PROCEEDINGS

OF THE

ASSOCIATION OF

ONTARIO LAND SURVEYORS

AT ITS FIRST ANNUAL MEETING, SINCE INCORPORATION,

HELD AT TORONTO, ON FEBRUARY 28TH,
MARCH 1ST AND 2ND,

1893

Being the Eighth Annual Meeting of the Association of Provincial Land Surveyors of Ontario.

AFFILIATED WITH ASSOCIATION OF DOMINION LAND SURVEYORS
AND ASSOCIATION OF PROVINCIAL LAND SURVEYORS
OF BRITISH COLUMBIA.

The Second Annual Meeting (Ninth Annual Meeting of the Association of Provincial Land Surveyors of Ontario) will be held in Toronto, on Tuesday, 27th of February, 1894.

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

F. I. COLMAN, *President.* PERCY C. HAMILTON, *Sec'y-Treas.* LOUIS BACQUE, *Sales Agent*

— THE —

COLMAN-HAMILTON CO.

[LIMITED]

WORKS: NEW LISBON OHIO. MINES: COLUMBIA CO., OHIO.

MANUFACTURERS OF

PIPE SEWER WATER CULVERT PIPE

VITRIFIED PAVING BRICK

For Gas Works, Retort Houses, Furnace Rooms, Street Pavements, Coach Houses, Stables, Factory Yards, Furnace Rooms, etc.

Fire Proofing, Fire Brick, Fire Clay, and all Fire Clay Products

---

ANNUAL CAPACITY 10,000 CARS

OFFICE AND YARDS:

44 Price Street, Toronto

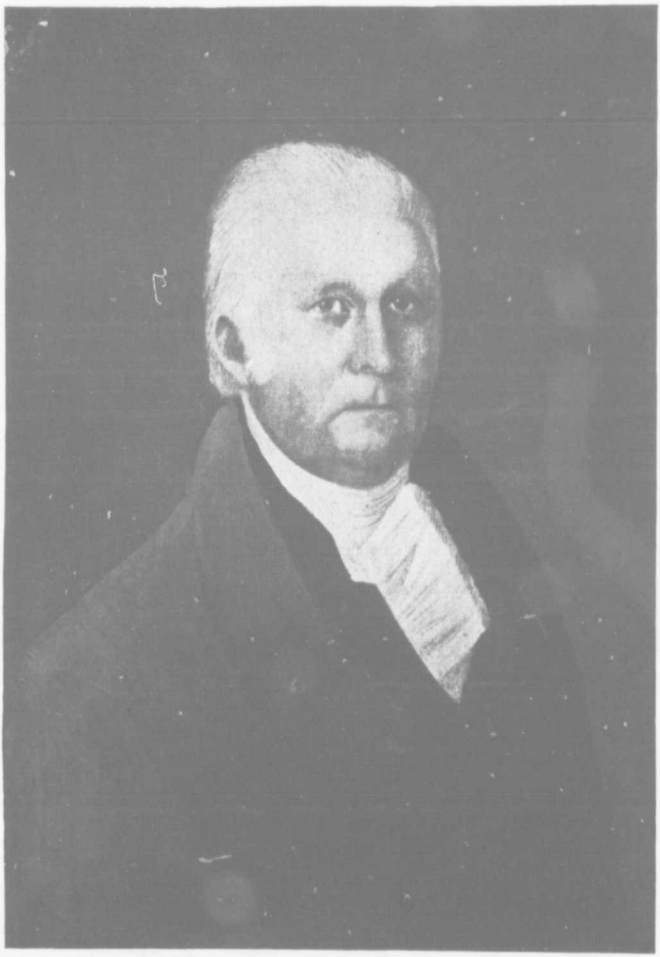
Telephone 3763.

AGENTS FOR

THE UNITED STATES FIRE CLAY CO.

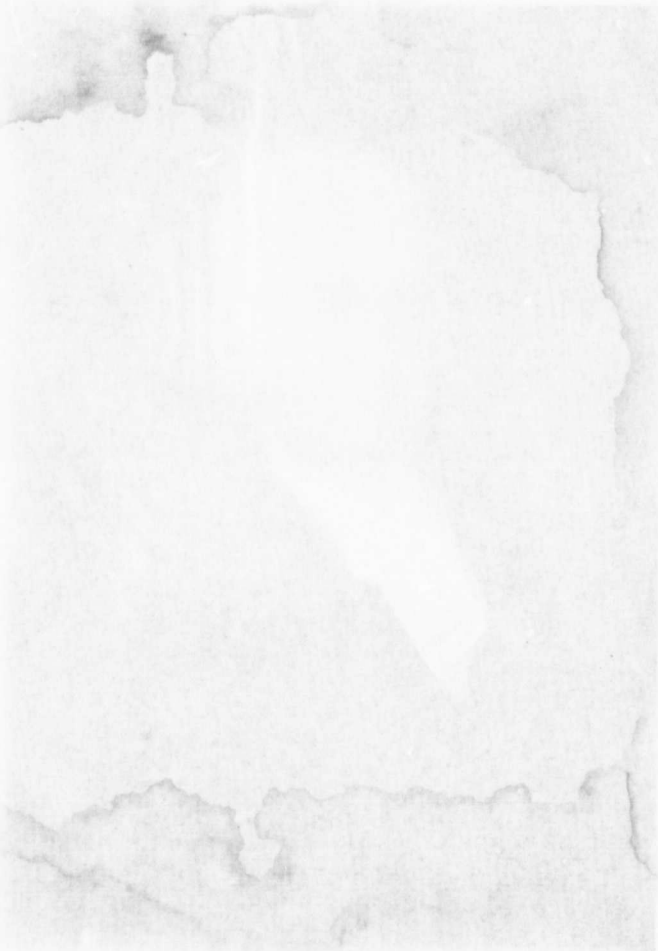
THE OHIO SEWER PIPE CO.

THE PIONEER FIRE-PROOF CONSTRUCTION CO., CHICAGO, ILL.



THOMAS RIDOUT,

Surveyor General of Upper Canada in 1810.



PROCEEDINGS

OF THE

ASSOCIATION OF

ONTARIO LAND SURVEYORS

AT ITS FIRST ANNUAL MEETING, SINCE INCORPORATION,

HELD AT TORONTO, ON FEBRUARY 28TH,
MARCH 1ST AND 2ND,

1893

Being the Eighth Annual Meeting of the Association of Provincial Land Surveyors of Ontario

---

AFFILIATED WITH ASSOCIATION OF DOMINION LAND SURVEYORS
AND ASSOCIATION OF PROVINCIAL LAND SURVEYORS
OF BRITISH COLUMBIA.

The Second Annual Meeting (Ninth Annual Meeting of the Association of Provincial Land Surveyors of Ontario) will be held in Toronto, on Tuesday, 27th of February, 1894.

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

PATRONIZE OUR ADVERTISERS.

NOTICES.

The attention of the members is called to the list of Standing Committees as given on page 6. Each member should assist the Standing Committees as much as possible.

Members can be supplied with copies of the Proceedings for 1887, 1888, 1889, 1890, 1891, or 1892 by remitting fifty cents to the Secretary.

Copies of the Ontario Land Surveyors' Act, and By-Laws of the Association will be sent upon receipt of three-cent stamp.

PATRONIZE OUR ADVERTISERS.

PREFACE.

To the Members of the Association of Ontario Land Surveyors:

The Proceedings of the Association at its first Annual Meeting since incorporation, are herewith presented.

Appended will be found the By-Laws of the Association, and Regulations of the Board of Examiners.

The attendance at this meeting was larger than at any previous one, and much interest was manifested in the discussions.

Affiliation with The Association of Dominion Land Surveyors, and The Association of Provincial Land Surveyors of British Columbia has been accomplished, and it is hoped that much benefit may result from the union of interests of representatives of our profession in the various parts of the Dominion.

The result of the Election of Officers leaves the *personnel* of the Council of Management the same as that of last year.

Each member is requested to exert himself personally to forward the interests of the Association in any direction within his power, and it is particularly desired, that the matter of contribution to the programme for our next Annual Meeting, be kept in view during the year.

Respectfully submitted on behalf of the Council.

A. J. VANNOSTRAND,
Secretary.

CONTENTS.

ASSOCIATION OF

ONTARIO LAND SURVEYORS

[INCORPORATED 1892].

ORGANIZED 23RD FEBRUARY, 1886.

Officers for 1893-94.

PRESIDENT.

Elihu Stewart, O.L.S., Collingwood.

VICE-PRESIDENT.

M. J. Butler, O.L.S., Napanee.

SECRETARY-TREASURER.

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

COUNCILLORS.

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

G. B. Kirkpatrick, O.L.S., Toronto
A. Niven, O.L.S., Haliburton } For 3 years.

P. S. Gibson, Willowdale
M. Gaviller, Barrie } For 2 years.

J. McAree, Toronto
V. Sankey, Toronto } For 1 year.

AUDITORS.

Willis Chipman, C.E., Toronto.
H. Proudfoot, C.E., Toronto.

BANKERS.

Imperial Bank of Canada.

BOARD OF EXAMINERS.

