22½ Ch. pt
School
E
D
1.00
SIDE ROAD
PENETANGUISHENE
Centre
Hotel
N.5°E.
S.81°E.
No 10
1 ch. to 1 inch


PLAN III Passmore's Plan"
LOT. II
N.50°W.
N.60°E.
Poplar tree
Site of the
Original Stake
SIDE ROAD
Gaviller's
Stake
Site of Original Stake
74'10"
GORE LOT "E"
PENETANGUISHINE ROAD
66'
LOT 11
CON. 1
VESPRA TP
GORE LOT "D
33'
33'
N. Limit Lot 10
Hotel
LOT 10 CON. 1 TR ORO
N.60°E.
33 Ft. to 1 inch

Extract from Field Notes, December 31st, 1811, by Surveyor Wilmot, beginning on the North Shore of Kempenfeldt Bay:

Nos.	*Chs.*	*Lks.*	*Nos.*	*Chs.*	*Lks.*
N.	9°	E.	N.	9°	E.
....	20	Depth of Village	10	20	....
2	20	....	N.	30	W.
3	20	....	R.	1	....
4	20	....	11	20	....
5	20	....	12	20	....
R.	1	....	13	20	....
6	20	....	14	20	....
7	20	.....	15	20	....
8	20	....	R.	1	....
9	20	....	16	20	....

Extract from Field Notes, Second Concession, Township of Oro, distant 101 chs., at right angles from Street.

No.	*Chs.*	*Lks.*		
N.	9°	E.		
....	....	....	Lots 20 chains; and road every	
9	20	....	5th lot, 1 chain.	
10	20	....		
R	1	....		
....	20	....	This is now D.	Notes made by Crown Lands Department.
....	15	....	This is now E.	
....	14	66	This is now F.	
....	20	52	This is now A.	
R	1	....		
11	20	....		
12	20	....		
13	20	....		
14	20	....		
15	20	....		
R	1	....		

REASONS OF APPEAL.

1. The true boundary between the two parts of lot "D" and between it and lot 10, which road has been opened and travelled for a great many years and has been treated by the inhabitants and the Township Council, by grants of money, statute labor, etc., as a public road.

2. This appeal is from the judgment of the Divisional Court, which being equally divided, the judgment of the learned trial judge, treating the road as non-existant, stands.

3. The plaintiff submits that the road in question exists, as shown by (*a*) the original plan made by the original surveyor, in which it clearly appears, and which is quite consistent with the field notes and with work on the ground; and (*b*) by the adoption of this plan by the Crown Lands Department and the patents and descriptions therefor subsequently issued by the Department, in which this road is expressly recognized and described.

4. The plaintiff submits that either of these two grounds is sufficient alone to entitle the plaintiff to judgment.

As to "a":

1. The instructions to the original surveyor were to lay out a road of communcation (the Penetanguishene road), together with a concession on each side of said road, and also in the same connection to "complete the survey of the 1st concession" by surveying the 2nd concession "on the same principles as the first" and to leave a road allowance between every five lots.

2. The original surveyor returned to the Department immediately after his survey his plan showing clearly the road allowance where it ought to be by the instructions (he having surveyed from the south), immediately north of lot 10 and between it and the "gore."

3. The defendant contends that the field notes are inconsistent with this plan, but it is perfectly plain that the intention of the original surveyor was to lay out this road, and it would be extraordinary to find such inconsistency where the field notes and plan are drawn by the same hand; and as a matter of fact the plaintiff submits that there is no such inconsistency. The field notes at this point, after reaching 10, show a change of course as follows: "N. 30° W" and then "R 1 chain," and then lot 11 and so on.

4. *It will be observed that the field notes make no reference to the "gore" expressly*, but simply show the opening for the road allowance or road allowances, as the case may be, and then continue on the new course.

5. It is submitted that it is not inconsistent, but, on the contrary, quite consistent with the plan and consistent with the existence of the road in question, or even with the two roads north and south of the gore.

6. The defendant insists that the road is north of the gore and south of 11, and the plaintiff, while neither denying nor admitting it, submits that the existence of two roads is quite consistent with both

the plan and field notes; in fact, two roads are shown on the plan, and it is observable in this connection that *both roads are continued and the same plan followed on this the 2nd concession which was surveyed by the same surveyor* at the same time, and there are not five lots in the 2nd concession forming the back part of this gore between the two roads any more than there are in the first.

7. On the other hand, the theory offered by the defendant, namely, the frontage of both "D" and "E" on the Penetanguishene road, would be quite inconsistent with the said field notes.

8. The defendant's theory also leaves a considerable space of land between lot 10 and lot D wholly unaccounted for, and for which the surveyors called by the defendants frankly say they cannot account.

9 It is also observable that the road at this point on the west of the Penetanguishene road is at right angles to neither course.

Then as to "b":—

1. The action of the original surveyor in laying out the road in question was adopted by the Department by the acceptance of his plan, the completion of their office plan from same, and by their transmission, as required by law, of a certified copy of same to the County Registry office, and by the subsequent sales of "D" and 10, *the only two lots adjoining the road in question.* The patents of these two lots are simply patents of these lots by numbers without metes and bounds, but the "descriptions" for same on which the patents were based, *and to which they refer*, do describe the lots by metes and bounds, and both expressly recognize and describe the road in question.

2. The plaintiff submits that this is conclusive both as to the original survey and also by the estoppel against the defendant claiming under one of these patents, without reference to the original survey. (See Haggarty *v.* Britton, 30 U.C.R., 321; Martin *v.* Crow, 22 U.C R., 485; Holmes *v.* Kechnie, 23 U.C.R., 57; Stevens *v.* Buck, 43 U.C.R., 6; Smith *v.* Clines, 20 C.P., 213; McEchran *v.* Somerville, 37 U.C.R., 609; Reg *v.* G.W.R., 21 U.C.R., 556; Reg *v.* Hunt, 16 C.P., 145; Badgely *v.* Bender, 3 O.S., 221; Davis *v.* Waddle, 6 C.P., 448.

3. The defendant suggests that the description, for the patent for lot "E" militates against the plaintiff's contention, but this and the patent was *subsequent* to the other patents referred to, and the description is *general* and was based on the then existence of "D" as previously granted, and only purported to deal with "E" and the road to the north; and the plaintiff submits that when properly read it is not inconsistent, but, if so, must give way to the prior and more specific grant and descriptions.

4. Some evidence was given on behalf of the defendant at the trial as to the site of a stake at this gore, which was assumed to be the south boundary of the road south of lot 11. This evidence, which was principally given by an old man named Johnstone, in his eighty-fourth year, was extremely unsatisfactory; he only pretended to have seen the stake once (sixty years before), and had never seen it or the

site since, and on cross-examination placed it in a different place, and where the plaintiff says it was, namely, the north-west corner of 10. The ground was very uneven, a large hollow having been filled up in the meantime and the road and neighborhood cleared of stumps and the face of it quite changed. This evidence is unreasonable, and if accepted would be wholly inconsistent with the field notes and plan and would produce the space unaccounted for, already referred to.

5. The plaintiff also refers to the reasoning in the judgment of Mr. Justice Rose in support of his contention.

REASONS AGAINST APPEAL.

The defendant submits that the judgment appealed from is right and should be affirmed for the reasons assigned in said judgment, and the following and other reasons:—

1. The onus lies upon the plaintiff to establish the true southern boundary of gore lot "D" as well as his title to the land in dispute. This onus he has not satisfied.

2. The true southern boundary of gore lot "D" does not in any way depend upon the existence of a road to the south of gore lot "D" and the opening up and travelling by the inhabitants of such a road, grants of money therefor, or the doing of statute labor thereon, cannot in any way fix the said boundary, although such acts may be sufficient to establish a highway.

3. The field notes of the original survey and the actual work on the ground done by the original surveyor, demonstrate that no road allowance was made or left in the original survey between lots 10 and "D," but that a road was laid off after the change of bearing was made at the apex of the gore, and such road has existed for years between lots 11 and "E."

4. If this were not so, and if a road had been laid out north of lot 10 it would necessarily follow that the balance of the Penetang road from the turn to Penetanguishene, would be, not where it is, but about four rods farther east, because the four rods for the supposed road north of lot 10 (the hotel corner) would carry the turning point in the Penetang road just so much farther along the first course of the latter which to that point was N. 9° E.

5. Again, the original surveyor's instructions were to lay off a road between every five lots, and had he laid off a road north of lot 10 in addition to the one south of 11, which admittedly he did lay off, he would have exceeded his instructions.

6. The plaintiff contends for the road between lots "D" and 10 because the original plan shows a road and because the descriptions for patent of "D" and 10 refers to such a road. As to these the defendant submits that the work on the ground and the original field notes should prevail over any plan or descriptions for use in the office of the Crown Lands Department, and that the latter are not in this case admissible evidence.

7. Moreover, if the plan in question is to be regarded at all, it must be looked at in its entirety and no particular part selected to uphold the plaintiff's contention. If it is looked at in this broad way, it will be at once seen, first, that the alleged road is in line with, and continuation of, the road between 10 and "D" in the second concession, and therefore such alleged road must have been adopted by the Department, if at all, as running in such course, and would occupy the next four rods south of where the plaintiff contends for, and practically come off what is now recognized as lot 10 To place it where the plaintiff contends necessarily introduces a jog not shown on the plan

Secondly, it will be observed that the plan shows the opening on the Penetang road for the two side roads to be eight rods in width or the width of two roads, whereas the actual distance on the ground between the admitted south west angle of lot 11 (the poplar tree) and the hotel corner is some 45ft. less than eight rods, again showing that the alleged road, if it existed at all, is taken up in part by lot 10.

8. If the existence of such a road between "D" and 10 is to be assumed, there is nothing to indicate that it must necessarily be 66ft. or four rods in width. Is it not more reasonable to suppose that the Department (if the present difficulty ever occurred to it at all) determined to use up the 22ft. 9in. surplus between lots "D" and 10 (occasioned by the change of bearing) in making a road?

9 If the descriptions for the patents of said lots "D" and "E" are to be referred to, it is to be noticed that the Crown Lands Department, when preparing them, was under the impression that such lots came to a point *on* the Penetang road. It will be observed that they both commence at a point *on* the Penetang road, and after describing a triangular piece of land, *return to the same point.* As a matter of survey, these gore lots do not actually come to a point, "D" having a frontage of 12ft. 3in. on the first course of the Penetang road, whilst "E" has a frontage of 10ft. 6in. on the second course of said road. If the point of commencement contended for, namely, P. L. S. Gaviller's stake, which is 74ft. 10in. east of the Penetang road, along the southern limit of the road allowance between 11 and "E" be accepted, then the point of commencement would not be *on* the Penetang road, nor would the third course of the triangle return to this point.

Further, the distance of the first course, that is, to the rear of the lot, would be, not 100 chains, but nearly one chain less, and the bearing between "D" and "E" would be different to that set out, and not as the evidence shows it to be, and the sizes of the lots "D" and "E" would be unequal and not alike, as set out in the grants.

10. The defendant also relies on the inconsistencies in the description for patents for "D" and "E."

OUT OF ONT. APPEAL REPORTS, VOL. XXI, PAGE 111.

"The question was one of boundary. Both parties claimed under the same patent, the contest being as to the point of com-

mencement of the description of the plaintiff's land, the plaintiff contending that there was a road allowance to the south of the lot as patented, and that his parcel commenced at the northerly boundary of this road and not at the northerly boundary of the next lot, which was an ascertained line. The action was tried before Ferguson, J., who found in favour of the defendant, and his judgment was affirmed by the Common Pleas Division, the judges being divided in opinion. A good deal of evidence, which it is unnecessary to refer to in detail, was given as to the work on the ground, one very old man, named Johnstone, describing the position of some of the surveyor's posts in the locality in question. The plaintiff appealed, and the appeal was argued before Hagarty, C. J. O., Osler, and Maclennan, J. J. A., and Robertson, J., on 30th November, and 1st December, 1893."

The Court of Appeal held as follows :—

"*The description of a lot prepared for and used by the Crown Lands Department in framing the patent which grants the lot by number or letter only, is admissible evidence to explain the metes and bounds of that lot.*

"The plan of survey of record in and adopted by the Crown Lands Department, governs on a question of location of a road, when the surveyor's field notes do not conflict with the plan, and no road has been laid out on the ground." Osler, J., in giving judgment, said :—

"In Badgely *vs.* Bender, 3 O S., 221, Sir Jno. Robinson, in speaking of such a plan, where no evidence remained or could be given of the actual original survey, said (p. 226): 'When we know that it is on these official documents that the patents have been subsequently framed, we must be convinced of the extreme danger of trusting so implicitly to anything else as to these official diagrams for information upon the plan on which the several townships were laid out.' *This has not been questioned in our courts at any time* within my knowledge."

In Regina *v.* Great Western Railway Company, 21 U.C.R., 555, at page 577, the Court, speaking by the same Chief Justice, says: "Under the 313th clause of the Municipal Act (the origin of which is sec. 12 of 50, Geo. III., ch. 1), the fact of a Government surveyor laying out certain allowances for a road in the plan of the original survey of Crown Lands would be sufficient, we think, to give such roads or streets the legal character of highways, though there may have been no stakes planted on the ground to mark them out."

See also Regina *vs.* Hume, 16 C.P., 145, and in appeal 17 C P., 443, and Carrick *vs.* Johnstone, 26 U.C R. 69. So in Hagarty *vs.* Britton, 30 U.C.R. 321; also, Martin *vs.* Crow. 22 U.C.R. 485; McGregor *vs.* McMichael, 41 U.C.R. 128; McEchran *vs.* Somerville, 37 U.C R., 600, 620, 629.

Maclennan, J.A., in giving judgment, said: "The plan must be regarded as a part, and an exceedingly important part, of his report,

and entitled to as much weight as the field notes, and when not in conflict with the work on the ground must be regarded as conclusive.

If we concede, therefore, that he left the gore alone and unsurveyed, *afterwards the Crown had a plan of the township prepared, and upon this plan* the gore is subdivided into three parts, namely, lots D and E, and an allowance for road along the southern limit of D. Badgely *vs.* Bender *decides that this plan alone*, without any evidence by whom compiled or from what materials, *is sufficient evidence of the allowance.*"

There were descriptions for patent.

"*These documents are official records.* They are instruments signed by an official of the Surveyor-General's Department, and were evidently prepared for the guidance of the proper officer in, and as his authority for, the preparation of the patents." In Stevens *vs.* Buck, 43 U.C.R. 1, Harrison, C J., reviewed the authorities, and held *that the Department of Crown Lands might alter the office plan of a township, and that the patents afterwards granted would be governed in their construction by the altered plan.*"

Hagarty, C.J.O, and Robertson, J., both agreed with the judgment given.

Appeal allowed with costs.

There was then an appeal taken to the Supreme Court, which Court confirmed the decision of the Court of Appeal, establishing as a public highway the road allowance in dispute.

This Association is not responsible as a body for any opinions expressed in its Papers by Members.]

THROUGH THE BARREN LANDS:

An Exploration Line of 3,200 Miles.

By J. W. TYRRELL, C.E., O.L.S.,
Hamilton.

Part I.

(2,200 miles by canoe.)

During the early spring of 1893, the Director of the Geological Survey of Canada having issued instructions to my brother, J. Burr Tyrrell, Field Geologist of that department, to conduct an exploratory survey into the great Barren Land district lying to the west of the northern portion of Hudson Bay, preparations were at once commenced for the undertaking.

For the purpose of taking charge of the topographical work, and acting as Eskimo interpreter, the services of the writer were engaged.

Two 18-feet varnished cedar canoes were ordered from the Peterboro' Canoe Co., to be shipped to Edmonton.

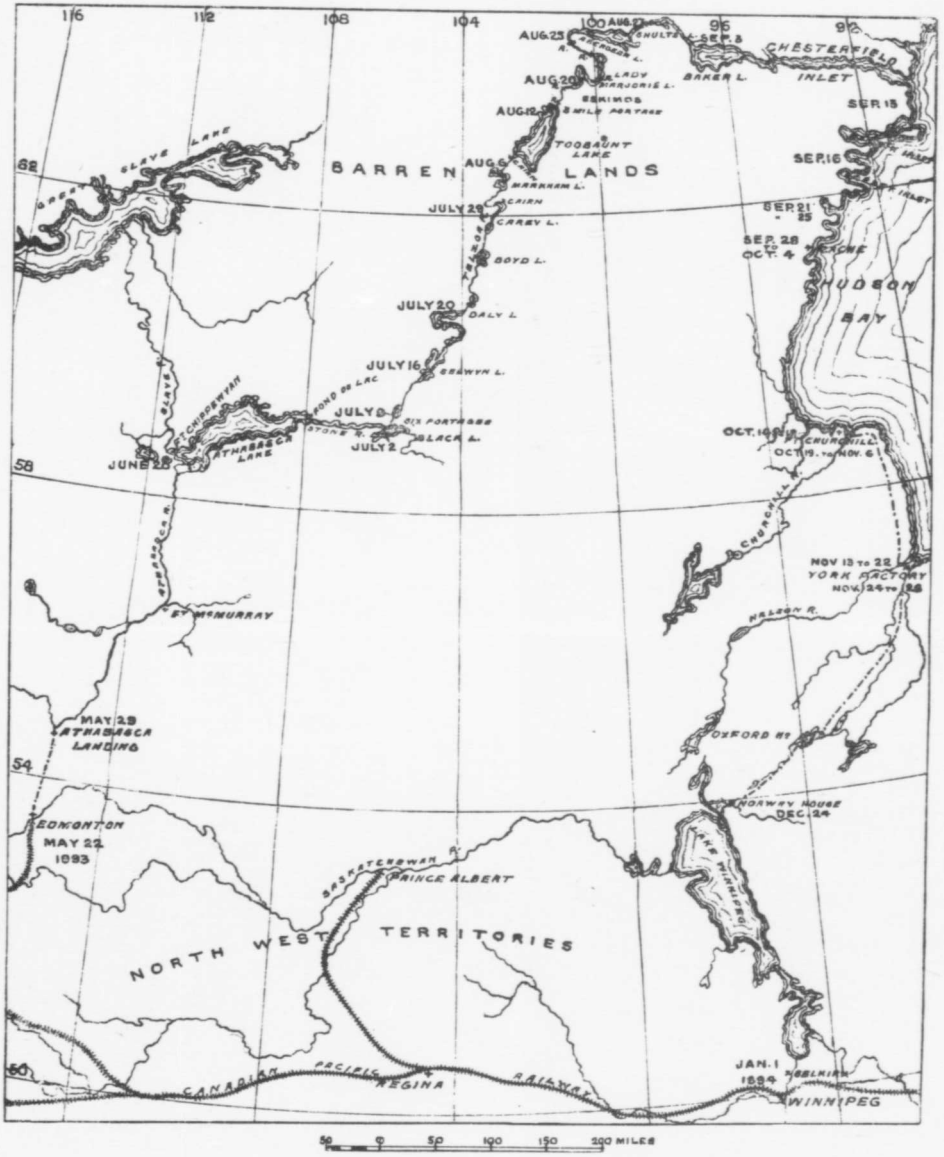
Four expert canoemen were employed to handle them, and arrangements were made to have a third 19-feet basswood canoe—used during the previous summer—and two men, in waiting at Fort McMurray on the Athabasca River.

Attention was then turned to the procuring of a suitable set of instruments, and after some difficulty we succeeded in obtaining what, I consider, approaches very nearly to an ideal outfit for exploratory work. The following is the complete list:—One large sextant with folding mercurial horizon, one Gurley pocket solar compass with extension leg tripod, two prismatic compasses, one fluid or boat's compass, two pocket compasses, two boat logs, one pedometer, two clinometers, one dipping needle, one pocket chronometer, three American watches, one aneroid barometer, a set of thermometers, a pair of field glasses, an aluminium binocular telescope, and a 4″ x 5″ hand camera.

Besides the above we provided ourselves with two repeating rifles, one Winchester repeating shot gun, and a good supply of ammunition.

All instruments and arms were well packed for carrying in leather sling cases.

The next matter of importance was the preparation of bills of *supplies* and *provisions*. As much portage work was to be expected on our trip, and as all available carrying capacity would be required for "grub," it appeared to be very necessary that the bulk and


116
112
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104
100
96
92
62
60
58
54
AUG 23
AUG 20
AUG 12
AUG 6
JULY 29
JULY 20
JULY 16
JULY 9
JULY 2
JUNE 28
SEP 8
SEP 15
SEP 16
SEP 21 to 25
SEP 28 to OCT 4
OCT 19 to NOV 6
NOV 13 to 22
NOV 24 to 28
DEC 24
JAN 1 1894
MAY 29
MAY 22 1893
CHESTERFIELD INLET
BAKER L.
LADY MARJORIE L.
ESKIMOS
8 MILE PORTAGE
TOOBAUNT LAKE
MARKHAM L.
CAIRN
CARREY L.
BOYD L.
DALY L.
CRAWYN L.
FOND DU LAC
STONE N.
SIX PORTAGES
BLACK L.
CHURCHILL
YORK FACTORY
HUDSON BAY
GREAT SLAVE LAKE
BARREN LANDS
SLAVE R.
ATHABASCA LAKE
ATHABASCA R.
ST. McMURRAY
CHURCHILL R.
HAYES R.
OXFORD HS
NORWAY HOUSE
LAKE WINNIPEGOSIS
EDMONTON
SASKATCHEWAN R.
PRINCE ALBERT
NORTH WEST TERRITORIES
CANADIAN PACIFIC RAILWAY
REGINA
WINNIPEG
50 0 50 100 150 200 MILES

weight of outfit should be kept down as much as possible. Another feature in connection with our survey was that much of our route would lie within the Barren Lands, where no fuel could be obtained for cooking purposes. Endeavoring to provide for these special features, without going too much into detail, the following was our list of *supplies* :—Three cotton " A " tents with tarpaulin floor cloths, one " reflector " or Dutch oven, two thin steel frying pans with folding handles, one nest of kettles, the usual culinary camp outfit of dishes, all made of tin on account of their lightness, three Hudson Bay Co. axes, and files to sharpen them, two small gill nets, an assortment of fishing tackle, three tracking lines, eight pack straps, three canoe covers, one dozen large waterproof sacks, five gallons of methylated alcohol, two so-called alcohol stoves, two boxes of candles, matches, one dozen bottles of Jamaica ginger, one dozen bottles of pain killer, and three caddies of tobacco, for use chiefly in securing the goodwill of natives.

Besides the above, the following *provisions* were ordered :—Flour, rice, oatmeal, biscuits, bacon, canned meats, sugar, evaporated fruits, baking powder, tea, chocolate, butter, salt, pepper, and mustard.

With the expectation of securing game on our journey, the quantities of flour and other vegetable foods were made large in proportion to amount of bacon and canned meats.

The orders for these goods, excepting such articles as could not be obtained in the west, were sent on to the Hudson Bay Company's store at Edmonton, where, by arrangement, our party—with the exception of the two Fort McMurray half-breeds—assembled on the 22nd of May.

From Edmonton, the north-western terminus of the Canadian Pacific Railway, for a distance of one hundred miles northerly to Athabasca Landing, our outfit was transported by waggons.

Here the bulk of our " stuff " was shipped by the Hudson Bay Company's steamer to Fort Chippeweyan on Lake Athabasca, and on the last day of May, with our light and beautiful little crafts, we commenced our canoe journey.

The *survey*, however, was not begun here ; and as the Athabasca River, from the landing down to the lake, has been so well described already by our friend Wm. Ogilvie, D.L.S , in his most interesting articles, I will not now attempt to re-describe it.

It will be sufficient to say that after passing down the Grand Rapids in safety and reaching Fort McMurray, we were joined by our third canoe and two additional men. Continuing, we arrived at Fort Chippeweyan, about 350 miles below the Landing, on the evening of the 17th of June.

Two days later the Hudson Bay Company's steamer "*Grahamme*" arrived with our supplies, and now preparations were made for the commencement of our survey.

Henceforth our route was to deviate from the beaten track of traders and former explorers.

The geographical position of Chippeweyan having been determined, it was to be made our starting point, and from here we would have to carry our whole season's supplies. During our brief stay at the Fort, the opportunity for rating the chronometer was taken advantage of; and what we considered a stroke of good fortune was that, through the kind efforts of Dr. McKay, the Company's agent in charge of the post, we secured the services of a native Chippeweyan Indian, named Moberly, who claimed to know the country for a hundred miles or more to the north-east of Lake Athabasca, into which we were proposing to travel. The assistance of such a man to act as our guide could not fail to be of great value to our party. He would be able to save us much time through knowing the trails, by taking us straight to the portages and in finding the best camping places. Of course, Indian-like, he had to be advanced a month's wages in goods from the store. Then he required an assistant to accompany him in his canoe, and finally he wanted an increase in wages. In consideration of the advantages which we hoped to derive from him as an escort, these matters were finally arranged to his liking; and on the morning of the 20th of June, with our little fleet of four canoes all well loaded, and a good-bye to civilization and all its formalities, we hoisted our sails—having a fair breeze—and set out on the traverse of the north shore of the lake.

Distances were measured with the "log," and when landings were made, courses were taken with the prismatic compass, though occasionally they were taken with the fluid compass without going ashore. As frequently as possible, without entailing too much delay, the solar instrument was set up, the magnetic variation determined, and rounds of angles taken. Thus a continual check was kept upon the magnetic compass readings.

Latitude observations were taken every day when the sun could be seen at noon, or the stars at night; and from time to time, at initial points on our route, observations were taken for longitude. When portages were met with, measurements were made by pacing, and on river work the distances were estimated by the time occupied in making them. As our general course on all river work was nearly north, the proper correction for each day's work was known from the determinations of our latitude, and with a little practice very close approximations, even on the streams, were found to be obtainable.

Thus, briefly stated, is the outline of the system of survey adopted by us.

On the 29th instant we reached Fond-du-lac, a winter outpost of the Hudson Bay Company. It was now deserted by all but an Indian family, who appeared to be in a very destitute condition.

From here to the eastward, a distance of fifty miles, the lake is quite narrow, having much the appearance of a broad river.

It is only from one to five miles in width, and across on the south shore could be seen a large group of Indian tepees. Here, it was found, was the home of our guide, and to it, of course, we all had to go. Our own canoes were not landed, but Moberly went ashore and

deliberately hauled out and overturned his. For some time we patiently awaited his return, but as he came not, a message was sent to him to make haste as we had no time to spare. After a while he did make his appearance, but only to inform us that he thought he would not go any farther. What could we do? We could not force him to come against his will, and it would do us no good to shoot him—though I confess I felt a little like doing so. We tried to persuade him to come with us, but the best we could do, after supplying his family with tea and sugar, was to get his promise that he would follow and overtake us on the morrow. We did not believe him, but being unable to do any better, we left him sitting on the shore smoking his pipe, and continued our course.

At noon the next day, as we were taking our lunch, sure enough, Moberly and his companion made their appearance. We had not expected them, but were glad that they had disappointed us From this time forward, the guide, who had usually kept himself in the rear since leaving Chippeweyan, began to lag far behind and only show up at camp, or meal time. This sort of thing, he was given to understand, would have to cease. He knew his duties quite well, and was reminded that he was expected to perform them. After this, for half a day, he did better, but then, at the eastern extremity of the lake, finding some of his native friends encamped by the shore, he hauled out his canoe and joined them. Nor could he be induced to continue a foot farther, unless we were prepared to divide up our flour and bacon with his friends, and this we naturally declined to do. From the first, Moberly had proved himself to be a miserable, unreliable scoundrel, and now he and his companion, after doing all they could for ten days to reduce our provisions and securing a month's pay in advance, had resolved to desert us.

Not only this, but, as we afterwards found, he had endeavored to work further mischief by stuffing our men with all sorts of stories about the insurmountable obstacles along the route we were proposing to take, and about the savage Eskimos who would certainly eat us. Indeed, such an impression did he make on the minds of some of our men, that one came to us and made a clean breast of his troubles. He told us of the report he had heard of the country, and of our certain doom in case we should continue. He said that he had a wife and family at home, and that he did not want to leave them without any one to provide for them, etc., etc , and this we found had become about the general feeling of the party. In reply to this manly confession of fears, I assured the men that old Moberly's yarns were a pack of lies pure and simple, and to prove my assertion I informed them that I had myself lived with the Eskimos for nearly two years, and had found them to be far better people than the man who had told them the stories.

By the use of such arguments as these, confidence was again restored, and the miserable, lying, skulking, intriguing Chippeweyan guide—no doubt feeling that he had acted very cleverly—was left with his friends, and we continued our journey, now up the Stone River, the eastern feeder of the lake.

Sunday, the 2nd of July, found us in camp on the bank of this river, at the foot of the lower fall—a wild and beautiful cataract. The weather was very warm and the black flies and mosquitoes swarmed in the woods and about camp, nor did they appear to have the customary aversion to a smudge, for dense smokes were made, and the flies only appeared to revel in them.

Some photographs were obtained of the flies and the falls, whilst during the morning at the foot of the rapids our fishery department secured a number of magnificent white fish and trout, two of which latter measured 3 ft. 2 in. and 3 ft. 1 in. in length respectively.

Our camp was not only situated at the foot of a beautiful waterfall, but in consequence was at the lower end of a rough and rocky portage, which was found to be three miles in length.

We had, at this early stage of our journey, in the neighborhood of four thousand pounds of cargo to be transported, and unfortunately one of our men, Jim, was laid up with a gash in his leg; but on Monday morning, being fresh and in high spirits, the men went at their work with a rush, notwithstanding a 200 feet rocky hill which had to be climbed and a deep muskeg which had to be waded through. Before night, spirits were away down, and every man's feet in the party, excepting those of Jim, who had already a game leg, were fearfully blistered.

Each packer had carried six loads to the opposite end of the portage, representing a walk of thirty-three miles, eighteen of which were travelled under heavy loads.

Camp was pitched with some satisfaction at the upper end of the portage. Two more loads for the party, however, remained at the foot of the rapids. On the following morning these were carried by our limping, back-aching packers to camp, and thence our traverse of the river was resumed.

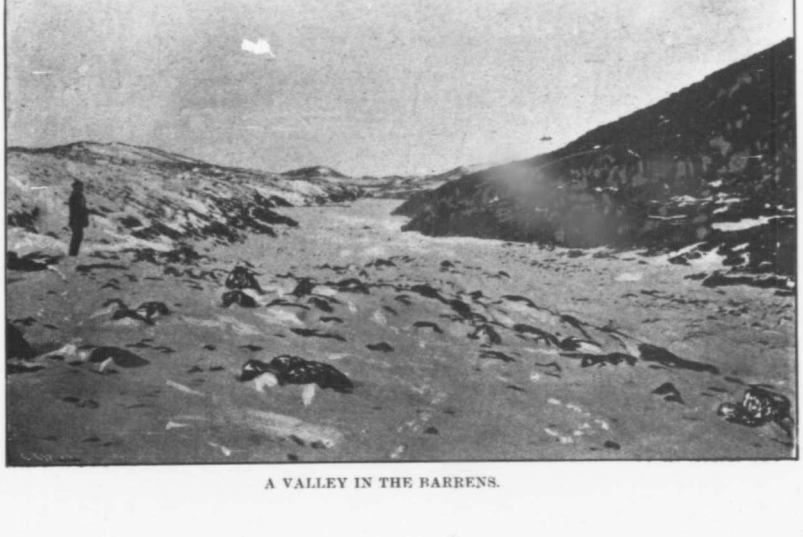
Early on the afternoon of the same day we reached the upper fall of the Stone River, and found ourselves at the foot of a second long portage. On account of the condition of the men, camp was now ordered to be pitched so as to give them a chance to rest, but my brother and I walked across the portage, which we found to be three and one-half miles in length. Its upper end terminated upon the shore of Black Lake, where it was thought we might see some native Indians who could be hired to assist us across the portage; but in this we were disappointed, finding, instead of Indians, only old forsaken tepee poles and blackened fireplaces.

The weather being extremely warm, and ourselves very weary, we tried to rest for a while upon the shore of the lake, but the flies swarmed about us with such frightful fury that we were obliged to beat a retreat and seek rest where alone it could be found, viz, beneath our mosquito nets at camp.

By the way, there is a Chippeweyan tradition which credits the Great Spirit with having first made black flies upon this very portage. (I have not the slightest doubt as to the truth of the legend.)

About two days were occupied in portaging our outfit to the shore of Black Lake; then on the 7th instant, starting out in a north-

J. W. TYRRELL, O.L.S., C.E.



A VALLEY IN THE BARRENS.

easterly direction and traversing the coast for a distance of sixteen miles, we reached the landing place of an Indian hunting trail, of which my brother had previously been informed by the natives. This place, up to the present time, had been our objective point, and our way to it was known to us; but beyond, nothing was known of our road or of the country through which it would lead us, excepting for a few days' journey, regarding which portion we had the following Indian directions:—"From Black Lake make a long portage northward to a little lake. Then cross five or six small lakes and as many portages, when a large body of water called Wolverine Lake will be reached. Pass through this lake and ascend a river flowing into it from the northward, until a second large lake called 'Active Man' is reached This lake will take two days to cross, and at its northern end will be found the height of land. Across this there is a portage to another large lake, from the north end of which a great river flows to the northward through a treeless country unknown to the Indians, but inhabited by savage Eskimos."

As to where this river flowed to we did not know, but were resolved upon making the discovery.

On the morning of July 8th, therefore, without guide or map, we commenced our survey into the great unexplored wilderness. Our road started with a two-mile portage, through thickets, swamps, and over rocky hills. Then in turn, day after day, numerous lakes, streams, and portages—very much as described by our Indian informer—were discovered and traversed.

After getting into a lake on several occasions, much trouble was experienced in finding the portage from it; but altogether less time was occupied in trail hunting than might have been expected. Timber, chiefly black spruce and tamarack, becoming more stunted and thinly scattered as we proceeded northward, extended to the height of land and some distance beyond.

One evening, after a long and miserable day's work up stream, in a cold, chilling rain, one of those little incidents occurred which serve to vary the daily routine of life upon a surveying party. As I was standing by the camp fire trying to dry my clothes and enjoying a cup of hot tea, my brother appeared from over a ridge at the back of the camp—where he and his geological hammer had been at war with the rocks—and announced that he had just heard a cariboo calf not far back in the swamp at the foot of the ridge. Being always ready for sport, I picked up my "Marlin," and, getting him to point out the direction from which he had heard the sound, started out, though already nearly dark, for some venison. The dense spruce swamp was found to be very wet, and literally alive with mosquitoes, which at every step rose up from the wet grass in swarms, and beat into my face. A "run-way" was soon found, and then, thinking that I was likely on the right track, I hurried noiselessly along, hoping soon to hear something of the calf. After travelling some distance without any signs of success, I was about to return for fear of losing my way in the darkness, when, a little distance ahead, I heard the cracking of a stick. Feeling that it was assuredly caused

by the foot of the fawn, with eyes and ears alert I glided silently on. Again and again the noise was heard, and each time nearer than the last; so my advance was continued cautiously until soon in a thicket of scrub, only a few yards ahead, the disturbing of some branches was noticed. Still no deer could be seen; but in creeping up closer, at the distance of only a few yards, I suddenly came within full view of an immense black bear. Although taken by surprise at the proportions of my supposed calf, I levelled for the back of bruin's head, and fired. Several delirious tumbles, followed by a bolt into the gloom of the swamp, completed the entertainment so far as I was concerned. It was too dark to follow the wounded animal; so I groped my way back to camp, and related my adventure with the "cariboo calf."

On the 18th of July the height of land was reached, and over this a portage of a mile and a quarter took us to a large body of water, which we have named Daly Lake, the level of which stood at an elevation of fifty feet below that of the one we had crossed just south of the divide. The height of land, from our barometric readings, was found to be about thirteen hundred feet above the sea; and upon this summit, to the top of a tall spruce tree, before we departed, I took occasion to nail the "flag that has braved a thousand years the battle and the breeze."

Daly Lake was found to be sixty miles in length, and from its north shore, after a good deal of searching in many deep bays, the outlet—our informant's "Great River flowing to the north"—was discovered.

It was indeed a great, broad, and rapid river, broken up into several channels, not deep, but as it were the waters of the lake spilling over the edge in the lowest places.

This was the river we had determined to descend; so with nothing more than conjectures as to where it would bear us, we pushed our canoes into the stream, and sped away to the northward.

Landings were made when necessary, in order to carry on the survey and examination of the country; but otherwise our canoes were kept in the current and our men at the paddles.

Though outlying groves of spruce and tamarack might still be found here and there in the most favored localities, we were now well into the barren lands; and the change from the wooded district was found to be anything but desirable.

An alcohol lamp for the purpose of making a hot cup of tea is an excellent thing; but, to a party wet and cold by rain or spray from the rapids, it is a miserable substitute for a roaring camp-fire.

The weather became very wet and cold, and storms, which swept the open country with frightful fury, began to be of very frequent occurrence; so that now our camp outfit was seldom if ever dry, and the progress of our survey was much interrupted.

On the 29th of July, as we were traversing the shores of Carey Lake, we were permitted to witness a sight which, as long as I live, I shall never forget. The land, as far as we could see, was

here, there, and everywhere covered over large areas, by moving masses of reindeer. No estimate could be arrived at as to their numbers. They could only be described in acres or square miles. After killing as many as we considered necessary for making dried meat for the rest of our journey, we walked into the solid herds, armed only with a camera, and secured a number of photographs. These now afford me a great deal of satisfaction; for when I begin to talk "deer," and people smile a look skeptical, all I have to do is to produce a photograph.

On the 7th of August we reached a great lake—probably Samuel Hearm's Doobaunt or Tobaunt Lake—which was then, as it perhaps always is, covered by a field of heavy ice. We were able to proceed in our canoes, without much obstruction, in an open channel of water along the shore, though sometimes we were blocked and had to portage past the ice, which in several places I measured and found to be as much as seven feet in thickness.

The weather experienced in the vicinity of this lake was most inhospitable. Five days were spent in traversing the one hundred miles of shore line from inlet to outlet; but seven days were unwillingly spent upon the rocky ice bound shore, where we were forced to await the abatement of two terrific storms accompanied by rain and snow. The lack of sufficient shelter contributed greatly to our discomfort throughout our entire Barren Land work; for unfortunately our tents, though admirably adapted for woodland districts, were here of comparatively little use, the rains being continually driven through them by the terrible force of the gales.

When the outlet of Tobaunt Lake was discovered, it was not found to be obstructed by ice as it was feared it might be, but as before, the clear cold waters of the great river rushed on to the northward.

A few miles down from the lake we first met with the Eskimos, of whom our men had been told such blood-curdling stories by the Chippeweyans. Had our men been disposed to believe the reports, they must have been pleasantly disappointed by the cordial, demonstrative receptions which from time to time we received at their hands.

(In a paper of this kind, it is necessary to be brief; otherwise I might be able to speak of many incidents, or characteristics of the country which would be of interest; but to give anything like a full account of our journey would trespass entirely too much upon your patience, and the pages of our Report.)

About the time we entered the Eskimo country, we also came across the first signs of Musk Oxen; but from this time forward the appearances of game of any description began to be rare, and with the month of August we parted company entirely with the deer.

Towards the end of August, judging from our geographical position and our north-westerly course, the indications were that our destination was to be the Great Fish River instead of Hudson Bay as we had hoped; but after following a very winding course, on the

evening of the 2nd September, we found ourselves on the waters of Baker Lake, which is emptied by two rivers into Chesterfield Inlet, the north-west arm of Hudson Bay.

Baker Lake as well as the Inlet was originally discovered and crudely mapped by one Captain Christopher in 1770, so that we were now again on waters not entirely unknown.

Since the commencement of our canoe journey we had altogether travelled a distance of fourteen hundred miles. We had carried on our survey for one thousand and fifty miles, of which distance eight hundred had been through entirely new country.

The balance of our route lay through Baker Lake and Chesterfield Inlet, and down the coast of Hudson Bay, which represented, to Churchill—the nearest habitation of man—a distance of seven hundred miles.

For this trip we still had three weeks' rations on hand. This it appeared would be scarcely sufficient, but we resolved to make the best possible use of our time. On the morning of the 3rd we continued our traverse.

On the evening of the 6th, having been much delayed by head winds, the northerly of the two outlets was discovered. At first no current could be detected in the river, but when we had followed its course a short distance, a strong flow, almost approaching a rapid, was met with, setting against us. Could it be possible that we were ascending a large river thus flowing in from the eastward? The canoemen were all confident that we were, and wished to turn back; but thinking it possible that we had already reached tide water, they were instructed to proceed, though very much against their inclinations. Soon, to their astonishment, and our mutual satisfaction, we were privileged to witness the seemingly strange occurrence of the river ceasing to flow, and then turning strongly in our favor. We had thus reached the tide water nearly two hundred miles in from the Bay. A week later we obtained our first view of the "big sea water;" on the morning of the 13th of September we turned southward; and during the succeeding three days, having fortunately fair weather, we traversed the bleak rocky shore of Hudson Bay for a distance of one hundred miles.

This run along such an exposed coast was most encouraging, for it took us across the mouths of several deep inlets which would have required days to traverse had the weather been unfavourable.

During the night of the 15th, however, as we were encamped on a little island in the mouth of Corbet's Inlet, we were overtaken by one of the many severe storms of the season, and for two days we were imprisoned there upon the sand bar. The gale was, as usual, accompanied by a chilling rain, which penetrated our tents and made our lives generally miserable.

On the afternoon of the 17th the wind fell, and though a heavy sea continued to roll in from the east, the waves ceased to break. Not wishing to lose any time, as the bottom of the "grub sack" was

already very visible, we launched upon the heaving waters, and started across the mouth of the inlet on an eight-mile traverse.

As we pulled out beyond the shelter of the islet we found the seas running fearfully high, but so long as they did not break upon us we had little to fear.

But when we were well out in the inlet, the wind began to come in gusts from the opposite direction to which it had been blowing, and speedily increased in strength to a full gale. The falling of the wind had been but the lull of a storm centre, and we were evidently in for a struggle. The waves became "choppy;" were again broken by the gale, and their crests swept over us.

Our position was indeed perilous. Every effort was made to guide our canoes in such a way as to brook least danger, but in spite of all we could do the seas dashed in upon us, and it appeared as if we would never reach the shore. My brother and I laid down our paddles and with tin kettles did our utmost to dash out the water and keep ourselves afloat. Many times the great tumbling billows seemed as if they would certainly roll over us, but, like ducks on the water, our little cedar crafts ever rose with the waves, though often half filled with spray.

At length we neared the land, but only to find it skirted by a long continuous line of shoals upon which the full force of the sea was breaking with frightful fury.

What was to be done? It was impossible for us to retreat in the teeth of the gale, and without a harbour we must certainly be smashed upon the rocks. On we were borne by the force of the storm for the breakers, but just as the crisis appeared to have come—thanks to a kind Providence—a way of escape was presented. One rock was found standing out a short distance in advance of the others, thus forming a little cove, and with a pull for our lives we managed to guide our canoes so that one after the other they were dashed into this shelter, where the force of the seas being broken, we all jumped from our canoes into the shallow water, and succeeded in landing them safely. Every particle ot our outfit was thoroughly soaked, but we were well pleased to escape with no worse misfortune.

The country here was very barren, comparatively level, and of a most dreary aspect, without a sign of vegetation. The gale continued for two days longer, so that we were not able to launch our canoes.

As provisions were now about exhausted, the attention of our party, whilst ashore, was chiefly devoted to hunting; but our efforts were not very fruitful, resulting only in the capture of one little duck and two gulls.

On the morning of the 20th, the wind having fallen, camp was called at four o'clock, and, without breakfast, our journey resumed. Later in the day each man had a small piece of dried meat, quite insufficient to satisfy his appetite; but, hungry though we were, the motto plainly inscribed on every man's face was "Speed the paddle."

Thus we pressed on for two days, and made very good progress, but, having scarcely anything to eat, we began to feel weak.

On the morning of the 22nd we were again storm bound by a heavy gale and snow, which lasted four days. During this time we suffered considerably from the violence of the storm as well as want of food. As soon as it had abated sufficiently, all hands went off hunting, and fortunately several hares and ptarmigans were secured and thoroughly appreciated.

On the morning of the 26th, the wind having fallen considerably, our canoes were loaded—though not with one bite of provisions—and a fair run made. Several sea ducks were shot during the day and thus our supper was secured.

The next day, again wind bound by a gale from the south-west, the whole party started out to hunt for food. We were not altogether unsuccessful, assembling in the evening with five marmots, a kind of ground squirrels

The next morning, the 28th, though a strong breeze was blowing, we determined to make a start at least, for to remain where we were, meant that we must soon starve to death. We were already much reduced and weakened from the effects of cold and hunger, and the condition of the weather had of late been most disheartening. We were still fully 300 miles from Churchill—the nearest habitation of man. We had not one bite of food, the country was covered with snow, the climate piercingly cold. We had no fire, and worst of all, the weather was such the greater part of the time that we were unable to travel. It was difficult to be cheerful under such circumstances, but we kept up a brave exterior and pushed on. As we were bending to our paddles and had made perhaps seven or eight miles south-westerly along the coast, a band of deer was observed upon the shore, so our course was quickly altered and a landing effected; though with some difficulty, as the tide was falling and the water rapidly receding. The men were left to keep the canoes afloat, and from being damaged by the rocks, whilst my brother and I, with our rifles, went off in pursuit of the deer, which were now very different animals to hunt than when in great bands earlier in the season. Another fact which rendered them difficult to approach, was, that the country was now a vast and dreary plain, affording no cover for the hunter save that of a few scattered boulders. Behind some of these we crept for long distances, but found it impossible to get within any kind of medium range. Several times we got within 400 or 500 yards of the band, but could get no closer, and so opened fire at that distance. At first they trotted about in confusion, but then, locating their source of danger, fled straight across the plains. For several hours we followed them, vainly seeking for some opportunity of nearer approach, but being unsuccessful we retraced our weary steps to the shore, where we arrived faint and exhausted. We found the men had been unable to keep the canoes afloat. They were now high and dry, and the water of the bay barely visible in the distance.

As it was impossible to launch our canoes until the return of the

tide, two of the Iroquois, Peter and Louis, were given our rifles and sent off to try their fortune. As they departed and left us lying in the shelter of a rock, we sincerely wished them success. We had done our utmost and had failed, if they also should fail it was too apparent what must soon be the result. Two of the other men were sent off with shot guns, and then anxious hours of waiting followed. No shots were heard, but towards evening Peter and Louis and afterwards the other men were observed returning in the distance. None of them carried loads, as we had hoped they might, and at the prospect I confess my heart sickened. As they came nearer, however, Louis, holding up something in his hand, exclaimed, "I got um." It was the claw of a polar bear, and we soon learned, with much joy, that he had, sure enough, killed a bear, which he had unexpectedly come upon at the edge of a little lake whilst following the deer.

It was about six miles inland that the encounter took place, and Louis was alone at the time. The meeting was a mutual surprise, sprung at close quarters, when our hunter's footsteps aroused bruin from his bed in the snow. Without wasting time in useless reflections the bear made straight for Louis, who met his charge with a slug and brought his assailant to his knees. The Indian then ran out upon the ice of the lake, but finding himself at a disadvantage there, instead of the bear as he had thought, he turned upon his pursuer, fired, and again knocked him down. Only for a moment, however; he got up and with a roar of desperation made again for Louis who had now regained the shore. They were already within a few feet of each other, so, realizing his situation, the Indian turned and this time shot his enemy dead at his feet. It was a happy shot for our whole party. Being unable to do anything with the carcass himself, he had returned—meeting his brother by the way—for assistance. All gladly followed him to the scene of the combat, where some moss was also found by which a fire was made, and some of the meat roasted.

The reviving effect produced upon the spirits of our party was marked. Though the flesh of the polar bear is famed for its rankness, we would not have exchanged it at that time for its weight in silver. I remember one of our western half-breeds being so exultant that he affirmed "He would not own the Queen as his uncle."

No part of the carcass was wasted, but every scrap, amounting to about 200 lbs. of meat and half as much blubber, was put into sacks and carried to the canoes, where, arriving long after dark, camp was made.

The next morning a strong east wind was blowing, driving a wild surf in upon the shore and making it impossible to launch. We were thankful, however, during our delay, to have a supply of meat, and advantage was also taken of the opportunity afforded for obtaining moss to cook it. Though several miles distant a quantity of this was gathered, and several large kettles of meat boiled, almost sufficient, it was hoped, to take us to Churchill. But alas for our hopes! The gale, which had been blowing, increased in fury until it became

a terrific storm accompanied by sleet and snow, and continued for five days.

One of the nights, during a wild snow storm, the tent which my brother and I occupied was ripped up the back by the force of the gale, and with difficulty secured from being carried away. So piercingly cold was the wind that without shelter we must soon have perished. We were already numb with cold, but midst the snow and darkness I managed to find a sail-needle and some twine, and then having lowered the tent to the ground—whilst my brother held the canvas together—I, with stiffened fingers, stitched up the rent. When the tent was again raised our bedding was buried beneath a snowdrift, but our blankets being our only comfort the snow was shaken off, and in a half perished condition we again crept beneath them to await results.

After this great storm, which lasted until the 4th of October, the whole country was buried in snow, and every possibility of finding even a little moss to burn was excluded.

Winter had indeed overtaken us. Ice was forming all along the shore of the Bay, and it was evident that within a few days canoe travelling must be at an end.

On the above date, though light snow was still falling, the wind had gone down sufficiently so that we were able to launch our canoes after a long portage out to meet the tide. By the most vigorous exertion all we were able to make during the day was ten miles, and that through a chilling spray which froze upon us and encased canoes and men in an armour of ice. We had great difficulty in getting ashore to camp at night, having again to portage a long distance over the low-tide boulder flats.

On the morning following the water of the Bay was out of sight, and it was not until about noon, when the tide flowed in, that we could get into the water. Then we were so obstructed by the new ice along the shore and a head wind, that we were not able to make more than a mile or two before we were again forced to struggle to the shore. At this rate of travel we would be a long time in reaching Churchill. We had now been more than three weeks on the coast and were still at least 250 miles from our haven.

Some different mode of travelling must be adopted or we could never get in. The shore ice was forming rapidly and might now block us at any time. We had not more than meat enough for another day or two, and the game had all left the country. What was to be done? My brother and I talked the matter over during the night. The plan suggested itself to abandon everything but rifles and blankets and to start down the shore on foot. But then how could the numerous large rivers, which were still open, be crossed? Again, to this plan there was the objection that having been in canoes all summer and though still strong enough to paddle, our party was in very poor condition to walk. The only other feasible plan was then suggested. It was to abandon dunnage, instruments, rock collection, etc., everything except note books, photographs, plant collection,

rifles, blankets, and two small tents; and thus with these to start out with only two canoes, and an increased force of one man in each of these, to travel for our lives.

This plan was decided upon, and in the morning the men were set to work to make as secure a cache as possible of all our stuff, excepting the articles above mentioned. This occupied the whole morning, and to us it was an unpleasant task, but as it seemed to be the only way by which we might hope to escape from this dreary ice-bound coast, it was felt to be a necessary one. Having made as snug a cache as we could build, with heavy heart we turned our steps towards the shore.

After lauching our two canoes it was with great danger and difficulty that we were able to force our way through the broken but heavy shore ice to the open water beyond. Having got clear of the ice we were able to make good progress, and so, even at great risk of being smashed upon some of the many rocks, we paddled far into the night; but at a late hour, being sheathed in ice from the freezing spray, we reached the shore and without supper lay down to sleep upon the snow.

Eight more dreary days passed, six of which were spent in battling with the elements, and two in lying storm-stayed upon the shore. During this interval our party suffered much from cold and lack of food, and to make matters worse dysentery attacked us.