V. Sankey, Toronto (Chairman).
M. J. Butler, Napanee } Appointed by Lieut.-Gov.
G. B. Kirkpatrick, Toronto } in Council.
P. S. Gibson, Willowdale }
A. Niven, Haliburton } Appointed by Council.
R. Coad, Glencoe }
M. Gaviller, Barrie }

STANDING COMMITTEES.

LAND SURVEYING.—M. Gaviller (Chairman), H. J. Browne, T. B. Speight, J. M. Tiernan, L. V. Rorke, J. L. Morris, B. J. Saunders.

DRAINAGE.—H. J. Bowman (Chairman), J. C. MacNabb, R. Coad, R McDowall, H. Winter, J. Robertson, W. R. Burke, Geo. Ross, C. A. Jones, A. G. Cavana, Alex. Baird, C. F. Miles.

ENGINEERING.—G. B. Abrey (Chairman), C. F. Aylsworth, Jr., O. McKay, Jno. McAree, T. H. Jones, J. W. Tyrrell, H. K. Wicksteed, A. W. Campbell.

ENTERTAINMENT.—F. L. Foster (Chairman), Chas. Murphy, H. D. Ellis, T. B. Speight, A. P. Walker, H. B. Proudfoot, W. A. Browne.

PUBLICATION.—H. L. Esten (Chairman), H. J. Browne, F. L. Foster, Chas. Murphy, J. McAree, K. Gamble.

TOPOGRAPHICAL SURVEYING.—Willis Chipman (Chairman), T. Fawcett, J. Dickson, J. P. B. Casgrain, A. L. Russell, J. Cozens, W. Ogilvie.

PROGRAMME OF THE

Association of Ontario Land Surveyors

(INCORPORATED)

AT ITS FIRST ANNUAL MEETING HELD IN TORONTO,
FEBRUARY 28TH AND MARCH 1ST AND 2ND, 1893.

PROGRAMME.

Tuesday, February 28th—Morning, 10 o'clock.

Meeting of Council.
Meeting of Standing Committees.

Afternoon, 2 o'clock.

Report of Council of Management.
Report of Secretary-Treasurer
President's Address.
Report of Committee on Land Surveying, with "Question Drawer." M. Gaviller, O.L.S., Chairman.
Report of Committee on Engineering, with "Question Drawer." G. B. Abrey, O.L.S., C.E., Chairman.
Report of Auditors.

Evening, 8 o'clock.

Paper—"Geographical Surveying," L. B. Stewart, O.L.S., D. T. S., Toronto.
Paper—"History of Taché Gold Field," H. DeQ. Sewell, O.L.S., Port Arthur.
Paper—"Timber Surveys," J. F. Whitson, O.L.S., Collingwood.

Wednesday, March 1st—Morning, 10 o'clock.

Paper—"The Duties of a Surveyor on the Maintenance-of-Way Staff of a Railroad," W. L. Innes, O.L.S., London.
Paper—"Local Improvements," P. S. Gibson, O.L.S., C.E., Willowdale.
Ratification of By-Laws.
Volunteer Papers.

Afternoon, 2 o'clock.

Paper—"A Plea for a Topographical Survey," Willis Chipman, O.L.S., C.E., Brockville.

Paper—"Shall it be a Tile Drain?" H. J. Bowman, O.L.S., C. E., Berlin.

Paper—"The Mexican Amalgamation Progress," Samuel Bray, O.L.S., Ottawa.

Paper—"Permanent Street Pavements," J. W. Tyrrell, O.L.S., C.E., Hamilton.

Evening, 7.45 o'clock.

Annual dinner at the Arlington Hotel.

Thursday, March 2nd—Morning, 10 o'clock.

Paper—"Draughting," F. L. Foster, O.L.S., Toronto.

Report of Committee on Drainage, with "Question Drawer." J. C. Macnabb, O.L.S., C.E., Hamilton.

Paper—"The Transit and How to use It," Cyrus Carroll, O.L.S., C.E., Hamilton.

Paper—"Drainage Difficulties in the South Western Municipalities of Ontario," Henry Winter, O.L.S., C.E., Thornyhurst.

Afternoon, 2 o'clock.

Report of Committee on Legislation, James Dickson, O.L.S., Chairman.

Report of Committee on Publication, H. L. Esten, O.L.S., Chairman.

Report of Committee on Entertainment, F. L. Foster, O.L.S., Chairman.

Unfinished Business.

Nomination of Officers.

Appointment of Scrutineers—Ballot of 1893.

New Business.

Adjournment.

ASSOCIATION OF

ONTARIO LAND SURVEYORS

(INCORPORATED).

MINUTES OF THE FIRST ANNUAL MEETING

(Eighth Annual Meeting of Provincial Land Surveyors of Ontario.)

FEBRUARY 28TH, MARCH 1ST AND 2ND, 1893.

The Association met at 2 p.m. on Tuesday, the 28th of February, in the lecture room of the Canadian Institute, 58 Richmond Street East, Toronto.

The President, Mr. Elihu Stewart, in the chair.

Moved by Lewis Bolton, seconded by M. Gaviller: That the minutes of the last meeting of the Association of Provincial Land Surveyors of Ontario, as printed in the Proceedings, be confirmed as read. Carried.

The Secretary read letters from the following gentlemen: Mr. W. E. Yarnold of Port Perry, Mr. Gibbs of Adolphustown, Mr. Henry Creswicke of Barrie, Mr. F. W. Wilkins of Norwood, and Mr. Joseph Kirk of Stratford.

After some discussion as to matters referred to in the above letters, it was moved by P. S. Gibson, seconded by A. J. VanNostrand: That the communications as read be received and laid on the table for reference. Carried.

The Secretary-Treasurer, Mr. A. J. VanNostrand, read his Annual Report.

Moved by A. Niven, seconded by H. J. Bowman: That the report of the Secretary-Treasurer be received and adopted, and that the financial statement be handed to the auditors for their report. Carried.

The President then delivered his Annual Address.

The paper prepared by Mr. Bray on "The Mexican Amalgamation Process" was read by Mr. Tyrrell, Mr. Bray being unable to attend the meeting.

Moved by A. J. VanNostrand, seconded by James Dickson: That Mr. Bray's paper be received and adopted, and that the thanks of this meeting be tendered him for it. Carried.

The Report of the Committee on Drainage was then read by Mr. Lewis Bolton, in the absence of the Chairman, Mr. J. C. Macnabb, together with some questions sent in, which matters were laid over for future discussion.

Question No. 7, submitted to the Committee on Land Surveying for 1891, was taken up and discussed (diagram explaining in Proceedings of 1891), after which it was moved by J. L. Morris, seconded by L. V. Rorke: That question No. 7 submitted to the Land Surveying Committee of 1891 be referred to the Committee on Land Surveying, with the request that they give a finding and report thereon at the next annual meeting. Carried.

On motion of Mr. Bolton, seconded by Mr. Wilkie, the meeting adjourned at 5 15 p. m.

Tuesday Evening Session, 8 o'clock.

The President in the chair.

Mr. L. B. Stewart read his paper on "Geographical Surveying," after which he extended a cordial invitation to the members of the Association to pay a visit to the School of Practical Science during their stay in the city.

Moved by Mr. Kirkpatrick, seconded by Mr. Niven: That the thanks of the Association be given Mr. Stewart for the admirable paper read by him. Carried.

Mr. H. DeQ. Sewell read his paper entitled "History of Taché Gold Field."

Moved by Mr. Dickson, seconded by Mr. Miles: That a cordial vote of thanks be given Mr. Sewell for his very interesting paper. Carried.

A paper on "Timber Surveys" was then read by Mr. J. F. Whitson.

Moved by Mr. Niven, seconded by Mr. Dickson: That a vote of thanks be given Mr. Whitson for his paper. Carried.

The Report of the Council of Management was then presented by Mr. Villiers Sankey, Chairman of the Council. Mr. Sankey also referred to the case of members of the Council, who are not resident in Toronto, and who are put to considerable expense in attending the meetings other than the general annual meeting, and suggested that some steps be taken by the Association towards providing for the payment of hotel and travelling expenses of those members referred to.

On motion of Mr. Sankey, seconded by Mr. Niven: The report of the Council of Management was adopted.

A discussion took place on a matter introduced by Mr. Wilkie as to a proposed new plan for the town of Almonte.

On motion of Mr. Bolton, seconded by Mr. Wilkie, the meeting adjourned at 10.30 p.m.

WEDNESDAY MORNING SESSION, 10 O'CLOCK.

The President in the chair.

The paper prepared by Mr. W. L. Innes on "The Duties of a Surveyor on the Maintenance-of-Way Staff of a Railroad," was read by the Secretary, Mr. A. J. VanNostrand, Mr. Innes not being able to attend.

Moved by Mr. Wilkie, seconded by Mr. M. J. Butler: That the thanks of the Association be tendered Mr. Innes for his paper. Carried.

Mr. P. S. Gibson then read his paper on "Local Improvements."

Moved by Mr. Gaviller, seconded by Mr. Niven: That a vote of thanks be tendered Mr Gibson for his paper. Carried.

The report of the Committee on Land Surveying was submitted by Mr. M. Gaviller, Chairman of the Committee, with Question Drawer and answers of the Committee.

After discussion, on the motion of Mr. Gaviller, seconded by Mr. Dickson, the report was received and adopted.