The shore ice had been steadily forming, rendering it more and more difficult to launch or get ashore. Our frail crafts had been badly battered and several times broken through by the ice, and the low character of the coast had not improved. Still, with hollow cheeks and enfeebled strength, we struggled on, sometimes making fair progress, and at others very little, until on October the 14th as we advanced the ice became so heavy and extended so far out to sea, that in order to clear it we could not see the land. Towards evening we began to look about for some opportunity of going ashore, but nothing could be seen but the sea and a vast field of ice with occasional protruding boulders. We pushed on hoping to find some bluff point or channel of water by which we might reach the shore, but the appearance of things did not change in the slightest. We stood up in our canoes and climbed upon boulders, vainly hoping to at least get a glimpse of land. Of course we knew the direction in which the shore lay, but it was so low and we were so far out that it was beyond our view. Soon the shades of night began to fall about us, our canoes were leaking badly and the weather was bitterly cold. We tried our utmost to reach the shore, but failing, resolved to await the time of high tide, which was 10 p.m., when it was hoped we might do better. Ten o'clock came, however, and we were still in the same condition, no more able to penetrate the ice or gain the shore than before. Indeed before this it had become intensely dark, and now we were in great danger of being smashed by ice or rocks. We were utterly helpless, and so could do nothing but remain where we were or go where the tide chose to carry us until the return of daylight.

The hours of that night were the longest that I have ever experienced, and the odds seemed to be against us surviving until morning; but at last the day returned and we were all alive. My brother was nearly frozen, having been obliged to sit or lie in icy water all night. Poor little Mitchel had both of his feet frozen, and several others of us were badly used up. Still we were in the same position as we had been in the night before. We could not hold out very much longer, we must gain the shore or perish. At the time of high tide, the ice having somewhat loosened, our canoes were thrust into the pack, and by great exertion as well as much care we succeeded about one o'clock in reaching solid ice upon which we were able to land, and, for the last time, haul out our noble little crafts. We had been in them just thirty hours, battling with the ice, exposed to a chilling winter blast, our clothing saturated and frozen, and our bodies faint and numb with starvation and cold. But we were now within reach of the land, and all of us who were able gladly scrambled out upon the ice to stretch our cramped and stiffened limbs. My brother was not able to walk, but was in a perishing condition from the exposure of the night. He had barely been able to keep his canoe afloat by bailing, and had been sitting in water for seventeen hours. I wrapped him up as warmly as I could in one of the canoes and administered half a bottle of Jamaica ginger, the last of our stock. We then set about hauling the canoes over the ice to the shore, which we soon reached and where we were so fortunate as to find driftwood. A fire was soon made, camp pitched, and, still more, a meal prepared. On the previous day a seal—the only one secured on the trip—had been shot and was now about to be appreciated. Camp being pitched my brother was moved to our tent, whilst the weaker of the men sought shelter in theirs. The three western men were still fairly strong, but the remaining five of us were very weak and badly used up. We knew now, however, that we could be no very great distance from Churchill, for we had again reached the wooded country, and two or three miles back from the shore could be seen dark clumps of spruce trees. This was a most consoling fact, for, besides having meat for several days, we now felt that we would have shelter and fire.

As to again launching our canoes, that was entirely out of the question, so that if we would reach Churchill at all it must be by land. As most of us were unable to walk, the only course open appeared to be to send on some of the stronger men to, if possible, reach the Fort and bring back a relief party. This plan was proposed, and two of the western men, Jim and John, volunteered to undertake the walk. We thought the distance could not be more than fifty miles and might be considerably less. On the following morning, the 16th of October, the two men set out on their journey, whilst those of us remaining proceeded to move our tents back from the shore about two miles to the nearest woods, where we might make ourselves more comfortable to await the success or failure of our relief party. A sheltered spot was selected for our camp, in a thick grove of spruce trees, and after

clearing away about two feet of snow which covered the ground, the tents were pitched, then well carpeted with spruce boughs, and a big camp fire made. This was indeed a happy change from lying in our canoes in the ice pack. Clothing and blankets were now dried, and with the seal meat besides some ptarmigans which we shot in the groves, we were soon very comfortable, with the exception, perhaps, of poor Mitchel who suffered much from his frozen feet.

About one o'clock on the afternoon of our third day at this camp, as we were all seated within our tents enjoying our dinner of boiled ptarmigans, my brother and I were startled by hearing some one exclaim "Halloo, Jim?" The eagerness with which we scrambled over dinner and dishes to our tent door, can better be imagined than described, and upon looking out, sure enough there was Jim returning.

Was he alone? No, thank the Lord! Behind him, a moment later, emerged from the woods, other strange men, followed by teams of dogs and sleds. One after the other there came scampering along no less than four teams hauling long, empty sleds, capable of furnishing accommodation for our whole outfit. As they drew up at our camp, Jim advanced and handed us letters from the trader and Mr. and Mrs. Lofthouse—the missionary and his wife—whose acquaintance I had the pleasure of making on two former visits to Churchill. The letters were not mere expressions of sympathy, but were accompanied by such provisions as we might require until we should all reach the Fort. It would be difficult to describe our feelings upon this occasion, the termination of our many hardships.

After a hard two days' tramp through the deep snow, Jim and John had reached Fort Churchill, where they had found kind friends ready to send us assistance.

Dog teams had been placed at their disposal, provisions supplied, and early on the morning of the same day on which they had found us, the train had set out for our relief.

With light sleds they had travelled at a rapid pace over the thirty miles of snowy plains which were found to still separate us from our haven. Another day of good travel in our canoes would have taken us in, but this was not afforded us.

With as little delay as possible preparations were begun for our sled journey to the Fort on the following day. Canoes were hauled up from the shore—where we had been obliged to leave them—and loaded upon two of the sleds; camp outfit and provisions were loaded upon the others, and as far as possible everything was made ready for an early start in the morning.

Long before daylight camp was astir, breakfast was partaken of by the light of the camp fire, and at the first streaks of dawn our crippled party, loaded upon the dog sleighs, was wending its way to Churchill.

The snow being very soft at this early season, the travelling was heavy and comparatively slow, but being anxious to make the Fort in the one day, the teams were urged on. At a sheltered spot, rather

more than half way to Churchill, a brief halt was made for dinner, and to rest the dogs ; but without allowing the usual time for a smoke, we again pushed on.

At three o'clock in the afternoon we reached the bottom of Button's Bay, and thence shaping our course north-easterly, we arrived about two hours later, at the base of a long range of rocky hills. For some time we skirted the foot of these, until, reaching a low place in the ridge, we turned up the steep path, and after a short climb to the crest, we found ourselves within full view of Fort Churchill. Though consisting of only four or five old frame buildings, the sight to us was one of profound satisfaction, and for a moment we paused on the summit of the ridge to take in the realities of the situation.

Little time, however, was afforded for reflection, for at the crack of the driver's whip the teams bounded forward, galloped down the steep slope, and without slackening their pace, sped across the plains below, until they came to a halt in front of the house of the Hudson Bay Company's trader. Presently a tall young Scotchman came out to receive us, introducing himself as Mr. Matheson, the master of the Fort. We felt a little taken back upon at once being asked how long we expected to remain ; however we arranged with him for quarters and rations for our men and board for ourselves until such time as we might be able to continue our journey on foot.

DISCUSSION.

Mr. E. Stewart—You speak of the barren country. Is it barren, no timber? Are there any minerals?

Mr. Tyrrell—Yes. To the north of Doobaunt Lake and to the west of the end of Chesterfield Inlet it was cut up everywhere by great quartz veins and it was a promising looking mineral country. Marble Island is white quartzite.

[*This Association is not responsible as a body for any opinions expressed in its Papers by Members.*]

FIELD TESTING OF MINERALS AND THE VALUE OF A COURSE OF INSTRUCTION.

By W. HAMILTON MERRITT, Assoc. R.S.M., M.E.,
Toronto.

(Lecturer on Mining Engineering—Kingston School of Mining.)

Mr. Chairman and Gentlemen,—It may seem peculiar to you that, not having the honour of being a member of your Association, I should give an address before you this morning on "Field Testing of Minerals and the Value of a Course of Instruction." I might mention in connection therewith that last summer, while conducting some prospectors' classes, I met an eminent member of your Association who asked if I would read a paper before you, and as his suggestion has been supplemented by a request from your Council I am only too glad to be able to give a few notes on the subject. I must say, however, I am very sorry that other affairs have so interfered with my plans that I have not been able to give the matter that attention which the importance of this occasion would warrant. Nevertheless, I will endeavor to give you as much of the subject before indicated as I can in a short time.

We all recognize the Province in which we live is an extremely large one, and I generally emphasize the fact when I wish to impress outsiders by inviting them to recollect that Ontario stretches past parts of the great States of New York, Pennsylvania, Ohio, Michigan, a small portion of Illinois, Wisconsin and Minnesota, and when they realize that fact they begin to believe Ontario is something.

But unfortunately I think we must also recognize that Ontario is in a very partially prospected condition, and in a very partially surveyed condition too Now, how many mines are actually operating to-day in that enormous expanse of country? We can really count the mines that are operating I think almost on the fingers of one hand. Therefore, it certainly should impress anyone that the amount of mineral development to the south of us in those States which bound Ontario is out of all proportion to the natural mineral possibilities of the two areas, that, considering the gigantic mineral development that is going on there, there is certainly field in Ontario for more than the number of mines that you can count on one or two hands or a very great number of hands. And this partial development is in a country which is really nothing short of a kingdom in itself, full of immense possibilities. There is no need of mentioning that to you, gentlemen, who have come in personal contact with this great field in many places, where you have seen indications of a diversity and richness in mineral products which some day must form the largest proportion of the wealth of this Province.

To-day we are only commencing to prospect.

It is a well known fact that no class of men in the country come in such close contact with the prospector as the Ontario Land Surveyor (in this province), and there is no one who is in a position to assist him so materially, and without doubt he does assist him very greatly. Oftentimes the Land Surveyor himself might be a Prospector. We know that it is not always the persons who are actually prospecting for certain minerals that are the discoverers. As a rule "chance" plays a very important part in the discovery of minerals. Most finds in the very first case are discoveries by chance. For instance, close at hand you will remember that the nickel-copper deposits were discovered entirely by chance, through building the Canadian Pacific Railway. And it is not long ago that I met in the Kootenay one of the Hall Brothers, who in hunting for their horses were the first men that discovered any mineral of value in the West Kootenay—"The Silver King," and from that date intelligent prospecting has brought about an enormous development. It is at present I may say enormous, but it is a very trifling thing to what it will be. So that a Land Surveyor may by chance be just as likely to come across a new mineral district as anyone else. While "chance" governs the discovery of many new fields we do not know how many misses are made for every hit. We are not aware how many deposits of one kind and another may be passed over without their value being recognised. We well know the copper-nickel deposits in Sudbury were in the first place merely opened up for copper, and that nickel was not recognized. Of course that ore was not a usual thing for a prospector to discover, but at all events want of experience in that class of ore prevented the discoverer from recognizing its' value in the first place. So there can be no doubt that it is advisable to have as much information as possible of all classes of minerals. Another very old story about the value of an ore not being recognized, most of you will remember in the case of the great Comstock lode in Nevada. The men who discovered it were only panning for gold in the first place, and did not recognize that there was silver in the ore (which was a good deal decomposed at the surface). They were throwing it away in heaps and continued to do so for a long time, while a very little prospecting knowledge and a very small outfit, would have enabled them to have tested for silver, which is an advisable thing to do in almost any kind of stuff, because silver may frequently be present in a decomposed condition as silver chloride, and look like so much mud in the outcrop or oxydized portions of any veins.

While it cannot be denied that a knowledge of common minerals, and the means of testing them in the field, is desirable, yet it is possible to go to the other extreme, and think we can rely on very imperfect tests under disadvantageous surroundings, to take the place of the chemist and the assayer. That is essentially a mistake. Where it is possible to bring any samples to be assayed or tested by the chemist and the assayer it is always desirable to do so. I may say that, with one exception, the assayer's tests as usually made, are naturally superior to those you can make in the field, while both tests are

extremely desirable. The one exception is the test for gold. The reason being that in an assayer's fire-test he gets all the contents of the ore without discriminating between the free milling gold and gold which is not extracted by mercury, but which requires some more expensive operations, such as smelting, chlorination, cyanide treatment, etc., while you can make a field test which will give you practically just the same test as a mill test, if you do it carefully. "Old timers" are generally satisfied with the pan test. They do not bother with the refractory portion of the ore at all. If they cannot get a good showing with their pan they probably drop the prospect and go on to something else.

Now, as an example of a field test of gold, applicable to either alluvial or quartz, we will take an auriferous quartz. Sampling is the first consideration. Nowhere have so many mistakes and regrets arisen as through improper sampling. Fair sampling of any deposit, not only of gold but any other deposit is a fundamental preliminary of immense importance. Bringing in little pieces, and getting an assay (of course the assay will show you what the specimen contains) will give no clue as to whether you can get hundreds or thousands of tons of it, which is the ultimate object of mining. This will remain distinctly to be proved, and therefore unless there is a certain amount of sampling done on the spot there will be difficulty in obtaining a proper result. Especially is that the case in gold ores, which being of such high value a very little piece will throw an assay one way or the other tremendously. It is always better to get as much as one can and make a heap on a level place and divide it up by quartering it down, or making channels through it and taking some out of the four remaining segments. It does not require much discrimination to get a fair sample, and then break the pieces to somewhat similar size and get another sample, and again break smaller and get another, until it is quartered down to a reasonable bulk. Now in the case of the gold ore we will take two pounds of it, when we have got a fair sample in the manner indicated.

For this test we use an ordinary miner's pan kept for that purpose. The pan you use for panning for free gold never should have any mercury put into it. Then we must have a balance. We are supposed to be in the field of course. It is very difficult now to get one of these cheap spring balances because they are prohibited by law. Still if you can get hold of one it will be serviceable. These could weigh two pounds of quartz. If you cannot get anything better you certainly need not be at a loss while you can get one of these book or paper balances that cost about 30 cents and which weigh up to 12 ounces. With that balance you can easily weigh out a couple of pounds, and it will also weigh out your ounce of mercury. After you have weighed out your rock in the first place, the two pounds, you pound it up to pulp in a mortar. I am describing an outfit with which you can carry on this test, and arrive at the result that I am coming to, and which you can take away anywhere. The mortar costs about 90 cents to a dollar, a small mortar. Larger mortars are naturally preferable, but weight,

as you well know, is a matter of consideration when you have to "pack" your outfit. Then you get the sieve for 50 cents to sieve the pulp with. In sieving it you should be very careful to notice whether there is any free gold left on your sieve. After you have sieved the pulp you put the final part on a piece of paper, and with your magnet you take out the iron, and then with your glass you can easily see the free gold. If there is any free gold you probably will put it in a little porcelain thimble, with a little nitric acid to clean it. You then throw it in with the rest of your pulp. When you have sieved your pulp and got your two pounds in the pan you then weigh out one ounce of mercury with your little scales.

The cheapest and best carrier of any kind of liquid is made by the "Patent lightest weight United States Mail Case Company." These cases are lined with cork and are very light and convenient. You can put any liquid in them and can even throw them about without danger of breaking. The mercury can be carried in one of these cases. You weigh out your ounce of mercury, and then you throw it in with the pulp, or, what is still better, you put a little metallic sodium (which is a good thing to have with you in panning when you want to collect the globules afterwards if they are at all scattered, or even if the mercury is somewhat floured) to the amount of a small pea, in the mercury. After you have heated the mercury in a porcelain dish you throw the resulting sodium amalgam into the pulp in your pan and then stir the pulp around with the mercury for about an hour, preferably with a wooden pestle. The use of a porcelain mortar and pestle is sometimes advocated, but that is awkward for taking in the field, and at all events it gives a grinding effect, whereas we have already ground and sieved the pulp and really have it as fine as a mill would get it. All you want to arrive at in a test is about what you would get in the mill, so after you have stirred the pulp around for about an hour with a wooden pestal you pan off the pulp into another pan, because you want to get the concentrates in order to know what amount of concentrates there is in the ore as well as the free milling property of the ore. You therefore pan off the concentrates and tailings and get all the mercury back; pan it a couple of times to make sure you have got all your mercury, then you pan for the concentrates and get your concentrates. So you have got the concentrates in one pan and the mercury in the other, and the pulp or tailings has been panned away. Then comes the question of retorting the mercury. Of course cheapness is the main thing for a prospector's method, so the outfit must not cost more than is absolutely necessary. You may therefore use ordinary Russian sheet-iron and get it bent up into a little cup, which you can get for about ten cents, and you can unbend it open again afterwards if you like. If you are anxious to save your mercury in the field you can do so if you take a good sized potato and hollow it out and use it to cover the little retort; all the mercury will then be caught in the potato and you get your little gold button, or gold sponge, left in the bottom of the retort. With your penknife you very easily scrape it

loose, and you empty it out. Then you take a little assay lead and melt it with the gold sponge on charcoal. A little clay-holder, which costs 25 cents, can be used with prepared charcoal buttons. The other side of the holder is for scorifying capsules. A charging spoon is a handy thing to have. The gold and lead are mixed together in the spoon and then you carefully pour into the charcoal cavity and fuse together the gold and the lead. Now you have got the bullion in with the lead button, by means of your blowpipe and candle. You then mix some borax and a little soda and fuse them with the lead button to purify it. Next you put a little bone ash in the other side of the clay holder, or in a clay pipe, shape it with the head of an iron bolt, and then you cupel the lead button and get your gold bead. The great point is in the cost. Balances costing $130 and all that sort of thing simply makes a prospector sick when you mention it. It fairly paralyzes him, he loses heart and hope of anything in the future. But where you have got a $3 balance, it makes a good deal of difference. Every one of those beads I am exhibiting has been weighed on this $3 balance, which weighs to five grains and is divided into a tenth of a grain. If two pounds of ore is taken every grain of gold we get gives a result of approximately two ounces of bullion to the ton of ore. A tenth of a grain is two-tenths, or one-fifth, of an ounce to a ton. If the bullion is $18 bullion, one grain means $36 to the ton. One little division is a tenth of that, that is $3.60 With this balance you can quite easily weigh to half of that. Therefore you can with no difficulty get the result of a gold ore running $1.50 to $2 a ton free milling with this balance, by using the two pounds of ore, and it is far better to use two pounds for a result than to use an assay ton (29.16 grammes). Therefore, in many respects, this field test is superior in its result to a fire assay. When you can get an ore down to $1.50 to $2 a ton, and up as high as you like of course, it is very satisfactory. Take the case of a large button from an ore that showed $174.50 in free gold, a very rich ore, which nearly exhausted the balance in weighing, 4 3/10 grains in the balance. You have got the concentrates, you weigh them easily on the letter-weight balance. Having ascertained the number of ounces, or the decimal of an ounce, which they weigh, divide that amount into thirty-two (number of ounces in two pounds) and thus you get the proportion of the concentrates to the ore. Therefore you see how many tons of ore it takes to make a ton of concentrates. So that finally you have your free gold and you know how many tons of rock you have got to mill to get a ton of concentrates, which is about all a prospector is very keen to know.

As regards the value of the concentrates. Roughly in the field you may say you can roast the concentrates and either pan them directly, or, if you have two pounds, you can treat them as above described for free gold. Or take two to three grains of raw ore, roast, then mix with litharge, soda and borax, cupel the resulting lead button, and if you get any gold at all, which you can see, it is worth making an assay of. But you can do still better. You can go a step further and use a little outfit which is very portable, namely, a Fletcher's furnace, and

a little crucible. The furnace has got a hole on the side and you blow in and smelt anything in it, and then use a capsule for your scorification, if you prefer to reduce the lead button in that way before cupellation. Take the case of some concentrates for illustration. They are roasted and three grains taken and smelted in the little furnace. Then you get it in the form of a lead button which is cupelled down, and you obtain a little button of gold, which you measure on the Platner's scale. You will see it better as a rule if you use a glass. Suppose it opposite the figure 6 on the scale. A table in Fletcher's little book gives you the number of grains of gold there are in the concentrates to the ton of ore, so that finally now you have got the free gold and the gold in the concentrates, and you have got the number of tons of ore to make a ton of concentrates. Therefore, you see, in this case we have got $163.40, or something like that, per ton from the ore, free milling, then there is $38 to the ton of concentrates, and by the amount of concentrates we get, it shows that it takes 42 tons of ore to make a ton of concentrates. Therefore, a ton of ore yields about 90 cents to the ton in concentrates and $163.40 in free gold. You find all that out with this outfit which is quite portable. It weighs only some 19 or 20 lbs., including 11 or 12 lbs. for mortar and pestle.

Naturally the more refractory the gold ore is the more valuable this test is. An assayer may give $50 a ton to a ton of ore. When you come to mill it perhaps it is all refractory and you cannot get out anything at all. If you had made this test in the field, for instance, and you find out it is all refractory and you cannot get the gold by mercury, it entirely alters your whole base of calculation about the ore. It costs quite a different sum to treat.

Silver ore is very much easier to test by the blow-pipe. Any galena that is found should be tested for silver, because you may say the only value there is in the lead is in the silver associated with it. At least you get the lead to the good, as it were, and it is safer not to reckon on any value except the silver.

Now, we mix fluxes according to the class of ore. There are different charges given in the little manual by Fletcher. The book costs about $1 30, and is a very excellent work.

As an example take an argentiferous galena. We mix three grains with a certain amount of nitre and carbonate of soda and then fuse them in the little furnace. It gets to white heat and readily fuses all down, and then the next thing after we have got it reduced is to take out the bead by breaking the little crucible. You lose less silver in scorifying than you do in cupellation. So that next we scorify the lead button down smaller. All you need do is to put one of the little capsules in the clay holder, blow on the lead, and gradually it oxidizes down. The little silver-lead button breaks out perfectly clean. The lead button is then cupelled in the bowl of a clay-pipe on some bone ash.

A small silver button is obtained as the result. Place the silver button on the Plattner's scale and see how many ounces to the ton it

goes. By a table in Fletcher's book we see the button gives a result of 54.26 ounces to the ton of galena.

COST AND DETAILED DESCRIPTION OF APPARATUS.

The *panning* outfit catalogued below, including sufficient supplies of reagents, etc., for any ordinary prospecting-trip, will cost about $7.50.

1. Glass-stoppered bottle, containing strong nitric acid. (This can be carried in a "patent lightest-weight liquid-mailing case.")
2. Two gold-pans; one to be used for mercury only.
3. Mercury, about 1 pound.
4. "Travellers' letter and parcel-balance" hand-scale, weighing 0.25 to 12 ounces, for weighing mercury and pulp; cost, 30 cents.
5. Balance, hand-scale with sliding weight, very sensitive, from 0.1 to 5 grains; cost, $3.
6. Small Russia sheet-iron retort, and sheet of Russia iron 1 foot square (with hole for retort in the center), for supporting the retort.
7. Small porcelain dish or thimble.
8. Iron mortar and pestle; cost, 90 cents.
9. Brass wire 60-mesh sieve; cost, 50 cents.
10. A little sodium carried in naphtha, in a wide-mouthed bottle, in a "patent lightest weight liquid-mailing case."
11. Wooden pestle.
12. Sheet or shot-lead (pure, if possible).
13. Borax.
14. Soda.
15. Blowpipe, cost, 25 cents.
16. Bone-ash.
17. Clay pipe for cupelling.
18. Charcoal.
19. Candles.

For *quantitative* determination of value of concentrates by measurement with Plattner's ivory scale (cost $3), a sufficient outfit, including the scale, can be obtained for $5, if the prospector makes his own little anvil, pestle and guard and pincers, and gets a small cheap hammer. He will need in addition (included in the $5) only a Fletcher blowpipe furnace, clay crucibles and capsules, a spirit-lamp and some litharge.

For *qualitative* work a prospectors' simple blowpipe outfit might comprise:

1. Knife.
2. Magnifying-glass.
3. Blowpipe.
4. Charcoal.
5. Candle.
6. Old scissors.
7. Pincers.
8. Steel anvil, $\frac{1}{2}$ by $1\frac{1}{2}$ by 2 inches.
9. Pestle and guard.
10. Small hammer.
11. Magnet.
12. Borax.
13. Soda.

14. Litharge.
15. Bone-ash.
16. Clay pipe for cupel.
17. Round-headed bolt for making cupels.

To which may be added platinum-wire, spirit-lamp, microcosmic salt, cobalt nitrate, three-cornered file and glass tubing.

The total cost need not greatly exceed $1.

Therefore for the entire panning, qualitative and quantitative field-outfit for purposes above indicated the cost need not exceed $14, and with it the prospector, or indeed the mining engineer, can with practice obtain in most cases valuable information in the field concerning the ores of the precious metals.

Weight of Apparatus.—The weight of complete outfit, including the panning, qualitative and quantitative outfits (avoiding duplications in above lists, may be about:

	Pounds.	Ounces.
Two pans,	3	12
Mortar and pestle,	11	
Remaining articles, including mercury and other ingredients,	5	4
Total weight,	20 pounds	

I shall not dwell on tests for other ores. There are certain field tests for some sorts of ore that are carried on very simply. Take two ores that sometimes look so very much alike that you can hardly tell one from the other. One is the usual ore of mercury and the other common red oxide of iron, hematite. If you use a simple little test on the blow-pipe you can easily distinguish one from the other. The weight will roughly tell the value of an iron ore. Between the ores of iron which look very much alike you well know one scratches red, being hematite, and the other black, being magnetite. It is a good thing to make no mistake about having a magnet, because sometimes magnetic ores of a lean quality puzzle people. I have seen prospectors and assayers about to assay some lean magnetic ore for silver. It may not look like magnetite, but the minute you take the magnet it attracts it and you can tell at once what it is. For native copper or galena you would pan. For the presence of copper dissolve in nitric acid then add ammonia in excess and you get a marked blue colour.

There are numerous little tests like that. One of the most difficult things to test is where a mineral occurs in very small quantities, such as nickel, but I have found by using the magnet and taking away most of the pyrrhotite some of the nickel minerals remain behind in a more concentrated condition. Then with a small borax bead you can get the reddish hue nickel color. There are a number of tests of different minerals that can be done in the field, but I did not intend at all to turn this into a class of testing ores, but just to show what can be done in some directions with a very cheap and portable outfit, because that is the main object. Expensive balances and heavy things to carry are an absolute impossibility. You have got to make your testing workable so that it can be done in the field.

With regard to the consideration of the educational part of the subject, it must be granted that the facility of making simple field tests of minerals is advisable, yet it will also be conceded without doubt that it may be very valuable to have a knowledge of chemistry and mineralogy, and an acquaintance with all the common rocks and ores that may be met with in this country. It might be said it would take a very long time to acquire this knowledge, but when I tell you that an effort has been made to implant the rudiments of these subjects in the prospector's mind in two weeks, it will be recognized that, for the purpose of prospecting, it is not deemed necessary to go very deeply into science. Yet when we come to the actual facts of the case in the field we do not want to go into the minute divisions of controversy, but we wish to know roughly what we see. There are very few minerals that are common in rocks, and there are not many ores that are common. Rocks puzzle people, yet when you recognize that in a little more than a dozen specimens we have all the common rocks in Ontario you will imagine it is not a hopeless thing to acquire a knowledge of them in a reasonably short time. Of course the three great divisions of rocks are the ordinary sedimentary rocks, the metamorphic rocks and the igneous rocks, which include the volcanic rocks. The only common ones we have in the mineral districts of the metamorphic class are crystalline limestone, gneiss, talc schists, what are called hydro-mica schists, mica schists, chloritic schists, and quartzite. And then the common igneous rocks are granite, syenite, and the green-stones, diorite and diabase. A very marked form of diabase is a rock which you are quite familiar with, viz., gabbro. There are not a great many minerals that compose these few rocks, and you can soon learn their characteristics.

With this elementary knowledge you will be able to tell all the common rocks you are likely to meet with in the field in Ontario.

We attempt to give this information in the Prospectors' classes in mining centers in two weeks. A course, however, of two months has been carried on for the last three years at the School of Mining at Kingston, especially designed to give prospectors, mine foremen, and mining men generally, a mixed theoretical and practical course which will fit them better for work in the field, in the study, and in the laboratory. It is merely designed to lay a foundation from which a man attending the class can proceed for himself, on whichever line or lines he may find desirable. It has been found possible in this course to give a foundation in chemistry. It fits the student to study mineralogy and to understand what a mineral is, chemically speaking. Mineralogy in a particularly practical form is fully dealt with to fit a man for field geology and prospecting. Geology, ore deposits, prospecting and mining, are all given attention, and the practical work of panning, blow-pipe, assaying and assisting at the running of the mill, etc., are part of a course made as practical as possible to assist a man in the field. It has occurred to me that this two month's course would be exactly the thing that many land surveyors would gladly have taken up,

especially before they entered upon the active operation of their profession, after which I well know it is often difficult to get away for two months at a time.

The course is held in the winter at Kingston, during January and February. I do not know of another School of Mining anywhere that is holding a similar course of instruction, and perhaps you would add to the usefulness of your indispensable Association if you made it obligatory for a man to hold a certificate of having attended this two month's course before he could put O.L.S. after his name.

In conclusion, I would like to draw your attention somewhat away from the immediate subject of my paper, and would ask the question,are there any causes,besides the lack of capital and the lack of mining experience, which act as retarders on mineral development in our great Province? It appears to me that there are at least two causes besides the deficiencies alluded to. One is that large blocks of unexplored land are held by individuals and companies which should be made impossible in the future, so far as the mineral is concerned. The other serious defect is that the prospector or discoverer, who, above all men, is deserving of consideration, does not receive the same liberal treatment as in British Columbia, Nova Scotia or the United States. Instead of being able to stake out his find and hold it for some years, subject to development work, he has to find the money for a survey and pay a dollar an acre in rent besides his development work. This may seem a small thing to men with money, but it is an insurmountable difficulty in the path of a man who has been "grub-staked" by a partner nearly as "dead broke" as himself.

If the Government did more surveying half of the difficulty might thereby be overcome. I believe it is generally conceded that the Government should do much more surveying, and that a very much too small proportion of the Province has been surveyed. The present situation appears to me to be a hardship to the surveyor. I would like to know how many cases are known to my hearers where the necessity of this law has induced men to deceive them in connection with remuneration for surveys, on which never a cent has been paid to this day. A very small proportion of surveyed claims ever amount to anything. In British Columbia the surveying comes after the development work has been done, and after the claim has been proved to be some good. With us the cart is before the horse.

DISCUSSION.

Mr. Butler—I would like to ask one question, whether Mr. Merritt thinks there is any probability of finding the clay shales through the Trenton or Laurentian formation suitable for clinker brick or that class. It is a clay shale from which paving brick is made.

Mr. Merritt—You find clay shales through almost any formation. But in the Laurentian, in the older rocks, these are generally meta-

morphosed into gneisses, and as you find them there they would not be in a workable condition. You should find them in the Huronian and Cambrian. There are lots of clay shales in the Silurian, but the Trenton is carbonate of lime. Near here, at the Humber, there are clay shales.

APPENDIX.

THE PEARY LECTURE.

Association Hall was crowded, on the evening of March 27th, to hear the Arctic explorer Peary and hundreds were turned away from the doors. Owing to the blundering of the door-keepers and ushers who were employed by the managers of the hall, the amount realized from the sale of seats was not what it should have been by at least $100. There was however a surplus and the association benefited thereby to a small extent. The committee having charge of the Lecture, desires to thank the members of the Association for their hearty support in making the lecture a financial success, and to express the hope that all who heard the lecture were well repaid. If any such lecture be undertaken again by the Association or any committee thereof, the members themselves should personally superintend the sale of seats and seating of ticket-holders.

The following from the *Globe* is a fair report of the lecture, but without the pictures no one can realize the dreariness of the journey:

Lieut. Peary has a sociable, conversational style of delivery, and carries the listener along so facilely through the splendid panorama of pictures that one comes almost to imagine that the trip is being actually taken in company with the explorer.

In discussing the recent rumors of Dr. Nansen's discoveries Lieut. Peary stated that the rumors were probably unfounded. The more recent statements to the contrary had not changed his opinion. Were they based on fact he felt confident that later news would show that, instead of having triumphed in his attempt to accomplish the feat of reaching the north pole, Dr. Nansen had met with disaster, his ship been crushed in the arctic ice, and he and his party had journeyed backward over the ice to the land of northern Sibera.

The lecture dealt with his latest expedition, that of 1894-5, from which he arrived home, or at least at St. John's, Newfoundland, on September 21. 1895, in the whaler *Kite*, several pictures of which vessel were given in the course of the lecture. The Lieutenant's expedition of 1891-2 to the same region was incidentally referred to here and there, as, for instance, to point out the routes taken each time the journey had been made across northern Greenland from Whale Sound on the west to Independence Bay on the east.

After a view of the *Kite* sailing out of St. John's harbour, and many scenes of Esquimaux, oomiacks, kiacks and villages, of Greenland landscapes, glaciers, cliffs, fiords and icebergs had been thrown upon the screen, Lieut. Peary went on to describe that terrible journey across the ice-cap. It was a narrative of terrible hardships encountered, mainly because they failed to discover a cache of food which had been made by Lieut. Peary the year before. Lieut. Peary's headquarters at Whale Sound and Inglefield Gulf had been named Bowdoin Lodge, and it was from there that a start was made on April 1, 1895, with the object of getting as far toward the northeast as possible to explore the country on the eastern coast of Greenland. Six Esquimaux accompanied the party during the initial one hundred miles. Four of these men then went back, and when discovery of the cache of supplies failed to be made Lieut. Peary sent back the remaining two Esquimaux with a message to say that he, with Mr. Lee and the Lieutenant's coloured man, Henson, had determined to go on, and trust to replenishing their supply of provisions by shooting musk oxen when they should arrive on the other side of the ice-cap. Those provisions which

they carried along consisted of frozen deer meat, some tinned biscuits, and walrus flesh for the dogs. Coal oil was taken as fuel instead of alcohol.

During the first fortnight the explorers covered 200 miles, and attained an altitude of 7,000 feet above sea level. Here violent winds were encountered and the cold became intense, the thermometers registering nearly 60 degrees below zero Fahrenheit. Rations had to be reduced for both men and dogs, with the result that numbers of the dogs died.

The incidents of his tramp across the great snow cap or dome of snow at altitudes of from 5,000 to 8,000 feet above the sea level, keeping his course in the same way that a ship is navigated at sea, from the western to the northeastern shore of Greenland, was listened to with thrilling interest. Speaking of his experiences after struggling for weeks across the trackless expanse of snow he said:

"Never shall I forget that time and scene. Three weakened men and nine nearly starved dogs standing there in the gaunt, frozen desert; these and the glistening snow, the steel-blue sky, and the cold white sun. Five hundred miles in an air line across a waste of snow to the nearest human being, with insufficient rations for even that distance, yet we were still facing the other way. I think that as we started each of us felt an unspoken prayer. I felt then, as I feel now, that in that cool, deliberate moment we took the golden bowl of life in our hands, and that the bowl had suddenly grown very fragile. And I feel now, as I felt then, that we were not rash nor foolhardy, but simply followed the dictates of temperaments which could not act otherwise, and would do the same again under the same circumstances."

After they had crossed the snow-cap they would certainly have perished had not Lieut. Peary and Henson succeeded in shooting ten musk oxen. They were also considerably handicapped by the fact that Mr. Lee had fallen ill. Independence Bay was reached after incredible suffering, but the possibility of further exploration was precluded by the absence of food supplies and the enfeebled condition of the men. Then began the terrible return journey, which was made in twenty-five days, notwithstanding the fact that the outward trip had occupied forty-three days. Food completely failed, and the final march of forty-six hours was made without a bite to eat. Poor, faithful Panikpah, the sole survivor of the magnificent dog train, was so weak and emaciated that, thoroughly exhausted, he had to lie down before the lodge was reached. They left him knowing that when he had rested somewhat he would follow them in. So he did, and Lieut. Peary cut slices of reindeer meat and fed them to him, before taking a mouthful himself, until the faithful animal became quite satisfied. In spite of the truth that Panikpah has never since gone hungry, yet, said Lieut. Peary, he can never forget that dreadful journey of starvation. For months afterward Panikpah would gather up every particle of venison, blubber or bone that he could find and hide it carefully away for future necessity which he feared.

Lieut. Peary's anecdotes about the natives and their habits were very entertaining, especially one which he told about an Eskimo wishing to exchange his wife and two children for Lieut. Peary's 25-cent jackknife. To give an idea of the stature of those people a view was thrown upon the screen showing that Eskimo and his family standing with Mrs. Peary. She is by no means a tall woman, but the Esquimaux were dwarfs in comparison. Notwithstanding that they are so short, they are stout and very firmly knit, for the man who wished to barter his family for a penknife weighed nearly 190 pounds. The females dress almost like the men, even to the "high-water" boots, so that if they ever take to the bicycle their costumes will require no "adapting."

It would be a difficult task to describe all the splendid pictures which followed each other upon the screen with such rapidity, and much of the interesting matter of Lieut. Peary's lecture must perforce for want of space be passed over. There is not a doubt that he has done and is doing good service in the cause of science, that he has increased our geographical knowledge of hyperborea, that our authentic geological and glacial information he has added to, and that he has demonstrated that even yon disparaged country has desirable flora and fauna. He deserves credit for trying to spread this knowledge by his entertaining lectures.

WILLIS CHIPMAN,
Chairman of Committee.

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BIOGRAPHICAL SKETCH OF SAMUEL HOLLAND, THE FIRST SURVEYOR-GENERAL FOR THE NORTHERN DISTRICT OF NORTH AMERICA. FROM A.D. 1752 TO A.D. 1802.

Major Samuel Holland was a native of Canada, and was the first to occupy the position of Surveyor-General for the Northern District of North America. He was born early in the eighteenth century, and about the year A.D. 1758 we find him actively occupied in assisting General Wolfe, as a military engineer, in his operations against Quebec and Louisburg. He seems at this time to have occupied the position of Major of Royal Engineers. During the war, in conjunction with Captain Simcoe, R.N., of H. M. S. "Pembroke," the father of Governor General Simcoe, and Mr. Cook (afterwards the famous explorer, Captain Cook), he made a chart of the Lower St. Lawrence, including the Bays of Chaleur and Gaspé, which was of much service to the British fleet while the war continued. Major Holland was an intimate personal friend of General Wolfe, and it is recorded that the General presented him with a pair of duelling pistols on the Heights of Abraham. A sad page in his family history is connected with this event. His eldest son, Samuel, was shot in a duel while using one of these pistols. In 1780 the subject of these memoirs purchased the Holland Farm, a beautiful estate and mansion, situated near Quebec, between the St. Louis and St. Foy Roads, and bounded on the north by the St. Foy Heights. Here was the "Holland Tree," so well known to the old inhabitants of Quebec; it marked the site of the burial place of Major Holland and his eldest son. This estate has now passed out of the hands of the Holland family.

Major Holland was a member of the Executive and Legislative Councils; he filled the office of Surveyor-General for fifty years. He prepared a very valuable Plan of Canada and the Province of Quebec, which is now at Ottawa, and which having been reproduced by the Canadian Government, is a great boon to the students of early Canadian geography and history. The Holland River, which enters Lake Simcoe from the south-west, and the Holland Landing, preserve the family name. He has left the following publications behind him:

1. Observations Made on the Islands of St. John and Cape Breton for Latitude and Longitude—1768.
2. Astronomical Observations—1769.
3. Eclipses of Jupiter's Satellites observed near Quebec—1774.
4. Astronomical Observations—1774.

He died January 28, 1802.

NEW BY-LAWS.

By-law No. 43. "To provide for the exemption of certain Surveyors from the operations of the Act to incorporate the Association of Ontario Land Surveyors."

"Whereas, under section 10, sub-section 4, the Association may by by-law exempt from the operations of the said Act any Land Surveyor who has been in the actual practice of his profession for a period of thirty-five years or more as a duly qualified Surveyor; and whereas Charles Unwin, William R. Rombough, and Henry Winter have represented to the Council that they had been in practice as aforesaid for a period of not less than thirty-five years previous to the date of the assenting to the said Act, viz, 14th April, 1892; be it resolved that the said Surveyors be and are hereby exempted under the said Act."

Passed by the Council of Management, April 9th, 1896.

By-law, No. 44. "To amend by-law number 12 of the Association of Ontario Land Surveyors.

Whereas, under By-law number 12, of the Association of Ontario Land Surveyors, it was enacted that the Council of Management of the said Association should annually appoint certain Standing Committees; and whereas one of the Committees so to be appointed was designated in the said by-laws as 'The Committee on Topographical Surveying,' and whereas it is deemed advisable in the interests of the said Association to alter the name of the said Committee; be it resolved that the said by-law number 12, is hereby amended by striking out the name 'The Committee on Topographical Surveying,' and substituting therefor the name, 'The Committee on Topographical Survey.'"

Passed by the Council of Management, April 9th, 1896.

NOTES OF COUNCIL MEETINGS.

At the April meeting Mr. Sankey was re-elected unanimously as Chairman of Council for the ensuing year.

By-law No. 43, exempting Messrs. Charles Unwin, William R. Rombough and Henry Winter, from the operations of the O L.S. Act, was passed by the Council on 9th April.

By-law No. 44, amending By-law No. 12, by striking out the name "Committee on Topographical Surveying" and substituting therefor the name "Committee on Topographical Survey," was passed by the Council on the same date.

A deputation from the Canadian Society of Civil Engineers composed of Sir Casimir Gzowski, Messrs. Alan Macdougal and M. J. Butler, was received by the Council. A copy of draft of proposed bill to incorporate that Society was presented, Sir Casimir Gzowski and Mr. Macdougal explaining at length the objects sought. The Council afterwards appointed a Special Committee to discuss the bill and to report. (See page 6.)

The Secretary was instructed to publish a report of the Peary lecture, also notes of Council meetings, in the forthcoming annual report.

The question of holding but one meeting of the Board of Examiners in each year was discussed, and was referred to the Board of Examiners for report at the next meeting.

A. J. VanNostrand,
Secretary.

OBITUARY.

Francis Bolger.

It is with regret that we have to record the loss of another of the first members of this Association. Mr Francis Bolger, O.L.S., who died at his home in Lindsay on Nov. 3, 1895, was the fourth son of Edward Bolger, of Ballanabarna, Justice of the Peace of the County of Kilkenny, Ireland. Coming to Canada in 1858 Mr. Bolger worked as engineer under the late Mr. Tate on the construction of the Grand Trunk Railway. Subsequently he studied his profession under the late Mr. George Dean, P.L.S, and received his commission as Provincial Land Surveyor on Oct. 10, 1863, commencing the practice of his profession at Elora. He afterwards held the position of assistant engineer on the Intercolonial Railway under Mr. Peterson, now chief engineer of the Canadian Pacific Railway. He afterwards practised in Toronto, St. Catharines, and Penetanguishene, in the latter place for some fourteen years. He was employed at various times by the Ontario and Dominion Governments. In April, 1895 Mr. Bolger removed to Lindsay and was appointed engineer for the Township of Ops. Not dismayed by a painful malady from which he had suffered for the last few years of his life, he continued his work until some three days before his death-summons came. A widow and son are left to mourn.

Leander Meyer Bowman.

The death of Mr. Leander Meyer Bowman, O.L.S., whose name has for some years appeared in the "withdrawn" list of the Association, occurred on Sept. 20, 1895.

Born at Berlin, Ont., on Dec. 29, 1863, and educated in the schools of that town, Mr. Bowman for about a year successfully taught school in his native county, and afterwards decided upon surveying and engineering as his life work. With this end in view he took a course at the School of Practical Science, and in the spring of 1887 went to Kansas City, Mo., where he was employed in bridge engineering work for the Chicago, Santa Fé and California Railway. While there his health so suffered from the climate that, although he returned to Canada on that account, he never fully recovered.

A practice in engineering and surveying was then established at Lindsay, Ont., conjointly with his brother, Mr. A. M. Bowman, and was carried on with success until May, 1891, when the subject of this sketch received the appointment of Chief Sanitary Inspector in the Medical Health Department of Toronto, which position he continued to occupy up to the time of his death.

During the period of his practice in Lindsay, Mr. Bowman's firm was awarded a contract for a survey of Dominion lands in Manitoba, and he was also employed under his father, Mr. Isaac Lucius Bowman (whose obituary notice appears in the 1893 Annual Report of the Association), on the survey of Crown Lands for the Ontario Government.

On April 14, 1892, Mr. L. M. Bowman was admitted to practice as a Provincial Land Surveyor, and registered as an Ontario Land Surveyor the same year, but at the same time withdrew from the list of practitioners.

Energetic and persevering, he was too unsparing of himself in his work, and succumbed to a complication of diseases before the prime of life had been reached.

A widow and two small children are bereft of their mainstay by his early demise.

William Haskins.

Another of our members, Mr. William Haskins, has passed away. The deceased has for the past forty years been Engineer for the City of Hamilton. Mr. Haskins was born May 29, 1828, at Coolkeno Hall, county Wicklow, Ireland. He was a son of Abraham Haskins, who came from England and settled in the county of Wicklow, and Margaret Fitzmaurice, daughter of Col. Fitzmaurice. Mr. Haskins was educated in Dublin, Ireland, where he studied his profession of civil engineer at Trinity College, under Sir John McNeill. In 1852 he married Catherine Murray, daughter of Hugh Murray, of the county of Carlow, Ireland, a gentleman of Scottish ancestry. He came to Canada in 1852, and obtained a position as assistant engineer on the survey and construction of the Great Western Railway. On 5th July, 1855, he received his commission as Provincial Land Surveyor. In 1856 he was appointed City Engineer for Hamilton. With the exception of Mr. Beasley he was the oldest civic official in that city. He rendered the city valuable service during his long term of office, all the important public works being constructed under his supervision. Mr. Haskins was a member of the Institute of Civil Engineers, London, Eng., and of the Canadian Society of Civil Engineers. He died suddenly at his residence in Hamilton on July 5, 1896, leaving a widow and five sons to mourn his loss.

Alfred Howitt.

Mr. Alfred Howitt, O.L.S., was taken from amongst us on May 6, 1896. The deceased gentleman was born in Nottinghamshire, Eng., in 1829, and came to this country with his father and mother in 1833. He commenced his studies in Guelph, and was afterwards sent to the Rockwood Academy, where he entered on his professional studies under the late Hugh Black, P.L.S. He went to Hamilton about the year 1848, and was employed professionally at Stratford after that time. In 1863 he married Miss Elizabeth Parks, of Puslinch Lake, and moved to the farm of Wingfield, near Gourock, where he practised his profession until the time of his death. He leaves one son, Dr. J. A. Howitt, of Morriston, and five daughters to regret his departure.

HEAD NOTES OF REPORTED LAND CASES.

H. L. ESTEN, O.L.S.,
Toronto.

SURVEY AFTER PATENT—PATENT GOVERNS.—TOWNSHIP OF HARWICH.

The plaintiff claimed a piece of land as part of lot ten in the first concession west of the Communication road in the township of Harwich; the defendants claimed it as part of lot nine, and the plaintiff was entitled to recover if the line between the lots was to be run as in the case of a double not a single-fronted concession. It appeared that lots nine and ten were described for patent by metes and bounds in 1793, and letters patent were soon after issued in accordance with this description. The original survey of that part of the township was not completed on the ground, but the surveyor laid out the Communication road as directed and returned a plan shewing it, and, as the learned Judge who tried the case without a jury found, he gave the information upon which the description for these lots and for others about the same time were prepared. The principle of survey with double-fronts was not in use before 1820. In 1821 another surveyor was instructed by the Government to complete the survey of this township with double-fronted concessions, and to explore and survey the road, but not to interfere with the lands ceded intersecting it. No posts on the ground were found along the Communication road, and he laid out the lots along it as double-fronted.

McGregor *vs.* McMichael *et al.*

Held, that the latter survey, made after the patents for these lots, could not affect them: that the principle of survey with double-fronts could not be applied to the grant made long before it was adopted; and that the plaintiff therefore could not succeed. McGregor *v.* McMichael *et al.*, 41 Q.B., 128.

SINGLE FRONT CONCESSION—NOT ALTERED BY SUBSEQUENT SURVEY.

The first five concessions of a township were surveyed in 1797, the lots being 29 chains 87 links in width. About 1813, an original post was found by a surveyor in front

Murphy *vs.* Healey.

of the fifth concession by which he determined the limits of the lots, and they had been settled on accordingly. In 1821 the remaining concessions were surveyed, under instructions from the Surveyor-General, which directed the several concession lines to be produced beginning with that between the fifth and sixth concessions, and from the centre of each line at the distance of 50 links each way, right and left, at right angles thereto, the several lots of the width of 29 chains 37 links were to be posted. The surveyor, under these instructions, double posted the line between the fifth and sixth concessions, making the lots 29 chains 37 links wide and patents were afterwards granted for half lots in the concession. It was contended that this made the fifth concession double-fronted, having the lots 29 chains 87 links wide in the front, and 29 chains 37 links in rear. One of these patents however made the rear half 29 chains 87 links wide, and the Government plans shewed no jog in the side lines of the fifth concession.

Held, that the concession was not double-fronted, for the evidence shewed that the whole of it had been surveyed as a single fronted one in 1797, and the surveyor in 1821 had no authority to change it, if he so intended. Murphy *v.* Healey 30 Q.B., 192.

SINGLE OR DOUBLE FRONT CONCESSION — HOW TO RUN SIDE LINE. TOWNSHIP OF CUMBERLAND.

Holmes *vs.* McKechnie.

The township of Cumberland is bounded to the north by the Ottawa, and has a range of lots on the river, with their rear boundaries irregular, corresponding to the course of the stream in front, the remainder of it being laid out into concessions running north and south, numbering from the east, and into lots running east and west numbering from the north.

The instructions for the original survey were to leave one chain as an allowance for road between each concession, to be double posted at the distance of 50 links right and left from the centre of the road. The surveyor however planted only a single row of posts in rear (*i.e.*, at the west side) of each concession, and he stated in his evidence that the west halves of lots in the concession were to be measured from these posts, and the east halves of lots in the next concession westward by beginning at the distance of one chain from each post westerly, parallel to the side line of the township. No line therefore was run or posted at the front of the eighth concession.

The plaintiff sued for trespass on the west half of lot B, in the eight concession, and the question was how the course and starting point of his side line were to be de-

termined? His surveyor took the line dividing Cumberland from Russell, the adjoining township to the south, as governing the course of the side line, because, though the lots numbered from the north, there was no continuous straight line at that end of the concession. He found an original monument on the rear line of the 7th concession, intended to mark the limit between lots A. and B. there, and ran the side line from a point one chain west of that monument to the rear of the 8th concession, which if correct, shewed that the plaintiff should recover; while if the township was to be treated as double-fronted, the line should have been run from the post at the west side of the concession, and in that case the defendant should succeed.

It appeared that whole lots had been granted in several of the concessions, and the north halves of two lots and the south half of one, all before 1854, but that many more grants had been made from 1821 to 1858 for the east and west halves of lots separately described.

Held, 1. That the course of the side line was under the facts proved correctly ascertained, the case being within the proviso to sec. 71, Consol. Stats. U.C, ch 77, and the principle of McDonald *v.* McDonald, 11 C.P. 374.

2. That sec. 85 could not apply, for no line in front of the 8th concession had ever been run or posted. As to the starting point for the side line, the precise case of this survey is unprovided for by the Act: the concessions were not single-fronted for the lines had been run and posted in rear not in front, and very few whole lots had been granted; and they were not within the definition of double-fronted concessions, or within sec. 28, for only a single row of posts had been planted, and the grants had not all been by half lots; but *Held*, looking at the instructions, the evidence of the surveyor and the grants made, that the weight of evidence was much in favour of treating the township as one with double rather than single-fronted concessions, in which case the plaintiff's side line had not been correctly determined.

Held, also, that if a single-fronted concession as the posts in rear of the seventh were intended to govern the front angle of lots in the eighth concession, the plaintiff's line might properly being as it did by his survey. Holmes *v.* McKechin, 23 Q.B., 52.

TOWNSHIP OF CUMBERLAND, SURVEY OF—SINGLE OR DOUBLE-FRONTED CONCESSIONS—EVIDENCE—SECOND NEW TRIAL GRANTED—12 VIC., CH. 35, SEC. 37.

See this case reported on a previous motion for a new trial.

The jury having again found for the plaintiff, the court granted a second new trial, holding that upon the facts proved the township should clearly be treated as one with double-fronted concessions.

Held, also, that as all the grants before the passing of the Surveyors' Act, 12 Vic., ch. 35, sec. 37, had described the land in half lots, that feature of a double-fronted concession was established by the retrospective words of the Act, and subsequent grants, therefore, could not affect the question.

There are several townships with double-fronted concessions in which the posts have not been planted on both sides of the allowances for roads between the concessions, though the statute makes that a part of the definition of such townships. Holmes *v.* McKechin, 23 Q B., 321.