The meeting then adjourned, it being 1 o'clock.

WEDNESDAY AFTERNOON SESSION, 2 O'CLOCK.

The President in the chair.

Mr. Willis Chipman read his paper on "A Plea for a Topographical Survey."

Moved by Mr Kirkpatrick, seconded by Mr. Butler: That a vote of thanks be tendered Mr. Chipman for his paper. Carried.

Mr. Allan Macdougall C.E., Secretary of the Canadian Institute, addressed the meeting, welcoming the members of the Association, to which the President suitably replied.

Mr. H. J. Bowman then read his paper on "Shall it be a Tile Drain?"

Moved by Mr. Tyrrell, seconded by Mr. McCulloch: That a vote of thanks be given Mr. Bowman for his paper. Carried.

The ratification of by-laws was then proceeded with, Mr. Sankey, Chairman of the Committee, reading them clause by clause, each one being carried separately.

Moved by Mr. Sankey, seconded by Mr. Gibson: That the by-laws that have just been carried, clause by clause, be carried now as a whole, and that the Council be authorized to have the same printed for circulation amongst the members Carried.

Mr. Tyrrell read his paper on "Permanent Street Pavements."

Moved by Mr. Butler, seconded by Mr. Abrey: That the paper be received and a vote of thanks given to Mr. Tyrrell. Carried.

On motion of Mr. Butler, seconded by Mr. VanNostrand, the meeting adjourned at 6 o'clock.

THURSDAY MORNING SESSION, 10 O'CLOCK.

The President in the chair.

Mr. F. L. Foster read his paper on "Draughting."

Moved by Mr. Niven, seconded by Mr. Morris: That a vote of thanks be given to Mr. Foster for his paper. Carried.

"The Transit and How to use it," a paper prepared by Mr. Carroll of Hamilton, was read by Mr. Tyrrell, owing to Mr. Carroll not being able to be present at the meeting.

Moved by Mr. Niven, seconded by Mr. Tyrrell: That Mr. Carroll's paper be received and the thanks of the Association tendered him for it. Carried.

Mr. Henry Winter read his paper on "Drainage Difficulties in the South-Western Municipalities of Ontario," with a diagram on the blackboard. The discussion on this paper was laid over till the afternoon.

The discussion on the report of the Drainage Committee, which was laid over on Tuesday afternoon, was then taken up, Mr. Bolton reading the report and questions sent in.

Moved by Mr. Bolton, seconded by Mr. Niven: That the Report of the Committee on Drainage be received and adopted. Carried.

The Report of the Committee on Engineering was presented by Mr. Abrey, Chairman of the Committee.

On motion of Mr. Abrey, seconded by Mr. Bowman, the report was adopted.

Report of the Committee on Legislation was read by Mr. James Dickson, Chairman of the Committee.

Moved by Mr. Dickson, seconded by Mr. Chipman: That the report be adopted. Carried.

Mr. F. L. Foster, Chairman of the Committee on Entertainment, moved, seconded by Mr. Dickson: That the report of that committee be taken as read. Carried.

On motion of Mr. Foster, seconded by Mr. Butler, the meeting adjourned at 12 45 p. m.

Thursday Afternoon Session.

The President in the chair.

The Report of the Auditors was read by the President.

Moved by Mr. Sewell, seconded by Mr. McAree: That the Auditors' Report with the financial statement be received and adopted. Carried.

The Report of the Committee on Publication was read by Mr. Esten, Chairman of the Committee, and on motion of Mr. Esten, seconded by Mr. Murphy, was adopted.

The following resolution was then passed: Moved by G. B. Abrey, seconded by A. Niven: That we have to regret the death of two of the members of this Association since our last annual meeting, viz: David Suter Campbell, of Mitchell, and Isaac Lucius Bowman, of Berlin. One of these, that of Mr. Campbell, occurred before the date of publication of our last report and was mentioned as an obituary notice there. We desire to convey to the members of their respective families this expression of our sympathy and sorrow in their bereavement, and request that copies of this motion be sent to them by the Secretary.

The matter of the remuneration of the officers of the Association for services rendered being taken up, it was moved by Mr. Dickson, seconded by Mr. Tyrrell: That the Secretary-Treasurer be paid the sum of $120 for his services during the past year. Carried.

Moved by Mr. Foster, seconded by Mr. Morris: That the members of the Council of the Ontario Land Surveyors be allowed all reasonable expenses, and $6 per day while in attendance in their capacity as Councillors at all meetings, except the general annual assembly of the Association.

Moved in amendment by Mr. H. J. Bowman, seconded by Mr. C. F. Miles: That the members of the Council be paid all reasonable expenses in coming to, attending and returning from Council meetings. No member, also a member of the Board of Examiners, to be paid railway fare when attending a meeting of the Board of Examiners at the same time.

After considerable discussion the amendment was carried by a vote of 12 to 6.

Moved by H. L. Esten, seconded by Charles J. Murphy: That any omissions or clerical errors in the record of the proceedings of this meeting, now in the hands of the stenographer and the Secretary, be corrected by the Committee on Publication before being printed. Carried.

Before taking up the matter of the nomination of officers for the ensuing year the meeting adjourned for ten minutes.

On re-assembling it was moved by Mr. Dickson, seconded by Mr. Jones: That Mr. Elihu Stewart be re-elected President for the ensuing year. Carried.

Moved by Mr. Niven, seconded by Mr. Gaviller: That Mr. M. J. Butler be re-elected Vice-President. Carried.

Moved by Mr. Butler, seconded by Mr. Sewell: That Mr. A. J. VanNostrand be re-elected Secretary-Treasurer for the ensuing year. Carried.

The following gentlemen were then nominated for the office of Auditors, two being required:—

Willis Chipman, nominated by Mr. Dickson, seconded by Mr. McAree.

H. B. Proudfoot, nominated by Mr. Niven, seconded by Mr. Foster.

C. J. Murphy, nominated by Mr. H. J. Bowman, seconded by Mr. Rorke.

F. L. Foster, nominated by Mr. Walker, seconded by Mr. Tyrrell.

The following were nominated for Councillors to take the place of the retiring Councillors, Messrs. Niven and Kirkpatrick:—

A. Niven, nominated by Mr. Dickson, seconded by Mr. Morris.

F. L. Foster, nominated by Mr. McAree, seconded by Mr. C. A. Jones.

G. B. Kirkpatrick, nominated by Mr. Walker, seconded by Mr. Tyrrell.

J. P. B. Casgrain, nominated by Mr. Miles, seconded by Mr. Esten.

T. B. Speight, nominated by Mr. Bowman, seconded by Captain Gamble.

The President then appointed Messrs. H. J. Browne and Captain Gamble scrutineers of ballots for the ensuing year.

The meeting being now open for the consideration of New Business, Mr. Abrey suggested that in future it be understood that the President should only hold office for one year instead of, as has been the custom, re-electing him for a second term. Some discussion followed, the general opinion being that things had better remain as they are and that the Association should not commit itself to any rule in regard to the matter.

In regard to the expenses incurred in connection with the annual dinner, some discussion took place. Mr. Bowman moved that a grant of $25 be made to the Entertainment Committee. This, however, was not supported, Mr. VanNostrand saying, that hitherto the Toronto surveyors had considered it nothing more than their share of the cost of the meeting, that they should make up any shortage which might be incurred in that direction, as a mark of appreciation of the visit of

their fellow-members from other parts of the province, and thought that the old order of things should be continued.

Moved by Mr. M. J. Butler, seconded by Mr. Walker: That the thanks of the Association of Ontario Land Surveyors be extended to the members of the Canadian Institute for their kindness in giving us the use of their library. Carried.

The discussion on the subject of "Drainage Difficulties in the South-Western Municipalities of Ontario," introduced by Mr. Winter during the morning session, was then resumed, Mr. Winter addressing the meeting.

Moved by Mr. Dickson, seconded by Mr. McAree: That a vote of thanks be given Mr. Winter for his paper and for the very able address he has given us upon the subject. Carried.

Mr. Dickson then introduced the matter of licensed surveyors working for less than the regular tariff charges, and asked if there was any way of disciplining such members.

After considerable discussion it was moved by Mr. Chipman, seconded by Mr. Butler: That the incoming Council be hereby instructed to report upon the question of a minimum tariff at the next annual meeting. Carried.

It was then moved by Willis Chipman, seconded by M. J. Butler: That the Secretary-Treasurer be instructed to insert in the forthcoming Proceedings a statement giving names of all articled pupils who have passed since 1885, to whom articled, and date of said articles; and also a list of all Land Surveyors who have registered and withdrawn from the Association. Carried.

Moved by Mr. Niven, seconded by Mr. Sewell: That a vote of thanks be given to the President for the able and instructive address given by him in the opening part of the proceedings. Carried.

Mr. Dickson asked for information respecting an official standard measure, and the matter was discussed by Messrs. Abrey, Butler and Chipman.

There being no other business, on motion of Mr. Dickson, seconded by Mr. Tyrrell, the meeting was declared closed. 5.40 p. m.

MEMBERS IN ATTENDANCE AT THE FIRST ANNUAL MEETING.