DOUBLE FRONT CONCESSION—ADJALA ROAD, TOWNSHIP OF ALBION.

McLachlen *vs.* Dixon.

In the township of Albion, the lots in the different concessions were originally surveyed and laid out with double fronts; but the Adjala road, which forms the northern boundary of the township of Albion, cuts lots numbers 30 and 31 in the 7th concession diagonally, leaving the eastern halves of these lots broken, and not corresponding with the front or west halves, and no posts or monuments were placed to mark the angles of the east halves.

Held, in appeal, that the side or division road between lots numbers 30 and 31 should not run direct from one front to the Adjala road in a direct line, but that the side road should be run from each front to the centre of the lots.

Macaulay, C. J., C. P., V. C. Esten, V. C. Spragge, and Richards, J., dissentiente. McLachlen *v.* Dixon, 4 C. P. 307.

DOUBLE FRONT.—PATENTED IN HALF LOTS.

Marrs *vs.* Davidson.

The 12 Vic., ch. 35, sec. 37, Consol. Stat. U. C., ch. 93 sec 28, which prescribes the rule for drawing the side lines in double-fronted concessions, applies to townships theretofore surveyed.

Held, following Warnock *v.* Cowan, 13 U. C. R. 257, and Holmes *v.* McKechin, 23 U. C. R., 52, 321,—that the lands having been described in half lots is made by that section part of the definition of a township with double front concessions.

Held, also, that the rule prescribed applies to all lands in such concessions, not to the grants of half lots only, and that it is brought into application by the granting of any half lots.

Semble, however, that the section is on both points open to doubts, which it is desirable to remove by legislation. Where land was described as commencing at a post planted four chains and fifty links from the north-east angle of a lot; *Held*, that the post (the existence and position of which were satisfactorily established) was the point of commencement, though its distance from the true north-east angle was inaccurately given.

The declaration charged the trespasses breaking down fences, etc., as committed on divers days and times. Defendant pleaded leave and license, which the plaintiff traversed. It appeared that part of the fence was removed under a license, and the remainder after it had been revoked, the interval from the first to the last removal being two or three years.

Held, that the plaintiff was entitled to succeed, though it would have been otherwise if the declaration had only charged the trespasses as committed on the same day, for the defendant could then have applied the license to the only trespass charged. Marrs *v.* Davidson, 22 Q. B, 641.

DOUBLE FRONT CONCESSION LINE BETWEEN LOTS, TOWNSHIP OF OPS.

In *trespass quære clausum fregit*, to try the boundary line between lots 28 and 29 in the 5th concession of Ops, the plaintiff described in his declaration by metes and bounds the piece of land trespassed upon, alleging it to be part of 28, to which lot his title was not disputed: *Held*, that "not guilty" was the only plea required and that the other pleas pleaded and set out below were unnecessary and inappropriate. Dark *vs.* Hepburn *et al.*

The land in question was situated at the rear of the concession (the concessions running north and south and numbering from the west), and plaintiff claiming that it was a double front concession, had the division line run from a point on the concession line in the rear, or, what he claimed to be the east front, of the concession; but there was no proper evidence of the concession having, in the original survey, been laid out as a double front concession, and of posts being planted in the rear, while the lots were granted by the letters patent as whole, and not as half lots.

Held, the fact of 28 and 29 having been granted as whole lots, was *prima facie* evidence of the concessions being single-fronted, and that the grant of half lots in the adjoining concession could not affect it.

Held, also, that the fact of defendants attempting to prove a post in rear, from which they contended the line should be run, did not estop them from asserting that the concession was single-fronted.

The jury were asked to find :—1. Is the point contended for by the defendants the place where the original post stood? 2. Did the plaintiff, when he moved his fence, do so on the understanding with the defendants that they acknowledged his right; or, Was his possession to be subject to the correct adjustment of the line? They found, that the post had not been proved, and that the plaintiff was given possession by the defendants: *Held*, that on the first answer the verdict should have been for defendants, for the fact that defendants had not proved the post did not relieve plaintiff from proving the true line; and that the second question was not presented by the case. Dark *v.* Hepburn *et al* 27 C. P., 357.

SPECIAL CASE—DOUBLE FRONT CONCESSIONS—POSTS NOT ALL PLANTED. TOWNSHIP OF EMILY.

Dyell *vs.* Millage.

By 36 Vic., ch. 60, sec. 1, O.,—after reciting that great inconvenience had resulted from the concessions in the township of Emily, having been intended to be made double-fronted, but posts not having been in many cases planted at the front and rear angles of the lots—it is enacted that notwithstanding anything in secs. 28-31, inclusive, of C. S. U. C., ch. 93 :—1. Where posts were in the original survey planted at the front, but not at the rear angles of any lot, the side lines should be run from the posts at the front angles to the rear of the concession, parallel with the governing line. 2. Where posts were in the original survey planted at the rear angles of any lot, the side lines should be run from the front angles of such lot parallel with the governing line to the centre of the concession, and thence direct to the post at the rear angle. 3. In all other cases, the side lines should be run from the front angles of the lots to the rear of the concession, parallel to the governing line. In trespass, to try the boundary between lots 15 and 16 in the 14th concession, it was admitted that the original survey of the township was intended to be in double-fronted concessions, and that there was satisfactory evidence of the original posts at the north or rear end of the concession, between lots 14 and 15 and lots 17 and 18, but not of the intermediate posts. It was admitted, also, that a post had been planted in the rear, in the original survey between the two lots in question; and the post in front was agreed upon.

Held, that the case came within the third sub-section, and that the line must therefore be drawn from the front to the rear of the concession parallel with the governing line. Dyell *v.* Millage, 27 C.P., 347.

BOUNDARY LINES AND SIDE LINES.

Stewart *vs.* Forsyth.

The Eastern side line of lot 24, in the front or first concession of the township of Kingston, cannot be run as it is described in the grant from the crown, or parallel to the Western limit of the township, according to 59 Geo. III., c. 14, because that would carry the concession beyond the line which was originally run out as its eastern boundary. *Doe dem.* Stuart *v.* Forsyth, 1 Q.B., 324.

SIDE LINES OF LOTS, HOW ASCERTAINED—SURVEY—12 VIC. CH. 35, CASE WITHIN THE 36TH SECTION OF—CONSTRUCTION OF 32ND SECTION.

McDonell *vs.* McDonell.

In the original survey of the township of K. which was made by alternate concessions, the lines in front of the first and rear of the second concessions, were run, and a single row of posts planted along the latter to divide the space into two hundred acre lots. The line between the first and second concessions was afterwards surveyed under instructions from Government, and divided off into lots of the same size.

Held, A case within the 36th section of 12 Vic., ch. 35; and therefore that the side lines of lots in the second concession should be ascertained by the posts of the original survey on the line in rear of that concession, and not by those of the subsequent survey on the division line between the first and second concessions. McDonell *v.* McDonell, 10 Q.B., 530.

BOUNDARY LINE—MODE OF ASCERTAINING WHEN IMPERFECTLY SURVEYED.

Davis *vs.* Waddell.

On the original survey of a township a base line had been run, but the concession lines had not been run through from one side of the township to the other, and the surveyor had also run the side lines, planting a post at the measured depth of each concession, to mark the line of the concession; but it appeared impossible the concession lines so marked could be straight, and one of the angles of a lot could not be discovered by any stake or monument.

Held, that the statutes 12 Vic., ch. 35, and 18 Vic., ch. 83, do not provide a rule for determining the front of any lot in a township so surveyed, and that the proper method of ascertaining the place of a lost post was by dividing the

distance between the nearest known posts on the side line, as it was originally run past the lots, and not by running a straight line between the nearest posts on the concession line and dividing the distances by the number of lots; also, that the side lines originally surveyed were to be considered true and unalterable boundaries. Davis *v.* Waddell, 6 C.P., 442.

BOUNDARY LINES AND SIDE LINES—BOUNDARY WHERE POST MARKING SIDE LINE OF LOT HAD BEEN LOST.

Culp *vs.* Culp.

A concession or base line had been run and posts planted on it upon a survey made on a similar principle to that referred to in Davis *v.* Waddell, but the question was how the side line of a lot was to be ascertained.

Held, that the distance between the two nearest ascertained monuments on the base line should be measured and divided proportionately between the lots, making the due allowance for roads, and that the side line required should be run from the angle of the lot so ascertained. Mary Culp *v.* John Culp, 6 C.P., 466.

SIDE LINE—TOWNSHIP OF YORK—12 VIC., CH. 35, SEC. 35.

Bell *vs.* White

Where the lots in a concession ranging from east to west were not numbered all the way from the boundary line of the concession on the east, but two blocks of five lots each had been laid out in the original survey fronting on and towards that line, and the remainder of the concession in blocks of five lots each, fronting as usual on the concession line, and numbering westward, beginning at No. 10.

Held, that the 35th section of 12 Vic., ch. 35, would nevertheless apply, and that the side line of the lot in question (32) must be determined by the course of the eastern boundary line of the concession.

Held, also, that the last proviso in that section would not apply, so as to make the boundary line of the block in which lot 32 was the governing line, because the township was surveyed before the 27th of March, 1829. Bell *v.* White, 15 Q.B., 171.

SURVEY—BOUNDARY LINE—NUMBERING OF LOTS—APPLICATION OF STATUTE.

Macdonald *vs.* McDonald.

Two surveyors being employed to divide the gore of land marked in the plan in the statement of case ran lines as are therein dotted and named McLaurin's and McLeod's lines. The parties apparently acquiesced in the McLeod's line for a time, but subsequently disagreed, and this action was brought to contest the division.

Held that the rule in the statute, that the course of the boundary line in each concession, on that side from which the lots are numbered shall be the course of the division or side line, not being applicable to the case as these lots purport to number from the east, while the gore at the east of the concession is not numbered, the defendant is entitled to recover. Macdonald *v.* McDonald, 11 C.P., 374.

TRESPASS ON HIGHWAY.

On the 8th of January, 1836, a surveyor, in compliance with instructions from the government agent, laid out a road or street on the northern limit of the town of London, two chains wide, a portion of which was then, and had for some time been, in the actual possession of the Episcopal church, to which body a patent subsequently, and on the 18th of January, 1836, was issued, granting to them all that parcel or tract of land, "on which the Episcopal church now stands, and containing four acres and two-tenths of an acre or thereabouts." Upon an indictment for a nuisance in stopping up the highway:— Mountjoy *vs.* Regina.

Held, that this survey, although made after the grantees had gone into possession, must prevail against such possession. Hagarty, J, diss. Mountjoy *v.* Regina, I. E. & A., 429. See Regina *v.* Bishop of Huron, 8 C.P., 253, from which this case was in effect an appeal.

WHEN NUMBERING OF LOTS ON PLAN IS ALTERED BY GOVERNMENT, ORIGINAL PATENT HOLDS AGAINST NEW NUMBERING.

In regard to a survey made before the 50 Geo. III., ch. 14, the provisions of that act will not have the effect of necessarily confining the grantee to the land designated by the posts planted in the original survey, if the plan of survey had been altered by the government before the issuing of the patent, and before the passing of that statute; therefore, when the government had added to the ends of the several concessions a strip of land which the surveyor had left unsurveyed between his concessions and the adjoining townships, and in consequence of such addition had changed the numbering of the lots throughout the concession. Talbot *vs.* Paterson.

Held, that the patents issued in accordance with such reformed survey would cover the land which the government intended to be included within the boundaries expressed in the patent, though the number of lots would not correspond with the posts set by the surveyor. *Doe d.*, Talbot *v.* Paterson, 3 Q.B., 431.

WORK ON GROUND—LICENSES TO CUT TIMBER—INCONSISTENT SURVEYS—"GENERAL COURSE" OF A RIVER.

White *et al.* *vs.* Dunlop.

The plaintiffs held a license dated September, 1860, to cut timber within certain limits, commencing "at the south branch of the Indian River, at the extremity of a limit licensed to A. & Co., ten miles above the forks." In 1842 a survey had been made by the Deputy Inspector of woods and forests, to determine A. & Co's limits, when the upper end, where the plaintiffs began, was marked by blazed trees; and in 1844 the survey was completed by one R, under instructions from the Department, and the line previously marked was then adopted, and recognized until March, 1867. In that month a surveyor was instructed by the department to determine the defendant's limits, which were the same as those of A. & Co and he made the upper boundary not so far from the forks as the previous surveys. His plan was returned to the Department, but no action taken on it. The plaintiffs then sued the defendant for cutting timber on the strip between the two surveys, trespasses complained of having been committed apparently before the last survey was made.

Held, that they could not recover, for R.'s survey having been adopted and acted on by the Government, the boundary marked on the ground in accordance with it must govern until changed by competent authority.

Quære, how a boundary line following "the general course of the river" for a given distance is to be ascertained, and whether it is properly done by drawing a straight line from the starting point to a point on the river at that distance.

Quære, whether, as was assumed in this case, the holder of a license which has expired may sue for trees cut during its currency. White *et al. v.* Dunlop, 27 Q.B., 237.

CHANGE OF PLAN—INCONSISTENT DESCRIPTIONS—ADMISSIBILITY OF DESCRIPTIONS TO EXPLAIN PATENTS.

Hagarty *vs.* Britton.

One R. in 1829 first surveyed part of the township of Plympton fronting on Lake Huron, and his plan returned shewed the lots fronting on the lake with an oblique line in rear, following the general course of the lake but no allowance for road. Afterwards a plan of the whole township was compiled in the Crown Land office, from surveys of three separate portions of it made by different surveyors. The descriptions of the lots were made from this plan, all the lots having been granted after it had been completed, and the distances in the descriptions contained in the

deeds were according to the scale on which the plan was compiled. This plan shewed a road in rear of the front lots, and made their depth greater than in R.'s plan. There was no proof of any work on the ground shewing that R. had ever run out or posted the rear lines as it appeared on his plan.

Held, that it was competent for the Government to make such allowance for road, not being inconsistent with any work on the ground.

Held, also, that in order to give effect to the change made by such allowance—to avoid an irregular rear boundary for such front lots—and to reconcile the plans, and the grants for one of the front lots and two gore lots in rear of it, which could not all three be carried out owing to a deficiency in the land—a proportionate reduction should be made in each of such lots.

The description of a lot by metes and bounds, from the Crown Land Department, is admissible in evidence to explain the patent for the lot, in which it is described only by the number and concession. Hagarty *v.* Britton, 30 Q.B., 321.

See also, Keeley *v.* Harrigan, *et al* 3 C.P., 173.

TITLE BY POSSESSION.

TOWNSHIP OF HAMILTON—SURVEY UNDER 29 VIC., CH. 72, EFFECT OF.

Taylor *vs.* Croft.

The plaintiff owned lot 28 and the defendant lot 27 in third concession of Hamilton, between which there was no road allowance, and the plaintiff, previous to the survey of that concession made under 29 Vic., ch. 72, had occupied the land in question for more than twenty years. By this survey it belonged to lot 27.

Held, Morrison, J., dissenting, that the effect of such survey was to fix conclusively the division line between the lots, but

Held, also, that the plaintiff's title by possession was not taken away by it.

The above survey was made by Surveyor E. C. Caddy. It was admitted that Caddy made a survey of concessions A and B, and of the first and third concessions of the said township, in accordance with the said Act, and did all in accordance with the act he was required to do; that in making his survey of the third concession, he found two original monuments, one on the east and the other on the west side of lot 27, and from the monument on the west side of the lot he ran a line as a division line between lots 27 and 28. There is no road allowance between the two lots.

The questions for the Court were, whether the survey of Caddy, under the facts stated, made by virtue of the Act, fixed conclusively the division line between lots 27 and 28. If conclusive, then the further question was, is the plaintiff entitled to recover by right of possession, notwithstanding the provisions of section 3, and the other provisions of said Act. Taylor *v.* Croft, 30 Q.B., 573.

TOWNSHIP OF SCARBOROUGH—24 VIC., CH. 64, 25 VIC., CH. 38,—EFFECT OF SURVEY UNDER—PROOF OF ORIGINAL MONUMENTS—STATUTE OF LIMITATIONS.

Palmer *vs.* Thornbeck.

In ejectment to try a question of boundary, the plaintiff claimed the north half of lot 31. Defendants limited their defence to a piece described by metes and bounds, giving notice that they claimed it as part of lot 32.

Held, that the plaintiff was not entitled to succeed on proving his title to lot 31; but that it was for him, seeking to change the possession, to shew that the piece in dispute was part of that lot.

In this case it appeared that over twenty years ago a fence was mutually erected by plaintiff and defendant's father, who then occupied lot 32, as a line fence along the course of an old blazed line; though for what purpose such line had been run did not appear. The fence continued to be used as a line fence until 1862-3, when, in consequence of the survey made under the 24 Vic., ch. 64, and 25 Vic., ch. 38, the plaintiff claimed that the line was incorrect, and he procured the Surveyor, who had made the survey to run the line. The Surveyor divided equally the space in the block containing these two lots between the road monuments planted several years previously by himself at the front angles of the side road allowances; but there was no evidence to shew how he ascertained the position of such side roads in making that survey, or of any search for the original monument. In 1865-6, after this new line had been run, the plaintiff pulled down a piece of the old fence and removed it to the new line, where it remained for two or three days until put back by the defendants to the original line, where it has so remained ever since.

Held, that these statutes did not interfere with any original posts, if existing; that the evidence was insufficient to shew plaintiff's right to claim according to the statutable survey, and a new trial was granted.

Per Gwynne, J.: That the onus was on the plaintiff of proving the original monument marking the front angle of the lot, or its loss, and that there was no satisfactory evidence

of its position, before the mode adopted of dividing the space between the road monuments could be adopted.

Per Hagarty, C. J.: That on proof, which was wanting here, of the statutable directions having been obeyed in laying out such side lines and planting the monuments, then that plaintiff would be entitled to the statutory division, and the onus of proving an original monument, marking the front angle of the lot, was on the defendants.

Per Galt, J.: That under those statutes, the onus of proving the existence of original monuments was cast upon the person asserting it

Semble, that the plaintiff's entry in 1865-6 was sufficient to stop the running of the Statute of Limitations. Palmer *v.* Thornbeck, 27 C.P., 291.

TOWNSHIP OF SCARBOROUGH—SURVEY UNDER 24 VIC., 64, AND 25 VIC, CH. 38—ONUS PROBANDI—STATUTE OF LIMITATIONS—EVIDENCE.

Palmer *vs.* Thornbeck.

On the second trial of this case, under the judgment granting a new trial herein, reported in 27 C.P., 291, it appeared that the line between lots 31 and 32 was not run upon the original survey, and that when the line was run in 1865, no trace could be found of an original post, if any had been planted, designating the boundary line between the lots on the front of the concession. It also appeared that the position of the original monuments at the front angle of the side road allowances was ascertained by the surveyor, and that the monuments planted by him were on such site.

Held, that on this evidence the plaintiff was entitled to claim according to the statutable survey.

Held, also, that the 6th Sec. of 25 Vic., ch. 38, had not the effect of divesting any title acquired by the Statute of Limitations.

Held, also, per Gwynne, J., adhering to his former judgment, that the onus probandi, that the piece of land in question was part of lot 31, either independently or by force of the statutes 24 Vic., ch. 64, and 25 Vic., ch. 38, rested on the plaintiff. Palmer *v.* Thornbeck, 28 C.P., 117.

MUNICIPAL SURVEYS.

C. S. U. C., CH. 93, SECS. 6, 7, SURVEY UNDER—MOTION TO QUASH BY-LAW—ACQUIESCENCE OF APPLICANT.

Fairbairn *vs.* Sandwich E.

Sec. 6 of C. S. U. C., ch. 93, authorizing the County Council to apply to the Governor to cause a concession line to be surveyed, applies only where such line was not run in the original survey or has been obliterated. Where,

therefore, it appears that there were in fact two lines clearly traceable, the question being which was the original line, and the surveyor decided this upon conflicting evidence.

Held, that such survey was not binding or conclusive, and that a by-law of the township adopting it must be quashed.

Held, also, that the acquiescence by the applicant in the line thus adopted (which was a highway) could not be urged against the application, other interests than his, both public and private, being affected.

Sec. 7 directs that the surveyor shall so draw the line as to leave each of the adjacent concessions of a depth proportionate to that intended in the original survey. The depth of the concession on the north side of the line in question lay from north to south, and the concessions on the south extended in depth from east to west, so that the depth of that to the north only would be affected by the position of the line.

Semble, that this would not prevent the application of the statute. In *re* Fairbairn and the Corporation of the Township of Sandwich East, 32 Q.B., 573.

MUNICIPAL SURVEYS.

Boley *vs.* McLean.

A surveyor employed by the Government, under Consol. Stat. U.C., ch. 63, secs 6-8, to survey a concession line alleged not to have been run in the original survey, or to have been obliterated, instead of attempting to make a survey in accordance with those sections, satisfied himself that the original line could be found and endeavored to retrace it.

Held, following Tanner *vs.* Bissell, 21 U.C.R., 553, that such survey was not binding under the statute; and the Court, on the evidence given at the trial, affirmed the finding of the learned judge, who tried the case without a jury, that the line so run was not in fact the same as the original line.

Semble, that in order to prove a survey which will be conclusive under the statute, the application by the county council to the Government for such survey must be shewn. Boley *vs.* McLean, 41 Q.B., 260.

ERROR IN MARKING POSTS OF ORIGINAL SURVEY.

Jarvis *vs.* Morton.

A mistake of a surveyor in marking the number of concessions wrong on some of the posts of an original survey, will not make it proper to describe the lots so marked as being in the concession numbered on the posts. Jarvis *vs.* Morton, 11 Q.B., 431.

CONCESSIONS—SURVEYS—STATUTES.

There is no rule of law nor any statute which makes it necessary that each concession should be of the same width throughout a township, nor is there any principle by which an error in the survey of one concession entirely unconnected with the actual work and survey on the ground in another, is to affect and either contract or expand such other concession. Johnson *vs.* Honsberger *et al*, 6 C.P., 201. Also Marrs *vs.* Davidson, 26 Q.B., 641; Dark *vs.* Hepburn. Johnson *vs.* Honsberger *et al.*

DISCREPANCY BETWEEN WORK ON GROUND AND PLAN—HIGHWAY—FIELD NOTES—COSTS.

The question in an action of trespass being whether there was a highway between lots 20 and 21 in a township, which the plaintiff denied, it appeared that the practice of surveyors in laying out a road allowance was to plant a post on each side of it, marked on the side nearest the road with the letter R., and on the opposite side with the number of the lot, and to plant a third post in the centre of the road marked R on two or on all four sides. Stakes thus marked were found between 19 and 20, but none between 20 and 21, and it was sworn that an original post had been seen there 24 years ago, and until within three or four years, marked 20 and 21, thus far shewing that there was no road allowance between those lots. Carrick *vs.* Johnston.

On the other hand, the registered map of the township, the map in the Crown Lands Department, and the field notes of the surveyor who made the original survey, shewed such allowance. The plaintiff and defendant both claimed under grants from the Crown of separate parts of lot 21, described as commencing on the northern limit of such allowance, and without it the defendant would have no access to his lands.

The jury were told that the work on the ground must govern, but that under C.S.U.C., ch. 54, sec. 313, the fact of the Government surveyor having laid out this road in his plan of the original survey, would make it a highway, unless there was evidence of his work on the ground clearly inconsistent with such plan. The jury having found for defendant.

Held, that the direction was right, but that the verdict was contrary to evidence, and a new trial was granted on payment of costs.

The Queen *vs.* Great Western R. W. Co., 21 U.C.R., 555, remarked upon.

A certified copy of part of the field notes of the original survey is admissable in evidence.

The defendant's counsel told the jury that a verdict in favour of the plaintiff for any sum would carry costs. Quære, as to the right to make such statement; but semble, that the objections to a verdict for the plaintiff founded upon it, would apply equally to a verdict for defendant. Carrick *vs.* Johnston, 26 Q.B., 69.

SURVEY—BOUNDARY LINE COMMISSIONERS—VALIDITY OF WORK DONE BY SUBORDINATE.

Ovens *vs.* Davidson.

Held, that a line run by a subordinate and adopted by the principal (surveyor) is the work of the latter, and must be treated as such.

That it is by the work as executed on the ground, and not as projected before execution, or represented on a plan afterwards, that the boundaries are to be determined. Ovens *vs.* Davidson, 10 C.P., 302.

SURVEY OF TOWNS AND VILLAGES—WORK ON THE GROUND —PLAN—C.S.U.C., CH. 93, SEC. 35.

McGregor *vs.* Calcutt.

Under the latter part of sec. 35, of ch. 93, C.S U.C., the work upon the ground in the original survey of towns and villages, to designate or define any lot, shews its true and unalterable boundaries, and will over-ride any plan of such lot. McGregor *v.* Calcutt, C.P. 39.

BOUNDARIES—ORIGINAL MONUMENTS—SURVEYS.

Artley *vs.* Curry.

In questions relating to boundaries and descriptions of lands, the well-established rule is that the work on the ground governs; and it is only where the site of a monument on the ground is incapable of ascertainment that a surveyor is authorized to apportion the quantities lying between two defined or known boundaries. Therefore, where an original monument or post was planted as indicating that the north-west angle of a lot was situated at a distance of half a chain south therefrom, and another surveyor had actually planted a post at the spot so indicated, and subsequently two surveyors, in total disregard of the two posts so planted, both of which were easy of ascertainment, made a survey of the locality and placed the post at a different spot, the court (Spragge, C.) disregarded the survey, and declared the north-west angle of the lot to be as indicated by the first mentioned monument. Artley *v.* Curry, 29 Chy., 243.

EVIDENCE.

A piece of land marked out in the original plan of a township, as an allowance for road, does not lose that character, because it has never been used as a road for a period of forty years, and a copy of the original plan of the township is admissible in evidence to prove such allowance, although it does not appear by whom, nor from what materials the plan was compiled. Badgely *v.* Bender, 3 O.S., 221. Badgely *vs.* Bender.

When a witness, a surveyor, founded his evidence upon the assumption of a certain monument as the correct point to start from in running a line, and the jury gave their verdict accordingly, and such witness afterwards discovered he was in error as to the correctness of that boundary, and made affidavit of his mistake, the court granted a new trial. *Doe d.* Case *v.* Magill, 5 O.S., 56. Case *vs.* Magill.

A surveyor cannot act independently of the provisions of the statute, 5 Geo. III., ch. 13, and arbitrarily lay on one side the evidence which neighbours are ready to give, from their own knowledge of the situation of original posts. Sherwood *vs.* Moore, 3 Q.B. 468. Sherwood *vs.* Moore.

THE DESCRIPTION AND CERTAINTY OF EVIDENCE REQUIRED BY PLAINTIFFS IN EJECTMENT BROUGHT ON ACCOUNT OF DISPUTED BOUNDARIES—FIELD NOTES.

In all ejectments brought on account of disputed boundaries, the plaintiff has to shew, beyond any reasonable doubt, that he is entitled to some land at least of which the defendant is in possession; where the point is a doubtful one, the plaintiff must be prepared to shew that he has had a survey carefully made, and that the proper steps have been taken which the law requires for ascertaining the exact position of any posts along the line which can still be discovered by inspection or can be established by evidence, in order that the court and jury may see whether the two lots in question are, by the proof which the plaintiff is seeking to establish, made to occupy their proper position on the concession line. Strong *vs.* Jones.

Semble, that an admitted copy of the field notes from the Crown Lands Office may be received in evidence. *Doe d.* Strong *v.* Jones, 7 Q.B., 385.

EVIDENCE.

A person not being a licensed surveyor is a competent witness on a question of boundary. Potter v. Campbell, *et al.* 16 Q.B., 109. Potter *vs.* Campbell.

BOUNDARY LINE—EVIDENCE.

Richmond *vs.* Ferris.

In ejectment for part of a gore of land, lying between lots Nos. 12 and 13, the plaintiff rested his case on proving by the recollection of witnesses, the original movement between lots Nos. 10 and 11 and between lots 14 and 15, and claimed to have the space between these two boundaries proportionally divided according to the width of lots Nos. 11, 12 and 13; and of this gore, as designated in the field notes. The defendant gave evidence of an original monument between the gore and lot No. 12; and if this were proved defendant was entitled to a verdict; but it did not appear from the field notes that any post had been planted in the original survey between the gore and lot No. 12.

Upon verdict for defendant, the court set aside such verdict, and granted a new trial, without cost—Hagarty, J., dissentiente. Richmond *v.* Ferris, 6 C.P., 163.

See also Ovens *v.* Davidson, 10 C.P., 307; McGregor *v.* Calcutt, 18 C.P., 39.

CROWN SURVEY—ALLOWANCE FOR ROADS—PROFESSIONAL EVIDENCE.

Stock *vs.* Ward *et al.*

An original Government survey of part of a township, made no mention of roads, and it was apparently the surveyor's intention the roads should be taken out of then (wild land) adjacent. The surveyor who afterwards surveyed the adjoining lands, treated the road allowance as included within the lines of the original survey, whereby the plaintiff's lot would be diminished one chain in breadth. The jury having found for the detendants, the court ordered a new trial, considering such verdict against the weight of evidence.

The weight attached by the court to the evidence given by professional witnesses is diminished by efforts to sustain the views of the party who may call them—it should be given free from bias. Stock *v.* Ward, *et al.*, 7 C.P., 127.

EVIDENCE—AFFIDAVITS TAKEN BY SURVEYOR—TRESPASS TO LAND—PLEADING—AFFIDAVITS TAKEN BY SURVEYOR—HOW FAR EVIDENCE—C.S.U.C., CH. 93, SECS. 50, 51—CONSTRUCTION OF.

Manary *vs.* Dash.

To an action of trespass on lot 11, in the 5th concession of Saltfleet, defendant pleaded, among other pleas, that the alleged trespass was committed on lot 12, and on defendant's land. *Semble*, that the allegation of title to lot 12 was superfluous, unless equivalent to

liberum tenementum; that the averment that the trespass was committed there was in effect not guilty; and that if the fact that the trespass took place on lot 11, and on the plaintiff's property, was intended to be put in issue, it should have been done in another form. The question in dispute at the trial being the boundary line between 11 and 12, affidavits were offered in evidence as to the line between lots 4 and 5, and 14 and 15, in the same concession, taken by the surveyor employed by defendants to run this line in 1860, and filed with the registrar under C.S.U.C. ch. 93, sec. 51. Held that such affidavits were properly rejected.

Quære, as to the effect of the words in that section, "subject to be produced thereafter in evidence in any court of law or equity within Upper Canada."

One of these affidavits went to show that none of the side lines in this concession had been run in the original survey, owing to a large swamp.

Held, not an affidavit within the statute, for evidence "concerning any boundary" does not mean evidence that no such boundary ever existed; and on this ground, also, such affidavit was rightly rejected. Manary *v.* Dash, 23 Q.B., 580.

ALIQUOT PARTS OF LOTS—EJECTMENT—SURVEY—ALIQUOT PART OF A LOT—C.S.C., CH. 77, SEC. 68.

In ejectment by the patentee of the south-east quarter of a lot, to try a disputed boundary, defendant owning the north-east quarter, the plaintiff's surveyor stated that he ran the east side-line of the lot, divided it into equal halves, and drew a line across the lot on a bearing corresponding to the concession line in the rear, and that of the quarter so ascertained defendant was in possession of eleven acres. He said, however, that he did not know the quantity in the whole lot, which fronted on a river, and there was a jog in the concession line in rear, for which he made no allowance. Babaun *vs.* Lanson.

By the Survey Act, C.S.C., ch. 77, sec. 68, every grant of an aliquot part of a lot shall be construed as a grant of such aliquot part of the whole, whether more or less than expressed in the grant.

Held, that the plaintiff had not clearly shown his right to the land claimed and was therefore not entitled to succeed; but a new trial was granted instead of a non-suit. Babaun *v.* Lanson, 27 Q.B., 399.

BOUNDARY LINES—EVIDENCE.

Held, that the entries in the diary of the surveyor, together with a small piece of map, also produced, supposed Smith *vs.* Clunas.

to be his (which was all that remained in the Crown Lands office shewing the lines in question run), and the trace of a blaze for a great part of the way, were evidence of the fact of the lines having been run by him in the manner in which he was directed to run them by his instructions (which were produced), although there was no further evidence upon the ground that the original lines had been run. Smith *v.* Clunas, *et al.* 20 C.P., 213; Dark *v.* Hepburn, *et al.*, 27 C.P., 357.

SPECIFIC PERFORMANCE—STATUTE OF FRAUDS.

Stretton *vs.* Stretton.

An agreement for sale of lands referred to them as certain lots in "Stretton's Survey." No survey had in fact been then made, but a rough sketch of the proposed survey was in existence.

Held, that such sketch could not be considered as the survey referred to in the agreement; and as parol evidence was necessary to show the particulars as to size and position, without which such sketch was unintelligible, the Court refused to enforce the agreement, but offered to make a decree for performance of the agreement admitted by the answer without costs; or dismiss the bill without costs—the defendant having improperly denied the agreement alleged by the plaintiff, which was clearly established by the evidence, though incapable of being enforced owing to the defence of the Statute of Frauds. Stretton *v.* Stretton, 24 Chy., 20.

SURVEY UNDER ORIGINAL PLAN, ETC., AND PRIVATE AGREEMENT.

McEachern *vs.* White *et al.*

It appeared that no survey had been made on the ground of the 10th or 11th concessions of the township of Eldon, north of the Portage road, but the patents had been granted according to a plan returned by the surveyor instructed to make the original survey; and by taking this plan, with the original instructions and field notes, the lots could be found upon the ground. One D., a P.L S., made a survey in accordance with this plan, by which the plaintiff's lot, 32, 10th concession, contained 200 acres, and defendant W.'s lot 32, 11th concession, 30 acres. While a dispute as to this line was pending the defendant W. induced the plaintiff to sign a document under seal, agreeing that the portion of the line between the 10th and 11th concessions opposite lots 32 be surveyed upon the same bearings as that portion of said line lying south of the Portage road. Defendant W., who was a sharp, intelligent man, knew that the effect of this would be to deprive the plaintiff's lot of 50 acres and add it to his own, while

the plaintiff, who was illiterate and dull, was quite ignorant of this; and defendant W. assured him that if the effect of the agreement should be to reduce his, defendant W.'s, lot to 10 acres he would be satisfied. The agreement was prepared at W.'s instance, and the plaintiff signed it without taking any advice.

Held, that the plan and survey must govern, and that there was nothing in the agreement, if binding upon the plaintiff, to prevent him from asserting his title in accordance with them, or to divest him of any portion of his land.

Semble, however, that under the circumstances plaintiff would not be bound by the agreement.

The plaintiff claimed under a patent for the east half of lot 32, in the 10th concession, as expressed in the patent, "according to the original survey of said township of Eldon," containing 100 acres more or less, issued on 1st of May, 1868, to the plaintiff. The patent for the west half of the same lot as expressed by the patent, "according to the original survey thereof," containing by admeasurement 100 acres more or less, was issued on the 3rd of February, 1873, to one James Sweeny. The defendant claimed under a patent to one Joseph Fee, dated 17th of October, 1853, of lot 32, in the 11th concession of Eldon, containing by admeasurement 30 acres more or less. McEachern *v.* Somerville, *et al.*; McEachern v. White *et al*, 37 Q.B., 609.

AS TO THE TOWNSHIP OF KINGSTON—BOUNDARY LINE.

Murney *vs.* Markland.

Appeal from the decision of the Boundary Line Commissioners of the Midland District upon an application of Edmund Murney, Esquire, to have the eastern boundary line of lot 25 in the first concession of the township of Kingston determined.

Semble, that the eastern boundary line of lot 25, in the first concession of the township of Kingston, is a line drawn from the north-west to the south-east angle of the said lot. (See Stewart *vs.* Forsyth.)

Award set aside, no further information having been given during term. Murney *v.* Markland *et al*, 6 O.S. 220.

RE-SURVEY OF TOWNSHIPS—CONSOL. STAT. U. C., CH. 93—RIGHT OF ACTION BY THE COUNTY.

Peterboro' Co. *vs.* Smith Tp.

Declaration that the plaintiffs, pursuant to the statute, applied to the Governor to have the concession lines in the defendants' township re-surveyed, which was ordered accordingly and the expense paid by the plaintiffs; that the plaintiffs thereupon directed the defendants to levy and

collect the moneys so paid; but, although they did levy part, they refused to pay the same to the plaintiffs.

Plea, that the only direction was by the plaintiffs' by-law, which before suit was quashed.

Held, on demurrer, that the declaration was bad for not showing a by-law, as the plaintiffs could proceed only in that way; and that the plea was good.

Quære, whether the money can be levied before the survey has been actually made. The Corporation of the County of Peterborough *v.* the Corporation of the Township of Smith, 26 Q. B. 40.

TRIVIAL CASE—AS TO THE TOWNSHIP OF VAUGHAN. BOUNDARY BY AGREEMENT—DIVISION FENCES—STATUTE OF LIMITATIONS—SMALLNESS OF INTEREST.

Bernard *vs.* Gibson.

The plaintiff and defendant were owners of adjoining lots in the township of Vaughan. An Act of the Legislature of Canada (23 Victoria, chapter 102) had been passed, providing for a new survey of the township; and, according to a survey made under the provisions of that Act, a strip of land containing about two acres and three-tenths, occupied by the defendant, it was alleged belonged to the plaintiff. On that strip there had recently been standing nine pine trees, seven of which the defendant had cut down. It appeared that some years before 1851, a fence from the front or easterly side of these lots, for a distance of about 60 or 70 rods, had been put up and was then standing on the supposed division line between the two lots: and also another fence running from the rear or westerly side of the lots to a distance of about 25 or 30 rods, leaving a space of about 600 yards in the centre unenclosed; but the parties respectively in occupation of the lots had always used the land on either side of the supposed line as belonging to them, up till about the year 1858, when the father of the plaintiff and the then owner of the defendant's lot procured a survey to be made and a fence to be erected on the division line then laid out, which was paid for jointly by them, and which corresponded with a line which had been run and blazed by the same surveyor in 1851. The plaintiff, in 1873, filed a bill seeking to restrain the further cutting of timber, and for a declaration that the strip in question was his property.

Held per Curiam, that there had been a sufficient occupation of the lands on either side of the line for such a length of time as bound the parties under the Statute of Limitations, even if the survey made and fence erected in 1858 were not sufficient acts to compel the parties to abide by that line as the true boundary; Blake, V. C., being of

opinion that they were. Spragge, C., dubitante as to the parties being bound under the Statute of Limitations; but, being clear that the matter in dispute was too insignificant to call for the interference of this Court by injunction, he concurred in dismissing the bill, with costs.

Held, also, that the Statute of 1860, directing a survey of the township to be made, had not the effect of creating any new right or title as between parties who had been in undisturbed possession for the statutable period of twenty years before action or suit brought. Bernard *v.* Gibson, 21 Chy. 195.

TOWNSHIP OF SMITH—LOTS FRONTING ON A RIVER—C. S. U. C., CH. 93, SEC. 27.

Johnson *vs.* Hunter.

The three easterly lots only of one concession in a township (Smith, in the county of Peterborough) were bounded in front by a river, and the line had been run in the original survey in front of such concession, up to though not past these lots, but the township itself fronted upon another township.

Held, clearly not a township bounded in front by a river, within the C.S.U.C , ch 93, sec. 27, so that resort might be had to the posts in the concession in rear to determine the side lines of these three lots.

Quære, whether such a case is provided for by the Statute. Johnson *v.* Hunter, 25 Q.B. 348.

TRESPASS—BOUNDARY LINE.

McNaught *vs.* Turnbull.

Trespass to try the boundary line between plaintiff and defendant. The former claimed title to part of N.W. part of lot No. 20 in the sixth concession of South Dumfries, by metes and bounds; the defendant claimed the east half. The descriptions in the deeds did not conflict; a line was originally run by a Mr. Ball for the prior holders of the property, one of them at the time claiming title through the original patentee, under an agreement for purchase, but was not acquiesced in by the plaintiff. In 1849 one M., a Provincial Land Surveyor, at plaintiff's request, ran a line supposed to be acquiesced in by the defendant; but upon the erection of a fence thereon by the plaintiff the defendant objected, and it was removed. In 1863 a Mr. Peters ran a line, claimed by the plaintiff as a true line, and which caused this dispute

Messrs. P. and J., being present at the time on defendant's behalf, concur in opinion that this line is correct.

The jury having found for the plaintiff with leave reserved to the defendant to move against it, upon motion—

Held, that the line originally run, and now contended for by the defendant, was not binding upon the parties, and that the evidence showed the line run by Peters, and acquiesced in by the defendant, to be the correct one; therefore the verdict for the plaintiff was correct. McNaught *v.* Turnbull, 13 Q.B. 426.

BOUNDARY—ESTOPPEL—AGREEMENT TO ABIDE BY SURVEY.

Crosswaite *vs.* Gage.

In action of trespass, *q.c.f.*, it appeared that defendant conveyed to the plaintiff 19 acres of lot 2 in the fifth concession of Barton, described by metes and bounds, commencing at the N.E. angle of the lot. This starting-point upon the ground was undisputed, and it was admitted that the description given enclosed the land claimed by the plaintiff.

Held, that defendant was estopped by his deed, and could not set up any question as to the boundary between lots 1 and 2.

It appeared also that about twelve years since, one W., defendant's tenant, having moved the fence between plaintiff and defendant, an agreement in writing was entered into between W. and the plaintiff that they would employ B., a surveyor, to establish the original line between lots 1 and 2, and would be bound by it; and defendant, by a memorandum signed by him at the foot of this agreement, agreed to abide by it. The land in dispute was then in W.'s possession, and it was alleged that B. had not completed his survey.

Held, no evidence to support defendant's plea of leave and license.

Held, also, that upon the evidence, set out below, B., the surveyor, had proceeded properly to establish the line. Crosswaite *v.* Gage, 32 Q.B. 196.

Also Holmes *v.* McKechin *et al*, 23 Q.B. 52.

LOTS FRONTING ON RIVER—POINT OF LAND IN FRONT SEPARATED BY WATER.

Thomson *vs.* Sherwood.

In an action of trespass, defendant claimed as part of lot 16 in the broken front of Escott that part of Cary's point in the river St. Lawrence which would be included within the side lines of the lot, if projected from the main shore across a small bay, to and across the point to the river in front of it. In the original plan of the township the line across the point from west to east, showing an intention to include it in the broken front was continued only as far east as lot 14, though the point extended far enough to cover the fronts of lots 15 and 16. In scaling

the front on the river posts appeared to have been put down on the main land, but none could be traced on the point. The jury found that these posts were intended to mark the width of lots, not the front angles of lots in the broken front, and that the front of lot 16 was upon the main shore, and not on the river in front of the point.

Held, that upon the evidence the verdict was right as no part of the point appeared to be included in the lot. Thomson *v.* Sherwood *et al.* 21 Q.B., 174

ALTERNATE CONCESSIONS, RUNNING OF—DISPUTED BOUNDARIES—ORIGINAL SURVEYS.

In the first government survey of a township (Loughborough), the lines between alternate concessions only, as the 2nd and 3rd, 4th and 5th, 6th and 7th, had been run and staked out, numbering from south to north. These lines were not straight but curved or bended southward in the centre of the township. It appeared (though not very satisfactorily) that several persons had, under government, settled according to these lines. Subsequently, a surveyor was employed by Government to run the concessions omitted on the first survey, viz., 1st and 2nd, 3rd and 4th, 5th and 6th concessions. He did so; but instead of running them parallel to, or diverged, as the lines formerly surveyed, he ran them in straight lines, thus cutting off part of the rear of the northerly concessions and adding them to the front of the southerly concessions. *Held*, that such last mentioned survey could not be adopted as the governing one. Martin Keeley *v.* Cornelius Harrigan, Cornelius Burk and James Ryan. 3 C P., 173. Keeley *vs.* Harrigan *et al.*

BOUNDARY LINE COMMISSIONERS—SURVEY CONFIRMED BY STATUTE, 12 VIC., CH. 35.

The judgment of the boundary line commissioners under 1 Vic., ch. 19, when not appealed against. *Held*, binding wher. not appealed against within six months as required by the statute. And the decision of this court in Keeley *v.* Harrigan, 3 U. C. C. P., 173, confirmed. Raile *v.* Cronson, 9 C. P., 9. Raile *vs.* Cronson.

SURVEYS UNDER SPECIAL ACTS.

TOWNSHIP OF BINBROOK—ERRONEOUS SURVEY—ACTS 1, WM. IV., CH. 8, 7 WM. IV. CH. 59, REMEDYING SAME—MARRIED WOMAN OWNING LAND IN BINBROOK.

Under the statutes 1 Wm. IV., ch. 8, and 7 Wm. IV., ch. 59, passed for the purpose of remedying an erroneous public survey, an inhabitant living in the front concession Crooks *vs.* Calder. Crooks *vs.* Ten Eyck.

of the township of Binbrook, cannot be dispossessed by an ejectment brought, after a prior submission to arbitration, by the husband of a married woman, owning land in the adjacent township of Saltfleet—the husband not being the owner of the land—to whom alone these acts apply. *Doe. d.* Crooks *v.* Ten Eyck; *doe d.* Crooks *v.* Calder, 7 Q. B., 581.

TOWNSHIP OF CUMBERLAND.

23 VIC., CH. 101—EJECTMENT—COMPENSATION FOR IMPROVEMENTS.

Smith *vs.* Sparrow.

The 23 Victoria, ch. 101, declares the mode in which the side lines in the 1st concession of Cumberland shall be run, and provides a particular method by which those injured by the change from the original plan of survey may obtain compensation.

Held, that the provisions of the general statute, 20 Vic., ch. 78, were thereby excluded, and that the defendant was confined to the remedy pointed out by the Special Act. Smith *v.* Sparrow, 21 Q. B., 323.

AS TO THE TOWNSHIP OF MONAGHAN.

16 VIC., CH. 228, SEC. 1—LIMIT BETWEEN 12 AND 13, 1ST CON. MONAGHAN—BIRDSALL'S LINE.

Otty *vs.* Davis.

Ejectment for part of lot No. 12 in the 12th concession of the township of Monaghan, described by metes and bounds.

Held, that under 16 Vic., ch. 228, sec. 1, Birdsall's line as laid out on the ground, must govern as the allowance for road between lots 12 and 13 along their whole extent, and not merely up to park lot 10 on lot 13; and that it was immaterial whether such line was correctly described in the statute. Otty *v.* Davis, 12 Q. B. 454.

AS TO THE TOWNSHIP OF NIAGARA.

STAT. 18 VIC., CH. 156, SEC. 3—APPLICATION OF.

Clement *vs.* Clement.

This was an action brought by the plaintiff for trespass by the defendants, upon a road allowance between lots numbers 110 and 111 in the township of Niagara, which the plaintiff claimed as his, by operation of the statute 18 Vic., ch. 156, sec. 3.

Held, that the preamble and enacting clause of the statute 18 Vic., cap. 156, apply to all that part of the township of Niagara which lies between the east and west lines of the township to the Queenston and Grimsby macadamized road, and should not be limited to the first concession only. Clement *v.* Clement, *et al*, 14 C. P., 146.

MUNICIPAL SURVEY, SUFFICIENCY OF PETITION FOR—NUISANCE —DISPUTED SURVEYS—C. S. U. C., CH. 93, SEC. 6

Regina *vs.* McGregor.

On an indictment for nuisance in obstructing a highway, the Crown put in the application by way of petition, under C. S. U. C., ch. 93, sec. 6, to the County Council of the County of Kent, in these words: "We, the undersigned freeholders of the fourth ward of, etc., humbly show: That your humble petitioners are labouring under a most weighty grievance in consequence of a dispute having arisen out of the different surveys of the, etc., and as it would appear that no final adjustment can be brought about other than is provided by the 31st clause of the 12 Vic., ch. 35, your petitioners humbly pray that the County Council of, etc., will give this our prayer due consideration, and by acting upon the above named clause of the 12 Vic., ch. 35, you will further and preserve the best interests of your petitioners. As the matter now stands it is impracticable for us to expend our public money or perform our statute labor, having no guarantee than the same will prove to be properly applied." There was also produced a memorial by the County Council of Kent, to the Governor-General, under the same Act, stating that over two-thirds of the freeholders, etc., had petitioned the council for a survey to be made of the line in dispute, in order to clear up a doubt that existed as to the site of the concession in question, owing to the dispute that had arisen out of the different surveys, and referring His Excellency to a copy of the petition, by which it would be seen that the petitioners bound themselves to be governed by the conditions of 12 Vic., ch. 35, sec. 31 (C. S. U. C., ch. 93, sec. 6), and praying that the said line might be surveyed. It was proved and not disputed that the necessary number of resident landholders under the Act had applied for the survey, but it was objected that the petition did not show this:

Held, following Cooper *v.* Wellbanks, 14 C. P. 364, that everything was to be presumed to be done correctly until the contrary was proved, and here it had been proved that the necessary number of persons under the Act had applied for the survey.

Held, also, as to the other objections, viz., that the petition did not show any want or obliteration of the original survey, and that neither petition nor memorial prayed for placing monuments, that the two documents could not be read in any other sense than as containing an application to the Governor requesting the making of a survey under the Act, and if to be made under the Act, then that the marking by permanent stone boundaries

under the direction of the Commissioner of Crown Lands, in the manner prescribed by the Act, was an incident to the survey necessarily involved in the application for the survey; and—therefore, *Held*, that the petition was sufficient. Regina *v.* McGregor, 13 C. P., 69.

MUNICIPAL SURVEYS WHEN ILLEGAL, LEVYING RATE FOR—SURVEYS MADE UPON APPLICATIONS BY MUNICIPALITIES SURVEY—12 VIC., CH. 81, SEC. 31—18 VIC., CH. 83, SEC. 8—LEVYING RATE.

Walker *vs.* Municipality of Burford.

The statute 12 Vic., ch. 35, sec. 31, provides for a survey of *concession lines* being made, on application to the Governor by the municipal council, which application need not be at the request of the landholders. The 18th Vic., ch. 83, sec. 8, provides for making a survey, and placing monuments *to mark the front and rear angles of lots*, on application to the Governor by the municipality, made at the request of one-half the resident landholders to be affected.

An application was made under the first Act, without any request of the landholders, to mark out concession lines, and under it the survey provided for in the second Act was afterwards made, *to define the boundaries of lots: Held*, that such survey was illegal.

The rate to pay for a survey, made under these Acts, must be levied, not upon the assessed value of the land, but in proportion to the quantity held by the respective proprietors. Walker and the Municipality of Burford, 15 Q.B., 82.

MUNICIPAL SURVEY BY-LAW.

C. S. U. C., CH. 93, SECS. 6-9—C. S. C., CH. 77, SECS. 58-61.

Scott *vs.* Peterboro' Co.

The county council passed a by-law directing a township municipality to levy and collect from *the patented and leased lands* of the township, a certain sum required to reimburse the expenses incurred in a re-survey of the township. *Held*, that the by law was illegal, for the statute directs that such expense shall be defrayed by the "*proprietors*" of the lands interested.

Semble, that the jurisdiction to pass such a by-law should appear on the face of it, by shewing a survey such as the statute contemplates.

Quære, whether the Act authorizes the re-survey of a whole township. In *re* Scott and the Corporation of the County of Peterborough, 25 Q.B., 453.

MUNICIPAL SURVEY BY-LAW.

BY-LAW OF UNITED TOWNSHIPS—SEPARATION—APPLICATION TO QUASH—PRACTICE—SURVEY.

A by-law was passed by the united townships of Smith and Harvey to levy a certain sum on lands in Harvey, to defray the expense of a re-survey of that township. The union having been dissolved. *Held*, that an application to quash was properly made by a rule calling on the corporation of Harvey, upon a certified copy obtained from the clerk of Smith, the senior township. Scott *vs.* Harvey Tp.

The certificate was under the corporate seal of Smith, but there was no seal to the copy of by-law, nor anything but the certificate to shew that it had been sealed.

Held, sufficient.

The by-law directed the money to be levied "on all lands patented, leased, sold, agreed to be sold, and located as free grants" in the township of Harvey. *Held*, bad, following Scott and the Corporation of Peterborough, 25 U. C. R., 453. In *re* Scott and the Corporation of the Township of Harvey, 26 Q. B., 32.