Abrey, G. B.
Bolton, L.
Bowman, H. J.
Bray, E.
Browne, W. A.
Butler, M. J.
Chipman, W.
Dickson, J.
Ellis, H. D.
Esten, H. L.
Farncomb, F. W.
Foster, F. L.
Gamble, K.
Gaviller, M.
Gibson, P. S.
Gibson, H. H.
Hutcheon, J.
Johnson, R. T.
Jones, C. A.
Kirkpatrick, G. B.
Laird, R.
Lumsden, H. D.
McAree, J.
McCulloch, A. L.
McFarlen, G. W.
McKay, O.
McMullen, W. E.
Miles, C. F.
Morris, J. L.
Murphy, C. J.
Niven, A.
Paterson, J. A.
Proudfoot, H. B.
Roberts, V. M.
Roger, John
Rorke, L. V.
Sankey, V.
Silvester, G. E.
Sewell, H. DeQ.
Speight, T. B.
Spry, W.
Steele, E. C.
Stewart, E.
Stewart, L. B.
Tyrrell, J. W.
VanBuskirk, W. F.
VanNostrand, A. J.
Walker, A. P.
Whitson, J. F.
Wilkie, E. T.
Winter, H.

RESULT OF ELECTIONS.

President.....E. Stewart.....(by acclamation).
Vice-President.....M. J. Butler.....(by acclamation).
Secretary-Treasurer.....A. J. VanNostrand.....(by acclamation).

Councillors elected for ensuing three years.

G. B. Kirkpatrick, A. Niven.

Auditors elected for ensuing year.

Willis Chipman, H. B. Proudfoot.

I hereby declare the above named Councillors and Auditors elected.

A. J. VanNostrand,
Secretary-Treasurer.

Certified correct.

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

REPORT OF SECRETARY-TREASURER.

MR. PRESIDENT,—I beg to submit the following report of the business of the Association during the period between the annual meeting in 1892 and the present.

The number of active members of the Association of Provincial Land Surveyors of Ontario at its Seventh Annual Meeting, was 107; with 9 additional who were in arrears for one year only.

At the present time there are 173 full members of the Association of Ontario Land Surveyors, 20 others who have paid $1.00 with their application for registration, with request to have their names withdrawn from the list of practitioners, 29 who have applied for registration, paying the fee of $1.00, but omitting to state whether they wished to withdraw or to remain in a position to practise, and 3 who are in arrears for a portion of the annual dues for the first Association year, making a total of 225 Provincial Land Surveyors who have applied for registration under the "Ontario Land Surveyors' Act"

As nearly as may be ascertained from the list of Provincial Land Surveyors in the Crown Lands Department, there are 136 who have not applied for registration, but of these a large number have left the Province or are engaged in other occupations.

The following circulars have been issued :—

No. 39.	(Assoc'n of P. L. Surveyors,)	to the profession, *re* incorporation.	350 copies
" 40.	" " " "	Re Anonymous circular	200 "
" 41.	" " " "	Ballot for 1892-3.	200 "
" 42.	" " " "	Explanation of Ballot	200 "
" 1.	(Assoc'n of O.L. Surveyors.)	Ballot for 1892-3..	360 "
" 2.	" " " "	Explanation of Ballot	360 "
" 3.	" " " "	Announcement in '92 report	1000 "
" 4.	" " " "	To unregistered Surveyors	200 "
" 5.	" " " "	Respecting unpaid dues	150 "
" 6.	" " " "	Announcing annual meeting for '93	250 "
" 7.	" " " "	Programme for annual meeting..	250 "

In addition to the above about three hundred copies of the Ontario Land Surveyors' Bill, and three hundred and fifty copies of the Act as passed by the Legislature, were sent to the profession.

One thousand copies of the Annual Report for 1892, have been disposed of as follows :—

Sent to Members, Advertisers, Libraries, Newspapers, &c	242
Sent to exchange societies	665
Sold	7
On hand at date	86
Letters sent from the Secretary's office	670
Post-cards	56
Letters and post-cards received	508
Exchange reports received and distributed	795

In order to supply copies of all the exchanges to each of our members it will, in future, be necessary to make arrangements with the various exchange societies to have an additional number of their reports printed at the expense of our Association, as our membership exceeds that of any of our exchange societies.

I take this opportunity to express my thanks to the various standing Committees and in particular to the Committee on Publication. The labor of supervising all the details in the publication of the Annual Report must be experienced before it can be properly appreciated.

Accompanying this report is a statement of the financial transactions of the Association during the past year. All of which is respectfully submitted.

A. J. VANNOSTRAND,
Secretary-Treasurer.

Toronto, 27th Feb., 1893.

STATEMENT OF RECEIPTS AND EXPENDITURES, BETWEEN 22nd FEBRUARY 1892, AND 27th FEBRUARY 1893.

1892-3	RECEIPTS.		
To Balance on hand, 22nd February 1892			$173 97
" Fees for first Assoc'n year, 173 members at $5.00 each		$865 00	
" " " " " " 3 " " 4.00 "		12 00	
" " " " " " 49 " " 1.00 "		49 00	
" " " second " " 2 " " 4.00 "		8 00	934 00
" Advertisements in '91 Report		9 50	
" " " '92 "		89 00	98 50
" Reports sold, 7 copies at 50 cts		3 50	
" Postage received for Reports sold		06	3 56
" Receipts *re* Board of Examiners			237 00
Total			$1447 03

1892-3	EXPENDITURES.	
By Postage		$53 00
" Telegrams		75
" Printing Circulars, O. L. S Act, Stationery &c		80 50
" Publishing Report of Proceedings '92 Meeting		244 40
" Express and Freight *re* Exchanges		7 76
" Cartage		50
" Import Duty and Customs Brokerage		2 10
" Export Duty on Exchanges		1 00
" Typewriting		95
" Amount paid Solicitor, *re* Ontario Land Surveyors' Bill		100 00
" " " Secretary-Treasurer for 1891		40 00
" " " Stenographer for '92 Meeting		35 00
" " " Returning Officer in first election		25 00
" Rent of rooms for '92 Meeting		12 65
" Amount paid for Office Furnishings		18 90
" Expenses and Fees *re* Board of Examiners		109 15
" Balance		715 37
Total		$1447 03

A. J. VANNOSTRAND,
Secretary-Treasurer.

Toronto, 27th Feb., 1893.

REPORT OF AUDITORS.

We hereby certify that we have examined the accounts of the Secretary-Treasurer, and vouchers therefor, also Financial Statement, and have found them correct.

WILLIS CHIPMAN, } *Auditors.*
H. B. PROUDFOOT, }

March 1st, 1893.

REPORT OF COMMITTEE ON LAND SURVEYING.

MR. PRESIDENT,—Your Committee on making the first Report to the Association under our new name of Ontario Land Surveyors, cannot but think, when so many new names have been added to our list of membership, that it is as well to mention some of the changes that have been accomplished and subjects discussed in former years.

In 1887, the new Act respecting Land Surveyors and Surveys of Land became Chapter 152 of the Revised Statutes of Ontario. In 1892, the Act to incorporate the Association of Ontario Land Surveyors was passed. Also in this year our Association affiliated with the Association of Dominion Land Surveyors. From time to time the following have been discussed, and we consider are worthy of some definite action being taken as to them.

Improvements as to the construction and registration of plans, especially as to the bearings and work required on the ground.

The establishment of an Ontario Meridian Line. The adoption of a Registered Private Mark, by Ontario Land Surveyors. Organizing a Boundary Commission.

The best method of drawing up descriptions and laying out Town Plots, and who should survey a Railway Right-of-way.

Many questions as to the Field work have been answered, and we would earnestly recommend all to take part in this, our important department, the "Question Drawer." That most complicated patchwork designated the Ditches and Water Courses Act, has engaged the serious attention of our friends of the Drainage Committee, and we have every hope that next session of the Ontario Legislature will provide us with an intelligible guide as to this department of our field work. Questions submitted and answers to same are annexed.

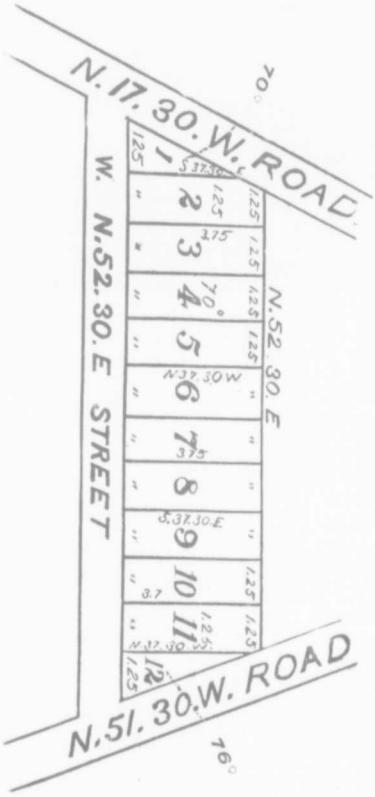
M. GAVILLER,
Chairman.

QUESTION DRAWER.