MUNICIPAL SURVEY, BY-LAW, LEVYING RATE.

C. S. U. C., CH. 93—RE-SURVEY OF TOWNSHIP.

The County Council, under Consol Stat., U. C., ch. 93, sec. 6, having caused the re-survey of an entire township, and directed a certain sum to be levied for the expenses, by a by-law which had been quashed, by a subsequent by-law directed the collection of a further sum for the purpose, to be levied on the proprietors of land in the township in proportion to the quantity of land held by them respectively in such township. This by-law was quashed, on the grounds: 1. That the Statute does not authorize the re-survey of a whole township, 2. That it directs the expense of each concession to be borne by the proprietors of land there. In the matter of Scott and the Corporation of the County of Peterborough, 26 Q. B., 36. Scott *vs.* Peterboro' Co.

MUNICIPAL SURVEY—IMPROPER APPLICATION FOR CONCESSION LINE.

A concession line having been laid out by a Provincial Land Surveyor under instructions from the Commissioner of Crown Lands, upon the petition of the corporation of the township, based upon the assumed application of one-half the resident land-holders to be affected by the survey, the petition being in the following words:—"To the Cooper *vs.* Wellbanks.

Reeve and Councillors in council assembled,—We, the undersigned freeholders in the 2nd and 3rd concessions, south side of Black River, west of Point Travers, in Marysburg, beg to ask your honourable body to petition the government to send a surveyor to establish the concession line according to law between the 2nd and 3rd concession commencing at the township line running towards South Bay, and by complying with this request your petitioners in duty bound will ever pray. Milford, April 14th, 1860." On receipt of this petition the corporation passed a resolution in these words: "Resolved, That in accordance with the statute 18 Vic., ch. 83, sec. 8, and the prayer of the petition of a majority of the householders to be affected thereby, that there be a survey made between the 2nd and 3rd concessions south of Black River from the township line of Athol, to lot number one in the third concession of Marysburg." On the 29th of May, 1860, the corporation of the township of Marysburg petitioned His Excellency to cause this survey to be made, and on the 9th of July, 1860, the Honourable the Commissioner of Crown Lands gave instructions to a Provincial Land Surveyor to survey and establish the concession line between the 2nd and 3rd concessions of the township of Marysburg, commencing at the township line, and running towards South Bay in accordance with the provisions of the Provincial Statute, 12 Vic., ch. 35, and 18 Vic., ch. 83.

Held, that the application to the corporation, and the resolution by the corporation not being such as the statute requires to authorize an application to the government to cause the survey to be made, that the survey made by the instructions of the Commissioner of Crown Lands, dated the 9th of July, 1860, was therefore unauthorised. Cooper *v.* Wellbanks, 14 C.P., 364.

SURVEY—WHEN LEGAL IF NOT MADE BY CROWN—MAPS, CUSTODY OF—EVIDENCE—ABBUTTALS IN DEEDS.

VanEvery *vs.* Drake.

A survey made by a private party of an unsurveyed block granted by the Crown is the "original survey and shall have the same force and effect thereof as though the said original surveys and plans thereof had been made by government authority." See 12 Vic., ch. 35, sec. 34.

When the description in a deed which was supposed to contain half a lot, in giving metes and bounds, stated as a measurement 40 chains as the length conveyed. *Held*, it was necessary for the grantee to prove the whole lot contained more than 80 chains from front to rear, to entitle him to any greater quantity, for the production of the deed alone would entitle him to 40 chains only.

A map produced from the custody of the son of the original owner of the lot and sworn to be the map upon which the township was originally sold.

Held, to be properly admitted in evidence. VanEvery *v.* Drake, 9 C.P., 478. McGregor *v.* Calcutt, 18 C.P., 39.

ERRONEOUS SURVEY—MAGNETIC BEARING AND ASTRONOMICAL BEARINGS.

Thibaudeau *et al. vs.* Skead.

Defendant claimed under a timber license which described his limits as bounded on the south by "the continuation of a line from the head of Mud Lake on the course North 54° E., formerly the boundary between T. C. and A. R. M." The plaintiff claimed under a license which gave his northerly limit as the same line, describing it also as running N. 54° E. Both licenses were renewals of previous licenses from about 1839.

Held, that the boundary between them was the true astronomical line N. 54° E.; and that the plaintiff could not claim according to a line run in 1874, N. 54° E. magnetically, making no allowance for the variations of the compass. Thibaudeau *et al v.* Skead, 39 Q.B. 387.

TRESPASS BY SURVEYORS IN MAKING PRIVATE SURVEYS.

Turnbull *vs.* McNaught.

The declaration stated that the defendant broke and entered the east half of lot No. 20 in the sixth concession of the township of South Dumfries, and there cut down and destroyed the trees and underwood, to-wit, etc. The fourth plea alleged that as to the breaking and entering, and cutting down and destroying a small quantity of underwood, he, the defendant, at the time when, etc., was in the lawful possession and seised in fee of a part of the west half of the same lot; that the boundary between the two parts was a straight line through the centre of the lot from the front to the rear; that the boundary was in dispute between the plaintiff and the defendant, and they could not agree upon the same; and that the defendant, in order to discover and ascertain correctly the boundary, employed and instructed a duly authorized land surveyor to run the said line and establish the said boundary, who, with certain chain-bearers and other necessary assistants, in pursuance of such instructions and in discharge of their duty as such land surveyors, necessarily entered into and upon the land in the first part of the plea mentioned, for the purpose of running the said line and discovering and ascertaining the said boundary, and necessarily and unavoidably cut down and destroyed a small quantity of brush and underwood then growing upon the said land

first mentioned, in order to run such line and to discover and ascertain such boundary as they lawfully might, doing no actual damage on the occasion, which are the same trespasses complained of.

Held, on demurrer to this plea, that a surveyor has no power to enter upon the lands of one neighbor for the purpose of making a mere private survey for another neighbor. Turnbull *v.* McNaught, 14 C.P., 375.

SPECIFIC PERFORMANCE UNDER ERRONEOUS SURVEY—LACHES.

Paul *vs.* Blackwood.

The defendant had for some time used part of the plaintiff's land as a mill-pond, and differences existed between them in relation thereto, to put an end to which they entered into a written agreement that the plaintiff should sell to the defendant as much of the land as was, or had been, overflowed by the water of the mill-pond, for a price which was proved to be much beyond the intrinsic value of the piece of land so sold. To carry into effect this contract, the plaintiff had the ground surveyed; but the survey was erroneous, and the deed which the plaintiff thereupon tendered comprised, in consequence, less land than the defendant was entitled to have. The defendant refused this deed, procured a new survey to be made, and tendered a new deed for execution by the plaintiff; and this deed the plaintiff refused to execute. When the first instalment of the purchase-money became due, the defendant tendered it, but did not pay it in consequence of the non-execution of the conveyance. The defendant continued to use the land for a mill-pond, and gave no intimation of his intention to abandon the contract; and twelvemonth afterwards the plaintiff filed a bill for a specific performance of the contract, which was decreed without costs. (Blake, C., diss.) Paul *v.* Blackwood, 3 Chy., 394.

AS TO DEBT LYING AGAINST THE TOWNSHIP COUNCIL FOR EXPENSE OF A SURVEY MADE UNDER THE 38 GEORGE III., CHAPTER I.

Roach *vs.* Council of Hamilton.

Held, per Cur., that the township council of Hamilton coming in the place under the 12 Vic., ch. 81, sec. 31, heads 26 and 31, of the trustees of the Newcastle district in quarter sessions assembled, could not be held liable *in debt* to the surveyor who had been appointed under the 38 George III., chapter 1, to re-survey the township of Hamilton. Roach *v.* Municipal Council of Hamilton, 8 Q.B., 229.

SURVEY MADE AFTER GRANT.

The question in dispute was what quantity of land was granted by the patent issued in 1797, the description in which was: "Beginning about 18 chains below a small creek which empties itself into the river Thames, in lot No. 17; thence west to the eastern boundary of lot 16, two chains, more or less; thence north 45 degrees west to the north-east angle of lot 16, 28 chains, more or less; thence south 45 degrees west to the river Thames; and thence along the bank of the river against the stream to the place of beginning, being the broken fronts of 16 and 17." The lots were supposed to contain 150 acres. There were two creeks, and the point of commencement contended for by the plaintiff (the upper creek) would give him a much larger quantity of land than the defendant claimed he was entitled to, while that sought to be upheld by the defendant would reduce it to about 50 acres. An old map from the Surveyor-General's office was put in evidence, under which the lot had evidently been granted; and a surveyor called for the defence stated that the ground contended for by the plaintiff corresponded best with the old map. Horne *vs.* Munro.

Held, that as the description contended for by the plaintiff corresponded best with the oldest plan to be found in the Surveyor-General's department, and with a survey since made for the purpose of tracing out or completing parts not fully surveyed before, he was entitled to recover. Horne *v.* Munro *et al*, 7 C.P., 433.

Semble, per Draper, C. J., the crown may grant a tract of land by a sufficient description to designate the portionment, although the township within which the land lies has not been surveyed and laid out into lots and concessions; and the grantee will be entitled to hold it, although a subsequent survey made by authority of the Crown makes it by name a different lot, or places it in a different concession from that named in the patent, or the surveyor laying it out projects a road through it. Ib.

HIGHWAYS, INDICTMENT FOR OBSTRUCTING.

In September, 1852, a tract of land upon the River St. Clair, adjoining the town plot of Sarnia to the south, was ceded by the Indians to the Crown, to be disposed of for their benefit. In the same year this tract was surveyed under instructions from the Government, and three streets laid out upon the plan, one called Front Street, running north and south, parallel with the river, and the others, Wellington and Nelson streets, running westerly through Regina *vs.* G. W. R. Co.

the track, crossing Front street at right angles, and continuing to the river bank, which was distant only 1 chain 50 links from Front street along Nelson, and 50 links along Wellington street. This plan was reported to the Government, with the surveyor's field notes, but Nelson and Wellington streets were not laid out upon the ground west of Front street, and that portion of them had never been opened or used so as to give access to the water—the river bank there being abrupt. A sale was held in 1853 at which some lots were sold with reference to this plan, one on Nelson street, but none west of Front street.

In 1854 the Great Western Railway Company purchased from the Government the tract west of Front street, along the river between Wellington and Nelson streets, and beyond them to the north and south, including the water lots in front, for which they paid the sum awarded by arbitration. Afterwards a public sale of lots in the tract ceded by the Indians was held by Government, at which a plan was referred to, made for the company by the same surveyor who first laid out the tract, showing the ground which the railway and its terminus would occupy, but exhibiting no streets leading through it to the river ; and this was the plan used before the arbitrators, and upon which their award was made.

The company, without objection on the part of the municipality entered upon the land bought by them, made new ground in front by filling up the river, and completed their buildings and other works which obstructed Wellington and Nelson streets running through the land purchased to the river, according to the first plan mentioned. After this the municipality by letters applied to them for compensation for the injury caused the town in consequence of the access to the water by these streets being cut off, claiming that they should be paid a fair value for the streets thus taken and remunerated for a purchase of land which it was proved they had made higher up at a cost of $3,200 in order to obtain access to the river. They made no complaint, however, that the defendants had acted illegally.

Defendants being afterwards indicted for obstructing these streets, it was left to the jury to say, with reference to the 15th clause of 22 Vic., ch. 116, whether the municipality or the government had permitted defendants to occupy the streets before that act, and if so, to find for defendants. The jury gave a general verdict of guilty, and being asked how they found as to the permission, said only that they thought the municipality ought to be compensated for the land.

By 22 Vic., ch. 116, sec. 15, it is enacted, in substance, that all highways occupied by this railway with the written assent of the municipality within which they are situated, shall be declared vested in them to the extent of the user permitted or enforced by the municipality; and all proposed or contemplated streets occupied by the company, or which they have been permitted to occupy by the license of the owner in fee, and which shall not lead to any place beyond the said railway, shall be deemed closed, and the occupation by the said railway shall be lawful.

Held, that defendants were clearly entitled to an acquittal under this clause, for, first, as to the first part of the clause, a written assent given afterwards by the municipality would suffice, and might be inferred from their letters, in which they asked only for pecuniary compensation; and, secondly, these were proposed or contemplated streets occupied by the company, and not leading to any place beyond the railway, in which case no assent was required.

Held, also, that the Consol. Stat. U.C., ch. 54, sec. 333, had no application, for it could not be said that these streets had not been opened by reason of any other road being used in lieu thereof.

That under 16 Vic., ch. 99, sec. 4, and 16 Vic., ch. 101, defendants had clearly a right to take possession of this land for their railway, with any easement thereto. *Quære*, whether the 4 W. IV., ch. 29, sec. 9, which requires this railway company on intersecting any highway to restore it to its former state, or in a sufficient manner not to impair its usefulness, could have been applied to this case; the streets in question never having been opened or used, being covered by the works of defendants, so that they could not be restored without dispossessing them, and leading to no place beyond. *Semble*, that at all events a mandamus would not, under the circumstances, have been granted at the instance of the municipality.

Under Consol. Stat. U.C., ch. 54, sec. 313, these streets, being laid out on the original plan made by the Crown surveyor, would be public highways, though not staked out upon the ground, and never opened or used.

Semble, that under 12 Vic., ch. 35, sec. 41, the Indians, or the government acting for them, had power to alter and amend the survey by striking out these streets where they ran through the land sold to defendants. Regina *v.* The Great Western Railway Company, 21 Q.B., 555.

PROHIBITION TO COUNTY JUDGE—AMENDING REGISTERED PLAN—STATUS OF APPLICANT—OWNER—ASSIGN—R.S.O., CH. 111, SEC. 84.

Chisholm and Town of Oakville.

Held (reversing the judgment of Proudfoot, J., 9 O.R., 274), that the status of C., as a person, or the assignee of a person, who registered a plan, was a question of law and fact combined for the county judge to determine upon C.'s application to him, under R.S O., ch. 111, sec. 84, to amend the plan, and that his decision was not examinable in prohibition.

Semble, a person not the owner of the property may register a plan, and although this would be at the time a futile proceeding, yet if he afterwards became the owner of the property and adopted the plan, he would be entitled under the Act to have it amended In *re* Chisholm and the corporation of the town of Oakville, 12 A.R., 225. In *re* the Hon. G. W. Allan, 10 O.R., 110.

EVIDENCE—SURVEYOR'S FIELD NOTES—POSSESSION—ACTS OF OCCUPATION—STATUTE OF LIMITATIONS—R. S. O., C. 108.

McGregor *vs.* Keiller *et al.*

To determine a disputed boundary line between two lots, the field notes of S., a land surveyor, were offered in evidence, but objected to on the ground that they were not made by S. in the execution of his duty as such surveyor:

Held, that the objection was good, and the evidence inadmissible. The plaintiff and M., his next adjoining neighbour, in 1868, employed a surveyor to run the line between his land and that of M. The line drawn ran through a wood. For more than ten years the plaintiff was in the habit of cutting timber up to the said line, and he and the owners of the adjoining land recognized it as the division line.

Held, that this was sufficient occupation by the plaintiff to give him a good title by possession up to the said line, whether it was the correct line or not.

Harris *v.* Mudie, 7 A.R., 414, distinguished. McGregor *v.* Keiller *et al*, 9 O.R., 677.

SURVEYOR'S LIABILITY—PROVINCIAL LAND SURVEYOR—IMPROPER SURVEY—LIABILITY FOR DAMAGE.

Tp. of Stafford *vs.* Bell.

A surveyor in making a survey is under no statutory obligation to perform the duty, but undertakes it as a matter of contract, and is liable only for damages caused by want of reasonable skill, or by gross negligence. The

defendant, a provincial land surveyor, who was employed by the plaintiffs to run certain lines for road allowances, proceeded upon a wrong principle in making the survey, and the plaintiffs sued him for damages which they had paid to persons encroached upon by opening the road according to his survey.

Held, reversing the judgment of the Common Pleas, 31 C.P., 77, that the plaintiffs could not recover, as although the survey was made by the defendant on an erroneous principle, the evidence failed to prove that the lines as run by him were not correct.

Quære, per Patterson, J. A., whether the fact that the plaintiffs knew that the correctness of the survey was questioned before opening the road did not make them guilty of contributory negligence.

Remarks upon the impropriety of receiving the opinions of surveyors as experts as to the proper mode of making a survey under a statute. The Corporation of the Township of Stafford *v.* Bell, 6 A.R., 273.

SURVEYOR'S WITNESS FEES, TAXATION OF—COSTS—PROCURING EVIDENCE—TAXATION—LOCAL MASTER—FEES.

McGannon *vs.* Clarke.

Expense incurred for surveys and other special work of that nature made in order to qualify witnesses (surveyors) to give evidence are not taxable between party and party, the English Chancery Order 120 (1845) not being in force here.

The taxing officer refused to allow charges for maps prepared to identify the details of the line mentioned in the judgment as that which the judge considered the true line, and also for a certificate of the state of the cause, for a letter advising of judgment, and for instructions on motion for judgment.

Held, that there being no error in principle, but only an exercise of discretion by the taxing officer, the Court would not interfere with his ruling.

Held, also, that the Local Masters, who are paid by fees instead of salary, are entitled to charge one dollar per hour in money under Chancery Tariff of 23rd March, 1875, when taxing costs. (June 18th, 1883.—Boyd, C.) McGannon *v.* Clarke, 9 P.R., 555.

UNSKILFUL SURVEY—COMPENSATION FOR IMPROVEMENTS UNDER R.S.O., CH. 51, SS. 29, 30.

Plumb *vs.* Steinhoff.

Where S., having purchased a lot of land, employed a public land surveyor to mark out the boundaries of it for him and the surveyor, by reason of an unskilful survey,

included in the lot, as marked out by him, land which should not have been so included, and S., misled thereby, effected improvements upon the land so erroneously included.

Held, on recovery of the said land by the rightful owner that S. was entitled to compensation for the said improvements under R S.O., ch. 51, ss. 29, 30. Plumb *v.* Steinhoff, 2 O.R., 614.

INDEX TO HEAD NOTES OF REPORTED LAND CASES.

LIST OF OFFICERS OF THE ASSOCIA SURVEYORS

1886 TO 1892 (BEFORE

OFFICERS.	1886-7.	1887-8.	1888-9.
President	Geo. B. Kirkpatrick	Geo. B. Kirkpatrick	A. Niven .....
Vice-President	John Galbraith.....	John Galbraith.....	Villiers Sankey....
Secretary-Treasurer	Willis Chipman....	Willis Chipman....	Willis Chipman....
Councillors	M. J. Butler.....	M. J. Butler	John McAree .....
	E. Stewart.....	Villiers Sankey.....	H. B. Proudfoot....
	Villiers Sankey.....	P. S. Gibson	W. R. Aylsworth ..

1892 TO 1897 (SINCE

OFFICERS.	1892-3.	1893-4.	1894-5.
President.....	E Stewart	E. Stewart.....	M. J. Butler .....
Vice-President	M. J. Butler	M. J. Butler	M. Gaviller.....
Secretary-Treasurer	A. J. VanNostrand .	A. J. VanNostrand .	A. J. VanNostrand .
Members of Council.	Hon. A. S Hardy..	Hon. A. S. Hardy..	Hon. A S. Hardy..
	P. S. Gibson	Geo. B. Kirkpatrick	Villiers Sankey*....
	M. Gaviller.....	A. Niven	Herbert J. Bowman.
	John McAree	P S Gibson	Geo. B. Kirkpatrick
	Villiers Sankey*....	M. Gaviller.....	A. Niven .....
	A. Niven	J. McAree	P. S Gibson.....
	Geo. B. Kirkpatrick	Villiers Sankey*....	Willis Chipman....

* Chairman

TION FORMED IN 1886 BY THE LAND OF ONTARIO.

INCORPORATION).

1889-90.	1890-1.	1891-2.	1892 (to 1st July).
A. Niven	Villiers Sankey.....	Villiers Sankey.....	E. Stewart.
Villiers Sankey.....	E. Stewart.....	E. Stewart.....	M. J. Butler.
Willis Chipman	A. J. VanNostrand .	A. J. VanNostrand..	A. J. VanNostrand.
E. Stewart.....	H. B. Proudfoot....	M. J. Butler	John McAree.
John McAree	M. Gaviller.....	H. B. Proudfoot ...	M. Gaviller.
P. S. Gibson.....	T. H. Jones.....	M. Gaviller.....	P. S. Gibson.

INCORPORATION).

1895 6.	1896-7.
M. Gaviller.....	Willis Chipman....
Willis Chipman	T. Harry Jones ...
A. J. VanNostrand .	A. J. VanNostrand .
Hon. A. S. Hardy..	Hon. A. S. Hardy..
P. S. Gibson	Geo. B. Kirkpatrick
F. L. Foster	A. Niven .....
Villiers Sankey*....	P. S. Gibson .....
Herbert J. Bowman	F. L. Foster .....
Geo. B. Kirkpatrick	Villiers Sankey*....
A. Niven	Herbert J. Bowman

of Council.

LIST OF MEMBERS.

15th August, 1896.

The names of those members granted exemption by By-laws ratified by the Association are marked*.
The names of those granted exemption by By-laws passed by Council since the annual meeting are marked†

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Abrey, George Brockitt, Toronto Junction D.L.S., Town Engineer.	10th Jan., 1860
Allan, John Richard, Renfrew Grad. S.P.S.	6th Nov., 1894
Aylsworth, Charles Fraser, Sr., Madoc D.L.S.	2nd April, 1861
Aylsworth, Charles Fraser, Jr., Madoc	8th Jan., 1886
Aylsworth, John Sidney, Selby, P. O. Box 23 D.L.S.	9th Jan., 1871
Aylsworth, William Robert, Belleville, P.O. Box 2 D.L.S.	8th Nov., 1861
Baird, Alexander, Leamington D.L.S.	7th July, 1877
Barrow, Ernest George, Hamilton D.L.S., M.C.S.C.E., Assistant City Engineer.	4th Oct., 1877
Bazett, Edward, Burk's Falls D.L.S.	8th July, 1881
Beatty, David, Parry Sound D.L.S.	12th July, 1869
Beatty, Herbert John, Eganville Grad. S.P.S.	8th Nov., 1893
Beatty, Walter, Delta D.L.S., M.P.P.	19th July, 1858
Bell, Andrew, Almonte D.L.S.	6th Oct., 1866
Bell, James Anthony, St. Thomas D.L.S., Co. Engineer, Elgin; City Engineer St. Thomas.	11th Oct., 1875
Bigger, Charles Albert, Ottawa, 68 Daly Ave	6th Jan., 1882
Bolger, Thomas Oliver, Kingston D.L.S., City Engineer.	6th July, 1865
Bolton, Ellsworth Doan, Listowel B.A.Sc. (McGill).	7th Nov., 1895

NAME AND P.O. ADDRESS. DATE OF ADMISSION BY BOARD.

Bolton, Jesse Nunn, Toronto, 264 Major st..... 6th April, 1867
D.L.S.

Bolton, Lewis, Listowel..... 9th July, 1864
D.L.S.

Booth, Charles Edward Stuart, Kingston,
196 Colborne st ..... 6th April, 1882

Bowman, Clemens Dersteine, West Montrose..... 10th July, 1879

Bowman, Herbert Joseph, Berlin..... 7th Oct., 1886
Grad. S.P.S., Town Engineer.

Bray, Edgar, Oakville..... ..... 6th Oct., 1866
D.L.S.

Bray, Harry Freeman, Oakville ..... 10th July, 1882

Bray Samuel, Ottawa, Dept. of Ind'n Affairs..... 6th Jan., 1877
C.E., D.L.S.

Brown, David Rose, Cornwall..... 10th Oct., 1850
D.L.S.

*Brown, John Smith, Kemptville ..... 8th July, 1852
D.L.S.

Browne, Harry John, Toronto, 17 Toronto st.....6th July, 1872
D.L.S., C.E.

Browne, William Albert, Toronto, 17 Toronto st...10th April, 1876

Burke, William Robert, Ingersoll..... 5th April, 1878
D.L.S.

Burt, Frederick Percy, New York, N.Y..... 8th July, 1885
Manager and Treasurer Eng. News Pub. Co., Tribune Building.

Butler, Matthew Joseph, Napanee, P O Box 359... 11th Jan., 1878
M.I.C.E., M.A.S.C.E., M.C.S.C.E., C.E.

Byrne, Thomas, Sault Ste. Marie..... 15th July, 1862
D.L.S.

Caddy, Cyprian Francis, Campbellford.....10th July, 1860
D.L.S.

*Caddy, Edward C., Cobourg..... 18th Dec., 1846
D.L.S.

Caddy, John St. Vincent, Ottawa, 559 King st..... 6th Oct., 1866
D.L.S.

Cameron, Alfred John, Peterborough..... 9th April, 1889

Campbell, Archibald William, St. Thomas..... 10th April, 1885
Provincial Instructor in Road Making.

Carre, Henry, Belleville, P.O. Box 203..... 8th Nov., 1861
City Engineer, B.A. and C.E. (Trin. Coll., Dublin), D.L.S.

NAME AND P.O. ADDRESS. DATE OF ADMISSION BY BOARD.

Carroll, Cyrus, Hamilton, 6½ James st s..... 10th Jan., 1860
M.C.S.C.E., D.L.S.

Casgrain, Joseph Philippe Bâby. Morrisburg..... 5th Jan., 1887
D.L.S., P.L.S. (Que.), C.E., A.M.C.S.C.E.

Cavana, Allan George, Orillia..... 8th July, 1876
D.L.S.

Chalmers, John, Owen Sound, 15 Melville st..... 14th April, 1896
Grad. S.P.S.

Charlesworth, Lionel Clare, Collingwood..... 14th April, 1896
Grad. S.P.C.

*Cheesman, Thomas, Mitchell..... 11th July, 1856
D.L.S.

CHIPMAN, WILLIS, Toronto, 103 Bay st..... 4th Oct., 1881
President of Association O.L.S., B.A.Sc. (McGill), M.A.S.C.E., M.C.S.C.E.

Coad, Richard, Glencoe..... 8th Oct., 1879
D.L.S.

Code, Abraham Silas, Alvinston..... 14th April, 1896

Cozens, Joseph, Sault Ste. Marie..... 7th July, 1875
D.L.S.