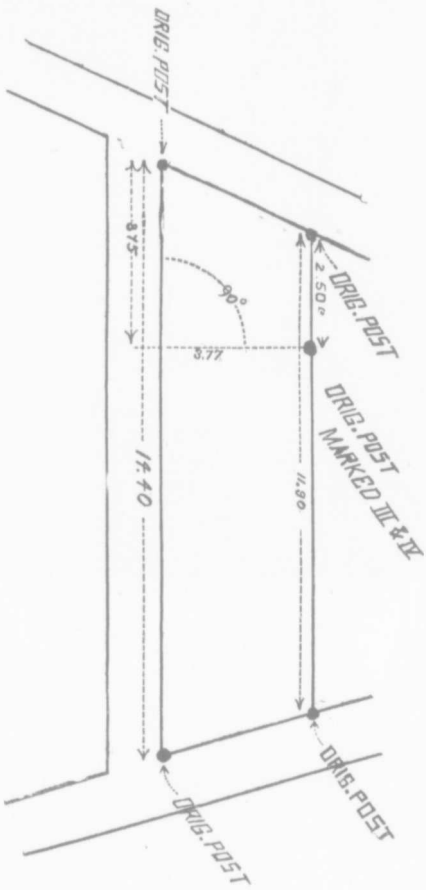
Question 1.—The principal points are, 1st, a shortage of 60 links across the block (corner indisputable), 2nd, a point between lots 3 and 4 at the *back*, also indisputable. It will also be noted that the lines (side) are to have a *fixed bearing*. Wanted the line between lots 3 and 4. *See Diagrams.*

Answer.—Assuming the plan to be registered, find point in front by proportional subdivision. Sec. 62 Surveyors' Act. Rear post already found.

FIGURE A.—Sketch of original plan.



Question 1.—How would you define the line between Lots 3 and 4?



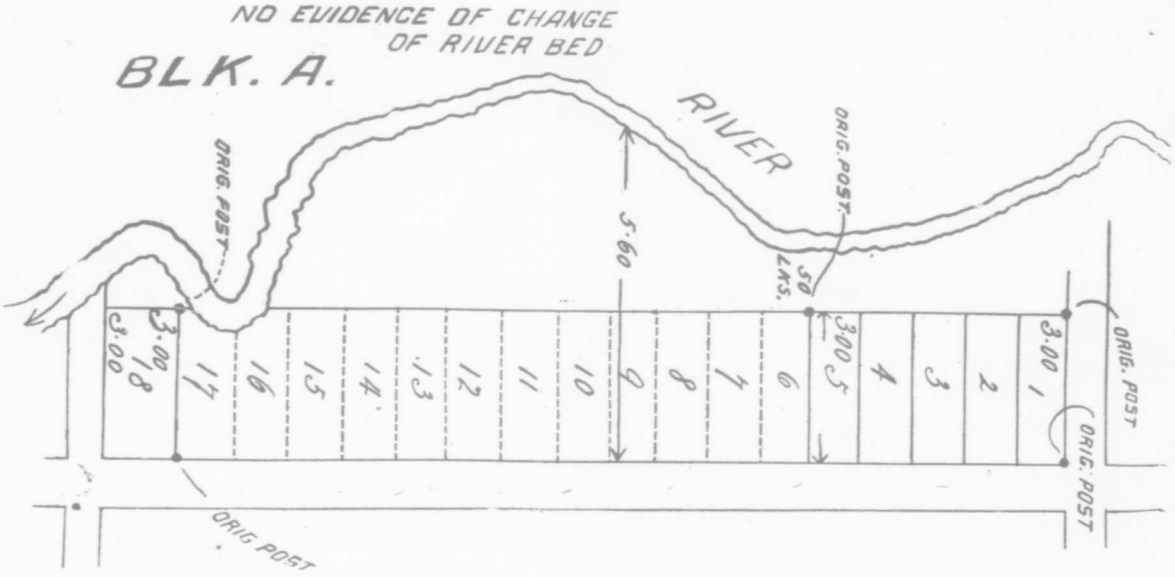
[Question 1.]

FIGURE B.—Sketch from actual survey.

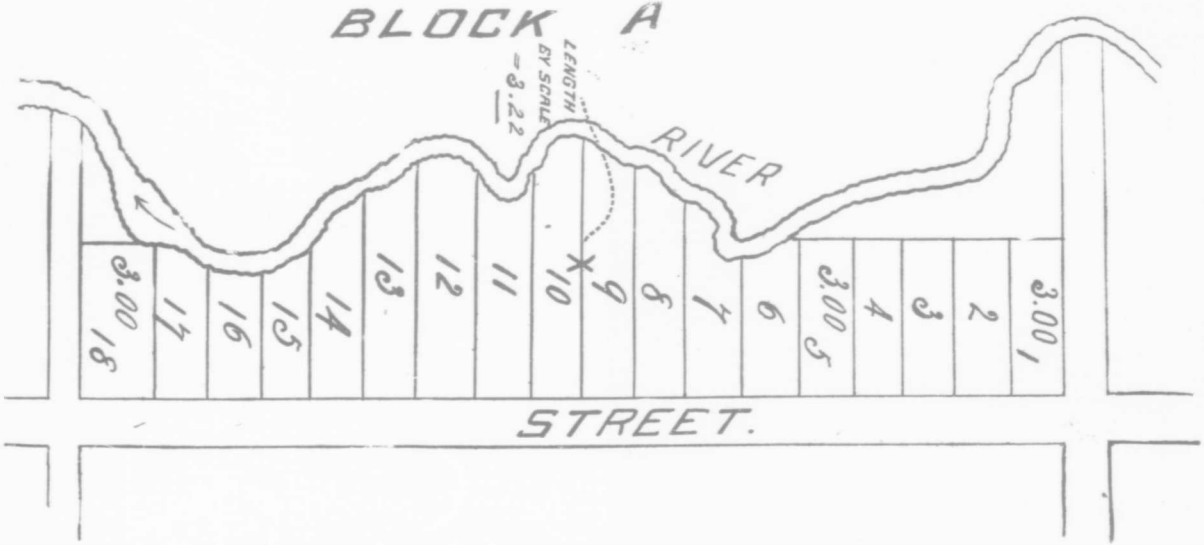
Question 2.—1st, River only sketched on ice, original survey is evident, as it does *not* agree with place at all, except at lot 18; owner of block A denies that lots 6–17, should not at most be more than they scale on Reg. Plan; owners of lot 6–17 claims to go to the river.

Are either right? See Diagrams.

Answer.—From data furnished the lot line should run through to the river.



Question 2.—Required the lengths of Lots 6 to 17 inclusive, but particularly between Lots 9 and 10.
FIGURE A.—Sketch from actual survey.



Question 2. FIGURE B.—Sketch from registered plan.

Question 3.—Double front survey, base line north boundary. Lot 23, Con XIII, has no front on Con. line XIII and XIV on original plan and field notes. How should A B (line between West halves of lots 22 and 23, Con. XIII) be run?

Answer.—Decisions given in court to be quoted in next Report.

Question 4.—Double front survey, base line West boundary. No posts planted in original survey on lake shore. How should A B C D and E F be run?

Answer.—Width of lots on Con. line XIII and XIV to be ascertained by proportional division on that line, and used as fronts for North half of Con. XIII.

Question 5.—On January 26, '92, I was employed by A and B to form the line between lots 7 and 8, Con. III, Township. A, the owner of lot 8, made affidavit that he had seen the original post 18 years before, had buried underneath it a broken green-glass bottle. I measured both lots from undisputed posts, found lot 7 = 30.59 chains; lot 8 = 32.68 chains; they were each intended to be 30 00 chains. B, the owner of lot 7, insisted upon seeing the facts sworn to in the affidavit verified, and I refused to make the survey until the frost was out and a search made. On April 24, went back; the parties had dug, at a piece of wood which had been placed to mark the spot; and found two small pieces of green glass, 6 small pieces of smoky glass and 22 small pieces of crockery, also a small piece of cedar that might have been the decayed part of a post. A could give no explanation, and as the articles found did not verify the affidavit, I made an equal division and ran the line. On June 1st I was sent for again; the parties had again dug and found the glass as described in the affidavit, but 26 inches east, and 5 inches on the course of the side-line south of where the crockery had been found. I ran the line over again from that point. Was my last survey correct?

Answer.—The last point adopted was correct.

Question 3.

Question 4.

REPORT OF COMMITTEE ON DRAINAGE.

MR. PRESIDENT,—Your Committee on Drainage beg to make the following report thereon :

During the season of 1892, the most important work done in connection with drainage matters was the taking of evidence by the Commission, appointed by the Ontario Government, regarding the working of the present Acts in the different parts of Ontario.

The method adopted by the Commission for securing this evidence from the different parties interested, was exceedingly thorough as the Commission met the parties on their own ground, and patiently listened to the views and opinions of all sorts and conditions of men—Reeves, Councillors, Ratepayers of the highland and lowland type, President and non-President, Lawyers, Surveyors and Engineers—in fact, anyone who had a suggestion to make towards the improvement of the Act was cheerfully accorded a hearing. This work extended over the greater part of the last summer meetings, having been held in the principal towns of Western Ontario, and resulted in the accumulation of a mass of evidence that covered the subject pretty thoroughly. The Commission has completed its labours and the report of the work is in the hands of the Government, so that at the present session we may expect to have an Act framed that will meet all the different situations which confront an Engineer in designing drainage works.

At the present time the Drainage Act is and has been for the past year, in a chrysalis state and inert. As a consequence of this, active operations have been confined to repairs and the construction of small works, though the legal department apparently were unaffected, as appeals, and counter appeals before the Referee were the order of the day.

In that vexatious question of "Outlet" in the Township of Raleigh, the adjoining Townships of Harwick and Tilbury, each assessed for outlet, appealed, but as yet no decision has been received by the Referee. The Township of Romney appealing from an assessment by Tilbury East for outlet was sustained by the Referee. The feeling evidently is gaining ground that the high lands should not be assessed as heavily as has been the custom heretofore Doubtless, when the new Act is in force, drainage matters will again assume that prominence they attained a year or so ago, when it is to be hoped that the dangerous element of opportunities for litigation will be found to have been entirely eliminated, and that henceforth there will be no necessity to carry appeal cases to the "foot of the Throne," as has been done in the case of "Williams *vs* Raleigh," upon which a decision is promised by the Privy Council next July. It will be a hard matter to realize that this case is really ended, as for years past it has been looked upon as a standing institution in connection with drainage in Western Ontario. The old scheme of a canal across the plains from Lake St. Clair to Lake Erie has been revived, and application for a charter is

about to be made at the present session of the Dominion Parliament. The annexed plan and description of the scheme will convey a good idea of the work and the effect it would have upon the large areas of marsh lands in its vicinity.

On behalf of the Committee on Drainage,

JOHN C. MACNABB,
Chairman.

QUESTION DRAWER.

To the Land Surveyors' Association of Ontario.

SELBY, Jan. 21, 1893.

Would it not be better if the Ditches and Watercourses Act be so amended that the Municipal clerks should keep a supply of forms, similar to Form D, and should furnish said forms to the owners of land that apply to him for the Drainage Engineer to appoint a meeting. Said owners to fill up the forms and serve them on each and all the parties interested.

Yours, etc.,
JOHN S. AYLESWORTH, O. L. S.

These forms are held and used by many Township Clerks at the present time.

KIDGETOWN, Jan. 18th, 1893.

DEAR SIR—I received from you a short time since an invitation to write something, or give some hints on some subject. I have nothing to write about unless the amendment of some of our laws.

I consider that our Municipal officers have too much power in appointing an Engineer under the Ditches and Watercourses Act. They can appoint any person they consider capable. I say we should have the work. The law makes us study and prepare 3 or 4 years and then give our work to any person.

And the law relating to holding land by possession—I consider it the most unjust law that could be enacted. A person may have a deed of land and pay taxes for a number of years, and another man along side have possession of a part and can hold it in spite of his deed. I consider it wrong; there is no use of having a deed.

I remain your obedient servant,
THOS. SCANE.

A. J. VanNostrand, Esq., Sec. &c., Association O. L. S.

DISCUSSION.

Mr. Bolton—So far as I can see, the questions that are here have nothing particular in them. This is one, "Would it not be better if the Ditches and Watercourses Act would be amended so that the municipal clerks could keep forms similar to the form D, and should

supply such forms to land owners to fill up and serve them on each of the parties interested?" Up in our part of the country the clerks of the municipalities are all supplied with all the forms. In Listowel, the printing office publishes all the forms under the Ditches and Watercourses Act, and the clerks go there and get them.

Mr. Jones—In my experience most of the township clerks have those forms, that is, in the Western district, but still there are very often cases in which those forms will scarcely answer.

Mr. Wilkie—I am in exactly the same position as Mr. Aylesworth, who asked the question, seems to be in. Down in our country they have not any at all. However, we are not bothered with a great many cases.

Mr. Bowman—I understand that this Ditches and Watercourses Act is to be wiped out. If that is the case, we need not bother very much about the forms. The way the Act stands now, there are so many forms required that the notices and forms are more than all the rest of the Act put together. I would not trust any township clerk to make out forms to be served on parties that you could go into court on and say that the forms had been served properly. Whenever a difficult case comes up I get the interested parties to come to me and I write up a form that will suit myself and keep a copy of it, and have them served on the proper day; and if they cannot succeed in arranging the matter between themselves, I write out the requisition for them and then they could send that to the township clerk. If you are going into court there is no use trying to make an award when the preliminary notices are not correct.

Mr. Bolton—In our part of the country they are printed exactly as they are in the Act, so there can not be any mistake about it.

Mr. Wilkie—Once in a while a case turns up where the form in the Act will not suit.

Mr. Bolton—There is another question which the Drainage Committee have not considered. It is, "What are the best methods of protecting the joints of agricultural drains, tiles of all sizes, 1½ inches to 12 inches in diameter, and laid in different kinds of soil?"

Mr. Butler—I have had some little experience in that in clay and sandy soil, and the plan I pursued was to take a piece of the cheapest class of cotton, three or four inches wide, and a couple of wraps around the joints and cover it with sawdust or straw on top, and I have never heard of one of them being choked. The size of the tiles was up to four inches.

THE FOLLOWING QUESTION WAS SUBMITTED BY MR. TYRRELL, WITH DIAGRAM ON BLACKBOARD:

In order to drain the swamp A, a ditch was cut across the high land on the road, and a great volume of water passes down through it from A, flooding E's property. There is a fall in the direction of E and

also a fall in the direction of A. The question is whether the path-master had a right to cut that ditch through there at B, and if he had not, have I, as Township Engineer, a right to order it to be closed again and make A drain his own swamp? Now the water is carried into the road ditch, across the road, and flows off through E.

Mr. Bolton—I don't think an Engineer has any right to close any drain. He may order the opening of other drains, but I don't think there is anything in the Act to give him authority to close a drain.

Mr. Butler—I am sure a judge would soon order it closed.

Mr. Jones—I had a case somewhat similar to that this last year, and though I did not consider I had any authority to stop it up I did not tell them so, but I put it in the award that the drain was to be closed at a certain point and I believe they have done so.

Mr. Tyrrell—A claims that his water already comes out to the road, which it does. Then he claims that the township has a right to take it away from the road.

Mr. Jones—If the fall is in the other direction he cannot ask them to take it through the division of land.

Mr. Bolton—I know in our county E has good cause for bringing an action for damages. I know cases where they have got $2,000 and $3,000 in cases where it was not as bad as that.

Mr. Gaviller—I had a case like that where they asked me about it, and I told them to go and put a dam right in that ditch 6 to 8 feet thick so it would not wash away. They did that and there was never another thing about it.

DISCUSSION ON THE REPORT OF THE COMMITTEE APPOINTED TO CONFER WITH THE ONTARIO DRAINAGE COMMISSION.

Mr. Winter—Included in this report the report of a Committee that was appointed to confer with the Drainage Commission appointed by the Government appears. The chairman of this committee, has reported that the commission has completed its labors and the report of the work is in the hands of the Government, so that during the present session we may expect to have an Act framed that will meet all the different situations, which confront the engineer in designing drainage work. I will say this for the credit of the profession, or such members thereof as belong to the western country, that the engineers themselves have found no difficulty in designing the drainage works, that is, if their recommendations were carried out. But the difficulty is, that the municipalities going on with the construction of the drainage work in very many cases do not feel disposed to act upon the suggestions or recommendations of the engineer, but take a good deal of it into their own hands, and if the work turns out to be a failure, which it frequently or almost invariably does, they make him the scapegoat and blame him for it. I may say that in that section of the

country where the suggestions of the engineer have been carried out, they are almost invariably a success; they are only failures where his recommendations have been set aside. At the present time the Drainage Act is, and has been for the past year, in a chrysalis state. Active operations have been confined to repairs or construction of small works, though the legal department was apparently unaffected, for appeals and counter appeals before the Referee were the order of the day. There are more expensive suits going on there during the whole year, so that we are in that unfortunate position, that our drainage works cost us more in law costs and in damages than the construction of the drains, and in that section of the country they are naturally very anxious that something should be done. I understand that there will be an attempt made to amend the drainage laws, to cover the difficulties I have indicated, and probably we could deal with the question more intelligently, if we had an opportunity of seeing the report of the drainage commission, but of course there will be no chance of seeing that until it is first brought before the Legislature. It strikes me that the important point that requires to be covered is this, the law requires to be amended in such a way that the party proceeding with the construction of the drain, will not be sole judge of where that drain should be located, and be constructed irrespective of the effect it would have upon other parties. In the construction of a drain where conflicting interests will probably arise, all parties interested in that drain should have a voice in deciding how the drain should be located and constructed, that is, those liable to suffer by the improper or unskilful construction of a drain, should not be obliged to wait until they actually sustain the damage, but have a right to interfere and restrain those going on with the work, in order that the matter might be so arranged that the drain would be constructed according to proper principles and no damage be done. That might be done in this way, by the Act making provisions for the appointment of a drainage inspector, either a drainage inspector for each county or a Board of inspectors for the whole province, so that whenever the question should arise as to the location or construction of a drain, that is liable to involve conflicting interests, the matter would be referred to an impartial authority of that kind. I think that there should be some disinterested and outside authority to decide questions of that kind, before the damage was actually sustained in order rather to prevent the mischief than to try to remedy it after it is done, by litigation and otherwise.