Creswicke, Henry, Barrie..... 8th July, 1864
D.L.S.

*Cromwell, Joseph Miller Oliver, Perth..... 1st Oct., 1846
D.L.S.

*Davidson, Alexander, Arkona..... 11th Oct., 1858
D.L.S.

Davidson, Walter Stanley, Arkona..... 9th April, 1884

Davis, Allan Ross, Napanee..... 8th Jan., 1886
B.A.Sc. (McGill).

Davis, John, Alton..... 5th April, 1878

Davis, William Mahlon, Woodstock..... 11th April, 1885
Grad. R. M. Coll.

Deacon, Thomas Russ, Rat Portage..... 12th Nov., 1892
Grad. S.P.S., Town Engineer.

*Deane, Michael, Windsor..... 26th May, 1848
D.L.S.

Deans, William James, Oshawa..... 11th July, 1884

DeGurse, Joseph, Windsor, P.O. Box 167..... 5th April, 1883
Chief Eng., L.E. & D.R.R.

DeMorest, Richard Watson, Sudbury..... 9th April, 1889
M.E.

Dickson, James, Fenelon Falls..... 6th April, 1867
D.L.S., Ins. of Crown Land Surveys.

NAME AND P.O. ADDRESS. DATE OF ADMISSION BY BOARD.

Dobbie, Thomas William, Tilsonburg ..... 11th July, 1856
D.L.S.

Doupe, Joseph, Winnipeg, Man., 194 McDermot Ave., 13th Jan , 1863
D.L.S., P.L.S. (Man.), C.E. (McGill).

Ellis, Henry Disney, Toronto, City Hall..... 7th April. 1877
D.L.S., Eng. in charge of Roadways.

Esten, Henry Lionel, Toronto, 157 Bay st..... 7th Jan., 1887

Evans, John Dunlop, Trenton..... ..... 8th July, 1864
D.L.S., Chief Eng., Cent. Ont. Ry.

Fair, John, Brantford..... 13th April, 1875

Fairbairn, Richard Purdom, Toronto, 127 Major st., 7th Oct.. 1876
Surveyor for Dept. of Pub. Works.

Fairchild, Charles Court, Simcoe..... ..... 9th April, 1894
Grad. S.P.S.

Farncomb, Alfred Ernest, London, 213 Dundas st., 9th April, 1895

Farncomb, Frederick William, London,
213 Dundas st..... 6th, Nov. 1889

Fawcett, Thomas, Ottawa, Dept. of Interior..... 6th Jan., 1881
Dom. Topographical Surveyor.

Fitton, Charles Edward, Orillia, Drawer 31..... 10th April, 1879
D.L.S.

FitzGerald, James William, Peterborough, Box 333, 13th July, 1857
D.L.S.

Flater, Frederick William, Chatham..... 9th April, 1888

Foster, Frederick Lucas, Toronto, 157 Bay st..... 9th April, 1863
D.L.S.

Francis, John James, Sarnia, P.O. Box 304..... 16th Oct., 1861
D.L.S.

*Fraser, Charles, Wallaceburg..... 5th Aug., 1847
D.L.S.

Galbraith William, Bracebridge ..... 4th April, 1883
D.L.S.

Gamble, Killaly, Toronto, 193 Bloor st. e ..... 6th April, 1888
D.L.S., P.L.S. (Man.), Captain R.A.

Gardiner, Edward, St. Catharines..... 6th Jan., 1866
D.L.S.

Gaviller, Maurice, Collingwood, Box 773..... 6th Jan., 1866
C.E. (McGill), D.L.S.

Gibbons, James, Renfrew..... 15th April, 1890
Grad. S.P.S.

NAME AND P.O. ADDRESS. DATE OF ADMISSION BY BOARD.

Gibson, Harold Holmes, Willowdale ..... 8th Sept., 1891

*Gibson, James Alexander, Oshawa ..... 7th April, 1855
D.L.S.

Gibson, Peter Silas, Willowdale ..... 19th July, 1858
C.E., M.S. (Mich. Univ.), D.L.S., M.C.S.C.E., Engineer Tp. of York.

Gilliland, Thomas Brown, Eugenia ..... 11th July, 1868
D.L.S.

Gillon, Douglas John, Fort Frances ..... 9th Nov., 1895
Grad. R.I.E.C.

Graydon, Aquila Ormsby, London ..... 8th July, 1880
City Engineer.

Green, Thomas Daniel, Ottawa, Dept. of Indian Affairs ..... 7th Jan., 1885
D.L.S.

Griffin, Albert Dyke, Woodstock, P.O. Box 612 .... 11th Nov., 1890

Hanning, Clement George, Preston, Lock Box 130 .. 19th July, 1858
D.L.S., C.E., (Trin. Coll., Dublin).

Hart, Milner, Toronto, 103 Bay st ..... 11th July, 1863
D.L.S.

Harvey, Thomas Alexander, London, 1 Oxford st .. 13th Nov., 1893

Henderson, Eder Eli, Henderson P.O., Maine ..... 7th April, 1887
Grad. S.P.S.

Henry, Frederick, London, Albion Building ..... 7th April, 1887

*Hermon, Royal Wilkinson, Rednersville ..... 13th July, 1857
D.L.S.

Hewson, Thomas Ringwood, Hamilton, 42 James st. n ..... 6th July, 1877
D.L.S.

Hobson, Joseph, Montreal, G. T. Ry. Office ..... 3rd Oct., 1855
D.L.S., Chief Eng. Grand Trunk Railway System.

Hopkins, Marshall Willard, Hamilton, 28 James st. s., 13th Nov., 1893
B.A. Sc. (McGill), A.M.C.S.C.E., Chief Eng. I.R.R. Co.

Hutcheon, James, Guelph ..... 10th Nov., 1891
Grad. S.P.S.

Innes, William Livingstone, Peterborough, 372½ Water st ..... 14th April, 1892
C.E. (Toronto Univ.)

James, Silas, Toronto, 72 Victoria st ..... 19th July, 1858
D.L.S.

Johnson, Robert Thornton, Toronto, 131 Wellington st w ..... 9th April, 1889

NAME AND P.O. ADDRESS. DATE OF ADMISSION BY BOARD.

Jones, Charles Albert, Petrolea ..... 8th April, 1881
D.L.S.

Jones, John Henry, Sarnia ..... 10th Oct., 1863
D.L.S.

Jones, Thomas Henry, Brantford ..... 10th Oct., 1878
City Engineer, B.A.Sc. (McGill).

*Keefer, Thomas Coltrin, Ottawa ..... 14th Aug., 1840
D.L.S., C.E.

Kennedy, James Henry, St. Thomas, P.O. Box 434, 7th April, 1887
C.E. (Tor. Univ.), M.C.S.C.E

Kippax, Hargreaves, Huron, South Dakota ..... 7th July, 1877
C.E. (Tor. Univ.), Assistant to Surveyor-General

*Kirk, Joseph, Stratford, P.O. Box 373 ..... 16th Feb., 1843
D.L.S.

Kirkpatrick, George Brownly, Toronto,
Dept. of Crown Lands ..... 13th April, 1863
D.L.S., Director of Surveys.

Klotz, Otto Julius, Ottawa, 437 Albert st ..... 6th Jan., 1876
C.E. (Mich. Univ.), Dom. Topographical Surveyor.

Laird, James Steward, Essex ..... 6th April, 1867
D.L.S.

Laird, Robert, Toronto, 14 Russell st ..... 11th Nov., 1887
Grad. S.P.S.

Lewis, John Bower, Ottawa, Brunswick House. .... 4th Oct., 1883
D.L.S.

Lougheed, Aaron, Port Arthur ..... 12th Nov., 1888
D.L.S.

*Low, Nathaniel Edward, Wiarton ..... 11th July, 1856
D.L.S.

Lumsden, Hugh David, Toronto, 63 Homewood ave...4th Jan, 1866
D.L.S., M.I.C.E., M.C.S.C.E.

*Lynch-Staunton, Francis Hardwick, Hamilton .... 11th Oct., 1856
D.L.S.

Macdougall, Allan Hay, Port Arthur ..... 11th April, 1859
D.L.S.

Mackenzie, William, Sarnia, 30 Vidal st ..... 11th April, 1896
Grad. R.M.C.

MacKenzie, William Lyon, Vankleek Hill ..... 7th April, 1887
Asst. Eng. M. and O. Ry.

MacNabb, John Chisholm, Mobile, Ala.,
106 St. Louis street ..... 8th Jan., 1880
C.E.

MacPherson, Duncan, Montreal ..... 9th Jan., 1884
Eng. Dept. C.P.Ry.

NAME AND P.O. ADDRESS. DATE OF ADMISSION BY BOARD.

McAree, John, Rat Portage ..... 6th April, 1867
Dom. Topographical Surveyor, B A.Sc. (Toronto).

*McCallum, James, Fort Frances ..... 30th Mar., 1849
D.L.S.

McCubbin, George Albert, St. Thomas, Box 423 .... 9th Nov., 1895

McCulloch, Andrew Lake, Galt ..... 10th Nov., 1888
Grad. S.P.S., A.M.C.S.C.E.

McDonell, Augustine, Chatham,
4 & 5 Ebert's Block ..... 11th July, 1863
D.L.S.

McDowall, Robert, Owen Sound ..... 11th Nov., 1890
Town Engineer, Grad. S.P.S.

McEvoy, Henry Robinson, St. Marys ..... 10th July, 1875
D.L.S.

McFarlen, George Walter, Toronto, Court House... 11th Nov., 1889
Grad. S.P.S.

McGeorge, William Graham, Chatham,
5 Sandwich st. w..... 8th Jan., 1866
D.L.S.

McGrandle, Hugh, Huntsville ..... 5th Jan., 1883

McKay, Owen, Windsor, P.O. Box 167..... 7th Jan., 1887
Grad. S.P.S.

McKenna, John Joseph, Dublin..... 9th July, 1860

McLatchie, John, Ottawa, 28 Stanley ave..... 9th Jan., 1864
D.L.S., P.L.S. (Que. & Man.)

McLean, James Keachie, Elora ..... 8th April, 1876
D.L.S.

McLennan, Murdoch John, Williamstown..... 13th Nov., 1893
B.A.Sc. (McGill).

McLennan, Roderick, Toronto, 115 Avenue rd .... 20th June, 1846
D.L.S.

McMullen, William Ernest, St. John, N.B..... 11th Nov., 1892
Assistant Engineer, C.P.R.

McNab, John Duncan, Owen Sound ..... 9th Oct., 1879

McPhillips, George, Windsor, P.O. Box 556 ..... 9th July, 1885
D.L.S., P.L.S. (Man.)

Malcolm, Sherman, Blenheim ..... 11th Oct., 1858
D.L.S.

Manigault, William Mazyck, Strathroy,
P.O. Box 300..... 8th July, 1876
D.L.S.

Marshall, James, Holyrood..... 6th Oct., 1866
D.L.S.

NAME AND P.O. ADDRESS. DATE OF ADMISSION BY BOARD.

Miles, Charles Falconer, Toronto, 244 Bloor st. w... 13th Jan., 1862
D.L.S.

Moore, John Mackenzie, London, Albion Building....9th Oct., 1879

Moore, John Harrison, Smith's Falls ..... 11th Nov., 1889
Grad. S.P.S.

Moore, Thomas Alexander, London South..... 12th Nov., 1892

Morris, James Lewis, Pembroke ..... 7th July, 1886
D.L.S., C.E. (Toronto Univ.)

Mountain, George Alphonse, Ottawa..... 9th Jan, 1884
M.C.S.C.E., D.L.S., P.L.S. (Que.)

Murdoch, William, Rat Portage..... 10th Jan., 1860
D.L.S., C.E.

Murphy, Charles Joseph, Toronto, 157 Bay st..... 6th Oct., 1886

Newman, William, Windsor, 57 Sandwich st. w.....12 Nov., 1892
Grad. S.P.S.

Niven, Alexander, Haliburton..... .....8th July, 1859
D.L.S.

Ogilvie, John Henry, West Superior, Wis.,
1810½ Tower av..... 8th April, 1876
D.L.S.

Ogilvie, William, Juneau, Alaska, U.S..... 12th July, 1869
D.L.S.

O'Hara, Walter Francis, Chatham..... 14th April, 1892
D.L.S.

Paterson, James Allison, Toronto, 23 Adelaide st. e., 5th April, 1878
C.E.

Patten, Thaddeus James, Little Current..... 5th Jan., 1883

Pedder, James Robert, Doon..... 10th Nov., 1891
Grad. S.P.S.

Peterson, Peter Alexander, Montreal, P.Q..... 16th July, 1863
Chief Engineer Can. Pac. Ry.

Pinhey, Charles Herbert, Coteau Landing, P.Q..... 12th Nov., 1888
D.L.S., Grad. S.P.S., A.M.C.S.C.E.

Proudfoot, Hume Blake, Toronto, 33 Tranby ave..... 6th Jan., 1882
D.L.S., C.E. (Toronto Univ.)

Purvis, Frank, Eganville ..... 7th April, 1875
D.L.S.

Rainboth, Edward Joseph, Ottawa..... 11th Nov., 1887
D.L.S.

NAME AND P.O. ADDRESS. DATE OF ADMISSION BY BOARD.

Rainboth, George Charles, Aylmer, Que. ..... 11th July, 1868
D.L.S., P.L.S. (Que.)

Ritchie, Nelson Thomas, Kincardine ..... 9th Nov., 1888

Roberts, Vaughan Maurice, St. Catharines ..... 5th April, 1887

Robertson, James, Glencoe ..... 11th July, 1885
Grad. S.P.S.

Roger, John, Mitchell ..... 10th Nov., 1888
Grad. S.P.S.

†Rombough, William R., Durham ..... 14th Nov., 1848
D.L.S.

Rorke, Louis Valentine, Sudbury ..... 14th April, 1890
D.L.S.

Ross, George, Welland ..... 10th July, 1879
B.A.Sc. (McGill).

*Rubidge, Tom S., Cornwall ..... 9th Feb., 1849
D.L.S., Asst. Eng. Dep. Rys. and Canals.

Russell, Alexander Lord, Port Arthur ..... 16th April, 1873
D.L.S.

Sankey, Villiers, Toronto, City Hall ..... 11th Jan., 1878
D.L.S., City Surveyor.

Saunders, Bryce Johnston, Brockville, P.O. Box 114..7th Jan., 1885
B.A.Sc. (McGill), D.L.S.

Scane, Thomas, Ridgetown ..... 7th Jan., 1865
D.L.S.

*Schofield, Milton C., Guelph ..... 28th Sept., 1843
D.L.S.

Seager, Edmund, Fort Frances ..... 8th July, 1861
D.L.S.

Selby, Henry Walter, Toronto, 21 Lippincott st .... 8th Jan., 1876
D.L.S.

Sewell, Henry DeQuincy, Toronto, 29 St. Mary st., and Port Arthur; cable, "Quincy," Toronto ..... 9th July, 1885
D.L.S., A.M.I.C.E.

Sing, Josiah Gershom, Meaford ..... 9th Jan., 1879
D.L.S.

Smith, Angus, Ridgetown ..... 14th April, 1896
Grad. S.P.S.

Smith, George, Woodville, Box 77 ..... 7th April, 1881

Smith, Henry, Toronto, Crown Lands Dept. ..... 8th Nov., 1861
Supt. Colonization Roads, D.L.S., M.C.S.C.E.

Speight, Thomas Bailey, Toronto, Yonge St. Arcade, 6th Jan., 1882
D.L.S.

NAME AND P.O. ADDRESS. DATE OF ADMISSION BY BOARD.

Squire, Richard Herbert, Brantford, Box 160..... 14th April, 1896
B.A.Sc. (Toronto).

Steele, Edward Charles, Goderich, Box 169..... 9th April, 1889

Stewart, Elihu, Collingwood..... ..... 8th April, 1872
D.L.S.

Stewart, John, Montreal..... 11th Nov., 1887
D.L.S.

Stewart, Walter Edgar, Aylmer..... 12th April, 1892

*Strange, Henry, Rockwood ..... 30th Nov., 1838
D.L.S., C.E.

Tiernan, Joseph Martin, Tilbury Centre..... 7th Jan., 1886

Traynor, Isaac, Dundalk..... 16th April, 1873
D.L.S.

Turnbull, Thomas, Winnipeg, Man., C.P.R. Office.. 6th July, 1878
D.L.S., C.E. (Toronto Univ.)

Tyrrell, James Williams, Hamilton, 42 James st. n... 8th April, 1885
Co. Eng. for Wentworth, C.E. (Toronto Univ.), D.L.S.

†Unwin, Charles, Toronto, 157 Bay st..... 12th April, 1852
D.L.S.

Ure, Frederick John, Woodstock ..... 7th April, 1887
C.E.

VanBuskirk, William Fraser, Stratford..... 7th April, 1888
Grad. R.M. Coll.

VanNostrand, Arthur J., Toronto, Yonge St. Arcade..30th Oct., 1882
D.L.S.

Wadsworth, Vernon Bayley, Toronto, 103 Bay st....9th April, 1864
D.L.S.

Walker, Alfred Paverley, Toronto,
C.P.Ry, Eng. Office ..... 6th Jan., 1882
A.M.C.S.C.E.

Wallace, Charles Hugh, Hamilton, 206 Bay st. s....9th Nov., 1889

Warren, James, Walkerton, Box 190 ..... 7th Oct., 1864
D.L.S., A.M.C.S.C.E.

Watson, John McCormack, Orillia, P.O. Box 224...13th April, 1892

*Weatherald, Thomas, Goderich, P.O. Box 273.....12th Jan., 1856
D.L.S., C.E.

NAME AND P.O. ADDRESS. DATE OF ADMISSION BY BOARD.

West, Richard Francis, Orangeville ..... 7th April, 1881

*Wheelock, Charles John, Orangeville ..... 11th July, 1856
D.L.S.

Wheelock, Charles Richard, Orangeville ..... 7th Jan., 1886
Treasurer County of Dufferin.

Whitson, James Francis, Toronto,
Crown Lands Dept ..... 9th Jan., 1886

Wicksteed, Henry King, Cobourg ..... 7th Jan., 1886
D.L.S., C.E.

Wiggins, Thomas Henry, Cornwall ..... 10th Nov., 1891
Grad. S.P.S., D.L.S., Town Engineer.

Wilde, John Absalom, Sault Ste. Marie ..... 9th April, 1889

Wilkie, Edward Thomson, Carleton Place ..... 11th April, 1891
D.L.S.

Wilkins, Frederick William, Ottawa,
Dept. of Interior ..... 6th Jan., 1877
Dom. Topographical Surveyor.

Williams, David, Kingston ..... 9th April, 1864
D.L.S.

†Winter, Henry, Thornyhurst ..... 11th July, 1853
D.L.S., C.E.

*Wood, Henry O., Billings' Bridge ..... 10th Oct., 1855
D.L.S.

*Yarnold, William Edward, Port Perry,
P.O. Box 44 ..... 7th April, 1854
D.L.S.

REGISTERED AND WITHDRAWN.

The names of those who have become "Associates" under By-law No. 39 are marked *.

NAME AND P. O. ADDRESS. DATE OF ADMISSION BY BOARD.

Apsey, John Fletcher, Baltimore, Md.,
2125 N. Charles st ..... 6th Jan., 1886
Grad. S.P.S.

Blake, Frank Lever, Toronto,
Meteorological Office ..... 13th April, 1875
D.L.S.

NAME AND P.O. ADDRESS. DATE OF ADMISSION BY BOARD.

Bowman, Arthur Meyer, Mahan, Beaver Co., Pa.. 11th Nov., 1887
Grad. S.P.S., Staff of U.S. Engineers.

Bowman, Franklin Meyer, Bellevue,
Allegheny Co., Pa .....11th April, 1892
Grad. S.P.S., Engineer Structural Iron Works.

Brady James, Victoria, B.C., Box 815 ..... 15th July, 1862
M.E.

Burnet, Hugh, Victoria, B.C..... 5th April, 1887
P.L.S. (B.C.).

Cambie, Henry John, Vancouver, B.C..... 8th July, 1861
P.L.S. (B.C.).

Coleman, Richard Herbert, Toronto,
204 King st. e. .....6th Oct-, 1877

Drewry, William Stewart, Ottawa,
Dept. of Interior.....5th April, 1883

Ducker, William A., Winnipeg, Man.,
314 McWilliam st..... 6th April, 1882
D.L.S.

Edwards, George, Thurso, Que..... .....6th Jan., 1866

Fowlie, Albert, Orillia ..... 13th Jan., 1863
D.L.S.

Galbraith, John, Toronto, Sch. of Prac. Science....13th April, 1875
M.A., D.L.S., Prof. Engineering.

Gibson, George, St. Catharines..... ..... 10th April, 1860
D.L.S.

*Harris, John Walter, Winnipeg, Assm't Com. Dept ....6th Oct. 1866
P.L.S. (Man.), D.L.S.

Hermon, Ernest Bolton, Vancouver, B.C..... 7th Oct., 1885
P.L.S. (B.C.), D.L.S.

Irwin, James Moore, Peterborough..... 13th Jan., 1863
D.L.S.

James, Darrell Denman, Buffalo, N.Y.,
417 Nth. Division st..... 3rd Nov., 1891
B.A., B.A.Sc.

NAME AND P.O. ADDRESS. DATE OF ADMISSION BY BOARD.

Jephson, Richard Jermy, Calgary, Alta ..... 7th April, 1877
P.L.S. (B.C.), D.L.S.

Johnson, Sydney Munnings, Rossland, B.C..... 9th Nov., 1895
B.A.Sc. (Toronto).

Kains, Tom, Victoria, B.C..... ..... 11th July, 1873
Surveyor-General, B.C.

Lane, Andrew, Sparrow's Point, Md..... 4th April, 1895
Grad. S.P.S., Draftsman Maryland Steel Co.

Lendrum, RobertWatt, South Edmonton, Alta..... 8th Jan., 1874
D.L.S.

Livingstone, Thomas Chisholm, Winnipeg, Man.. 10th Jan., 1859
D.L.S.

MacLeod, Henry Augustus F., Ottawa,
340 Cooper st..... 11th Oct., 1856
C.E., D.L.S.

MacMillan, James Alexander, Calgary, Alta..... 6th Jan., 1877
P.L.S. (B.C.).

McFadden, Moses, Neepawa, Man..... 13th April, 1858
D.L.S.

Magrath, Charles Alexander, Lethbridge, Alta.....1st Nov., 1881
B.A.Sc. (McGill), D.L.S.

Morris, Alfred Edmund, Perth..... 10th April, 1879

Munro, John Vicar, New York, N.Y., 359 W. 31st st..9th April, 1895

Pearce, William, Calgary, Alta..... 12th Oct., 1872
Dom. Insp. of Mines.

Ponton, Archibald William, Regina, Assa.... ..... 9th April, 1880
D.L.S.

Pope, Robert Tyndall, Ireland..... 13th April, 1875
C.E., D.L.S.

Reid, James Hales, Bowmanville, Box 35..... 6th Oct., 1860
C.E., F.G.S.

Reiffenstein, James Henry, Ottawa, Dept. of Interior. 16th April, 1873
D.L.S.

Reilly, William Robinson, London, 361 Simcoe st...7th April, 1881
D.L.S., P.L.S. (Man.).

Rogers, Richard Birdsall, Peterborough .. .. 9th Jan., 1879
B.A.Sc. (McGill), D.L.S.

Ross, Joseph Edmund, New Westminster, B.C..... 11th Nov., 1890
P.L.S. (B.C.).

NAME AND P. O. ADDRESS. DATE OF ADMISSION BY BOARD.

Sanderson, Daniel Leavens, Coral, Mich.....4th Oct., 1882

Shaw, Charles Æneas, Victoria, B.C., P.O. Box 815..6th Oct., 1877

Sherman, Ruyter Stinson, Vancouver, B.C.....12th April, 1890
P.L.S. (B.C.).

*Silvester, George Ernest, Steelton, Pa..... 12th Nov., 1892
Grad. S.P.S., Draftsman Penn. Steel Co.

Simpson, George Albert, Winnipeg, Man.,
N. P. & M. R'y..... ..... 7th Oct., 1864
C.E., D.L.S.

Spry, William, Toronto.... ....19th July, 1858
C.E., D.L.S.

*Stewart, Louis Beaufort, Toronto,
Sch. of Prac. Science..... 6th April, 1882
Dom. Top. Surveyor, Lect. in Surveying.

Strathern, John, Vancouver, B.C..... 5th Oct., 1876
P.L.S. (B.C.), D.L.S.

Thomson, Augustus Clifford, Kansas City, Mo.....14th Jan., 1861
C.E., D.L.S.

Tracey, Thomas Henry, Vancouver, B.C..... 8th April, 1870
P.L.S. (B.C.), C.E., D.L.S.

Vicars, John Richard Odlum, Kamloops, B.C..... 5th Jan., 1887
P.L.S. (B.C.), D.L.S.

Weekes, Abel Seneca, Wetaskiwin, Alta..... 12th April, 1890
D.L.S.

Wheeler, Arthur Oliver, New Westminster, B.C..... 8th July, 1881
P.L.S. (B.C.), D.L.S.

Willson, Alfred, Toronto, 204 King st. e..... 6th Oct., 1866
D.L.S., Com. Canada Company.

SUMMARY.

Active members subject to dues.....	199
Active members exempted from dues.....	24
Withdrawn from practice (including Associates).....	52
Dead	7
Total number enrolled since incorporation.....	282

In Memoriam.

NAME.	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION.	DIED.
Bolger, Francis	Lindsay	10th October, 1863	1892	3rd November, 1895.
Bowman, Leander Meyer.	Toronto	14th April, 1892	1892	20th September, 1895.
Gibbs, Thomas Fraser	Adolphustown	31st May, 1841	1892	17th April, 1893.
Haskins, William	Hamilton	5th July, 1855	1892	5th July, 1896
Howitt, Alfred	Gourock	12th January, 1856	1892	6th May, 1896.
Robinson, William	London	— May, 1846	1892	11th October, 1894.
Walsh, Thomas William	Simcoe	25th April, 1842	1892	14th March, 1895.

GENERAL INDEX.

NOTE.—Asterisks (*) show that the article is illustrated.

A.

B.

C.

D.

E.

Q.

R.

S.

T.

U.

W.