Mr. Tyrrell—It appears to me, that in the cases referred to this morning, by Mr. Winter, the difficulties occurred chiefly through the entire system of drainage not being properly designed in the first place. The drains were not constructed to proper outlets and afterwards the outlets were constructed and caused trouble to the original drains. The whole system appeared to have been done in a botchwork sort of way. However, it was probably not the fault of the engineers, as he explained, but there would have been no trouble if the whole system had been properly designed in the first place and constructed after that design.

REPORT OF COMMITTEE ON ENGINEERING.

MR. PRESIDENT,—Your Committee on Engineering beg to report that they have not, this year, been able to have a satisfactory meeting, and believe that the other standing Committees have had similar experiences. Your Committee would therefore recommend that a change be made in the programme for next year, so that the standing Committees may meet on the afternoon of the first day and report to the Association the next morning. All of which is respectfully submitted.

G. B. ABREY,
Chairman.

DISCUSSION.

Mr. Abrey—I think there should be some scheme by which the members of these Committees should get together and make their report the first day. About the only way these reports can be satisfactorily got in at present, is for the chairman or some person simply to constitute himself the Committee and make the report.

Mr. Bowman—I think that something in that line must be done.

Mr. VanNostrand—It may not be out of order for me to suggest that the committees try to do a little of the business by correspondence. There must be some things that occur during the year that can be attended to without everything being left till the time of the meeting. If we have a Committee, we have it for a certain purpose; and it would, perhaps, be better for the other Committees to collect material during the year, as the Land Surveying Committee has done heretofore. The Land Surveying Committee is, of course, the one that is nearest to our interests, and theirs has always been a very interesting report. If the other Committees could keep the matter in mind and do a little corresponding amongst themselves during the year, it would facilitate the getting out of the reports.

The President—When this proposal was made, the intention was that these questions be sent to the Chairmen of the several Committees, before the meeting, so that they would be prepared to come to a finding on them when they did meet. But any question that comes up during the meeting, such as Mr. Tyrrell's question now, we could scarcely expect the Committee to come to a finding on it. It would be a very great advantage if these questions could be sent in to the Chairman sometime before, so that they would be before the Committee at least at the first meeting.

Mr. Butler—I wish to say a few words in regard to the reports of the Engineering Committee. From year to year that Committee has felt a certain amount of difficulty in knowing what their duties were. Now, they cannot be expected to act as consulting engineers to all the engineers in the province; the field of engineering is too broad, including as it does, the great powers of nature converted to the use and convenience of man. There are certain kinds of engineering confined to the members of this Association, but it seems to me that

it is entirely within the province of the Engineering Committee of this Association, to deal with the question of our roads and country bridges and work of that class. I think that questions pertaining to these subjects might be brought before them, and they might embrace in their reports each year some suggestions as to that part of the work, and if that were done our Engineering Committee's report would be just as interesting as any of the others, and it would have also an educational value that it does not now possess.

REPORT OF PUBLICATION COMMITTEE.

MR. PRESIDENT,—Your Committee have to report as follows:

The "Proceedings" for 1892, were printed by C. Blackett Robinson, as usual.

Our exchanges are about the same as last year's. See list below.

Your Committee would again ask for help in getting advertisements, and hope the members of the profession will patronize those advertising with us. We would suggest, that where a paper is accompanied by a diagram illustrating it, a copy of such diagram on a sufficiently small scale to put into the report be attached to the paper.

EXCHANGE LIST.

	RECEIVED FROM.	SENT TO.
Ohio Society of Surveyors and Civil Engineers	130	130
Illinois Society, Engineers and Surveyors	190	110
Indiana Engineering Society	140	80
Iowa Engineers and Surveyors' Society	125	45
Michigan Engineering Society	150	140
School of Practical Science, Engineering Society	150	150
Association of Dominion Land Surveyors	...	10

Respectfully submitted,

H. L. ESTEN,
Chairman.

Carried.

DISCUSSION.

Mr. Esten—I would suggest that any person sending a question in to the Question Drawer, with a plan attached, should also attach a small plan on a scale suitable for putting in the Report, as it is a good deal of trouble for the Committee to plot all these plans on a suitable scale.

REPORT OF COMMITTEE ON ENTERTAINMENT.

MR. PRESIDENT,—The Entertainment Committee for 1892-3 have to report as follows:

The annual session of the Association for 1893, was held on Feb. 28th, March 1st and 2nd, in the Lecture Room of the Canadian Institute, which, though smaller than the Library in the same buiding in which the sessions for some years past have been held, is more conveniently fitted for the purpose of our Association, being provided with raised platform, blackboard, tables, reading desk, etc., and appeared to give general satisfaction.

With a view of ascertaining the wishes of the members of our Association in regard to the annual dinner, and of being able to judge as to the probable attendance, a precaution very essential to the success, pecuniary and otherwise, of such an entertainment, printed slips to that effect, and addressed postal cards were sent to all the members. And although replies from thirty-four were received, regretting their inability to attend, the answers of twenty-eight others who intended to be present on the occasion, decided the Committee in favor of the usual dinner, which was held on the evening of March 1st, at the Arlington Hotel.

Thirty-six, including five invited guests, were present to partake of the good things provided by our host, Mr. Matthews, who had evidently exerted himself to please all concerned.

Of seven invited guests five were present, including Mr. Aubrey White, Assistant Commissioner of Crown Lands; E. H. Keating, City Engineer, of Toronto, and Mr. W. A. Lee, President of the S.P. S. Engineering Society.

Letters regretting inability to attend, were received from The Hon. the Commissioner of Crown Lands, and Prof. Carpmael, of the Meteorological Observatory.

Some excellent speeches by members and invited guests contributed greatly to enhance the general pleasure and satisfaction evinced on the occasion, in reply to the various toasts prepared by yourself as Chairman, Mr. M. J. Butler as Vice-Chairman, and others, among which were the following: "Canada," responded to by Prof. Galbraith, H. Winters and J. Dickson; "The Ontario Legislature," responded to by A. Niven and Aubrey White; "Engineering Societies," by W. A. Lea, C. H. Keefer and E. H. Keating; "Association of Dominion Land Surveyors," by Willis Chipman; "Association of O. L. Surveyors," proposed by A. White and responded to by Messrs. Stewart, Butler and Dickson; "The North-West Intelligence Corps," responded to by H. B. Proudfoot and H. D. Ellis; "The Ladies," by Messrs. Tyrrell and Macdougall; "The Entertainment Committee," proposed by Mr. G. B. Kirkpatrick and responded to by Messrs. Foster, Ellis and Murphy; "Our Secretary," proposed by Mr. Chipman and responded to by A. J. VanNostrand. Songs were sung at intervals by Messrs. Niven, Sewell, Bowman and Foster.

A detailed account of Receipts and Expenditure of all moneys in connection with the business of the Entertainment Committee has been handed to the Secretary, Mr. VanNostrand, and can be seen at his office by any member.

All of which is respectfully submitted.

On behalf of the Com. on Entertainment,

FRED L. FOSTER,
Chairman.

REPORT OF COMMITTEE ON LEGISLATION.

MR. PRESIDENT,—Your Committee on Legislation have little new matter to report, as the Legislation obtained is now familiar to all.

It is a matter for congratulation that "Incorporation" has been so well received by the majority of those who had not expressed themselves prior to the passing of the Ontario Land Surveyors' Act.

Upon a second reading in the Legislature, some slight changes were made in the Bill as presented to the Association of Provincial Land Surveyors of Ontario, at its meeting in February last. These changes were in some cases beneficial to the profession, and met with the full approval of your Committee, and in other cases were assented to as being necessary to the passing of the Act.

With minor alterations, which would remove certain slight ambiguities, and which may be made at a future Session of the Legislature, your Committee beg to express the opinion, that in the Ontario Land Surveyors' Act we have a measure which bids fair to be of great benefit to the profession, without being in any way prejudicial to the interests of the public.

Respectfully submitted,

JAMES DICKSON,
Chairman.

DISCUSSION.

Mr. Dickson— I may say that the matter referred to here is owing to a trifling cause. One portion of the Act fixes the date on which we hold our annual meeting, and another portion leaves the fixing of the date with the Council. There is another matter I want to mention, which brings prominently out the necessity of what Mr. Abrey has said about any questions to be taken up in the report of any of the Committees, that they should be submitted to the Chairman sometime prior to the meeting, so that they can be prepared.

Mr. Tyrrell has drawn my attention to a matter that I think we have all met with, that is the uncertainty of the law where municipal surveys are made. Of course we are all aware that they are made under the instructions from the Crown Lands Department. A great

many surveyors were, and some are still under the impression that once a survey is confirmed it is final. Now the courts have decided that it is not final, and I have just heard of a case, where they have overthrown a survey altogether after it has been confirmed by the Commissioner of Crown Lands. I think we should have some Legislation to meet those cases. I would be glad if the gentlemen would just think the matter over during the coming year that it may be embodied in the next report.

Mr. Tyrrell—I might just refer to the statement made by Mr. Dickson with regard to confirmation of Crown Lands surveys. As he says, Crown Land surveys are no better than other surveys, as perhaps, we have all had occasion at one time or another to find out. Up in Wentworth, within the last few months, a very extensive and expensive survey was entirely upset, by a recent survey made by myself and Mr. Abrey. It seems to me it would be very desirable to have the Act so amended that when a survey is confirmed it would be final.

Mr. Sewell—There is another matter, and that is the way in which the Crown Lands Department is limited in making these surveys. The Act only provides for a very partial survey, and where there is any extensive work required the Department really has no power to authorize it.

REPORT OF COUNCIL, 1892.

Mr. President,—The first meeting was held at the Crown Lands Department on Oct. 18th, 1892, the members present being Hon. A. S. Hardy, Messrs. E. Stewart, P. S. Gibson, M. Gaviller, J. McAree, V. Sankey, A. Niven and G. B. Kirkpatrick.

The Council proceeded to organize as follows:—

Mr. V. Sankey was appointed Chairman.

The Hon. A. S. Hardy, Commissioner of Crown Lands, informed the meeting that the members of the Board of Examiners to be appointed by the Lieut.-Governor were Messrs. M. J. Butler and G. B. Kirkpatrick. The Council then appointed the following members:—Messrs. P. S. Gibson, A. Niven, R. Coad and M. Gaviller. Professor Coleman was appointed examiner in geology when required.

The Secretary-Treasurer was authorized to procure the necessary books and forms. He was also directed to deposit the funds of the Association in the Imperial Bank (Yonge St. branch), all cheques to be countersigned by the President, or, in his absence, by the Chairman. It was also decided to require him to give bonds to the amount of one thousand dollars, said bond to be in the custody of the President until proper provision is made therefor by the Association.

A draft of proposed By-laws has been drawn up and will be presented for discussion and ratification at this meeting.

The first examination was held at the Crown Lands Department commencing November 7th, 1892. The following gentlemen, having passed the final examination, were duly sworn in as Ontario Land Surveyors:—Thos. Russ Deacon, North Bay; Thos. Alexander Moore, London South; William Newman, Windsor; and George Ernest Silvester, Ringwood. Mr. Wm. Ernest McMullen, Toronto, who passed at the last meeting, was now sworn in. The following gentlemen passed the preliminary examination:—George Spencer Abrey, Toronto Junction; Abraham Silas Code, Glencoe; and Marshall Willard Hopkins, Stoney Creek.

The Council wishes to draw the attention of the Association to the work which devolves on the Secretary-Treasurer, who now also acts as Registrar, and considers it is only right that a reasonable remuneration for the Secretary-Treasurer should be fixed by By-law.

In conclusion the Council would urge all members of the Association to unite in furthering its welfare; now that we are fairly launched with full powers of self-government. Any member having any suggestions to make for the good of the Association should not wait until the annual meeting to express his views, but should communicate with the Chairman or the Secretary, who will submit the same to the Council. It is only in this way that members of an Association like this, who are dispersed over the whole Province, can unite to bring about the results in which we all have such a deep personal interest.

Respectfully submitted,

VILLIERS SANKEY,
Chairman.

Mr. Sankey—There is another matter which I wish to bring before you to-night. It is this, you are no doubt aware that now we have become an incorporated Association there is a lot of business which takes, compared with what our old Association did, a thoroughly business form. Our Councillors have really, under the Act and under the by-laws as proposed, and I believe it is in the interest of the Association that they should have, a strong controlling interest in the welfare of the Association. They are, as you all know, elected by the popular vote of the Association, and they should have the best welfare of the Association at heart. Now, it is not in the interests of the Association, that only Toronto men should be on that Council; it is clearly necessary that the profession at large should be represented from all sections of the province, from north and south and east and west; and I am very glad to see that the Council, as at present constituted, does fulfil that requirement. But, when you come to think of it, one meeting like this in the year is not sufficient to carry on the business of the Association. Under the by-laws it is suggested that there should be three regular meetings of the Council, one at our Annual meeting, and one at both the meetings of the Board of Examiners. This is something that I bring personally before you; it is not a matter that has been discussed in the Council at all; but I do think that it is nothing but right that the actual travelling

and hotel expenses of members of the Council who live outside of Toronto, should be paid by the Association. I am a Toronto member, and I don't think any Toronto member expects to be paid for any time he gives. I don't know that any surveyor asks for that, but I think it will occur to you as it does to me, that it is not reasonable to ask a surveyor away in the east, west, or north, to pay his travelling expenses and hotel bill in Toronto and still he working for the good of the Association in which we are all interested I hope some member will bring this up and make such suggestions on a purely business basis.

The President—I wish to emphasize the desirability of what Mr. Sankey says. As he says, it is a very different thing now from what it has been heretofore.

Mr. Dickson—I cordially agree with what he says about paying the expenses of members of the Council. I think further, it is very unfair that any gentleman should be brought from a distance to work for nothing. I think not only those coming from a distance, but those residing in the city should be allowed something for their lost time.

DISCUSSION ON RATIFICATION OF BY-LAWS.

On the Ratification of the By-laws, the by-laws submitted by the Council of Management being taken up separately and passed clause by clause.

"The standing committees shall be the Committee on Land Surveying, Committee on Drainage, Committee on Engineering, Committee on Entertainment, Committee on Publication."

Mr. Chipman—I would move that the word "Engineering" be struck out, and the words "Topographical Surveying" be inserted instead.

Mr. Dickson—I would move that the words "Topographical Surveying" be added in addition to what is there already.

Mr. Niven—I would second Mr. Dickson's motion.

Mr. Bowman—I think that should be tacked on to the Surveying Committee; they should take that question up, not the Engineering Committee.

Mr. Gibson—I will second Mr. Chipman's motion.

Mr. Chipman—My object in asking this, is this, we have a Canadian and American Society of Engineers, and quite a number here are members or associate members of those bodies, and I know this, that there are members of the Canadian Society of Engineers who are possibly a little jealous of this Association, thinking we are trespassing on their ground; and I think we have quite enough to do without touching engineering work proper. I think this topographical surveying will keep this committee fully employed in securing data and facts and figures to present to this Association at its successive meetings. They have enough work ahead to keep the committee employed for several years before we can expect to get the Legisla-

ture to give a grant for the work. It is true we have had several papers on engineering subjects in the last few years, but so far as the Engineering Committee is concerned it is a useless body.

Mr. Gaviller—In what position would you place the unfortunate township engineers? Are they going to drop the title "Engineer" altogether?

Mr. Chipman—I think not, but that comes under the Drainage Act. We are aspiring to have a triangulation survey made of the province, a geodetic survey followed by a topographical survey. The present Committee on Surveying has its hands full. At every meeting the report of the Committee on Land Surveying is the most voluminous and takes up more of our time than anything else.

Mr. Bowman—I have been a member of the Engineering Committee for several years, and I have felt that it has done very little, still I don't think it is the fault of the committee, but the fault of the system, in not having a special day for the committees to meet. I think every committee appointed should meet on the first day of the session, which should be taken up entirely by committee meetings. There is no use having the members here for three days when really part of the time is taken up in preparing committee reports. This way the committees are blamed for what is really not their fault at all.

Mr. Gibson—I think the trouble is this, we try to do it all by talking. I think when these questions come up they should be sent by post to the members of these committees. However, Mr. Chipman and I will withdraw our motion on condition that the other motion remain.

Mr. Chipman—But if it is "Engineering and Topographical" I would move an amendment that you insert a standing committee on Topographical Surveying.

The President—Will that meet your views, Mr. Dickson?

Mr. Dickson—Yes.

Mr. Sankey—I will second that.

(The by-law was then carried, with the addition of the words, "and Committee on Topographical Surveying.")

As to the examinations, "Candidates for admission to practice, etc."

Mr. Sankey—Shall we leave the marks to the Board of Examiners to settle?

Mr. Butler—As to the subject of trigonometry, spherical trigonometry, I think perhaps, as a member of the Board of Examiners, it might be wise to get an expression of opinion from the surveyors assembled as to how much that includes. That is a pretty flexible term. Plane trigonometry covers a large subject, so does spherical. How much of each should be given?

Mr. Gibson—The practice has been the ordinary rules of plane trigonometry and demonstrations of such rules.

Mr. Butler—But partly the object of getting this Board of Examiners has been to make it a little harder to get through.

Mr. Dickson—I think it should be altogether left in the hands of the Board of Examiners.

Mr. Sankey—I think it would be advisable that these by-laws should be distributed over the country, and when a candidate writes to the secretary, asking how much of this have I got to do, or what books have I got to read? the Secretary will just send him a copy of the by-laws. And I think the Board of Examiners should be asked to define the particular chapters of each book, and I would advise that they put in this by-law the actual works that it is advisable for the candidate to read. I know at the last examination some candidates had been reading on one book and others on another. In one case, one gentleman came up for examination in Euclid, and I happened to have the Euclid I personally knew best, and in the course of the examination he said: "I don't think the Euclid you are looking at is the one I have been reading; it is one I don't know anything about." I thought in justice to him I should take the book he had studied out of, and I found he was thoroughly well posted in it; but the class of question I was asking was not the one he had been led to expect. I think it is decidedly advisable that the candidates should have some idea what books they are going to be examined out of before they come up.

Mr. McAree—Besides the proof of the rules I think they should go on to calculation of logarithms, say about half of Todhunter's book.

Mr. Walker—I think it would be well to insert there the names of a few text books that would be used in this examination.

Mr. Gibson—Suggestive only though.

Mr. Walker—I think it is usual to have a list of text books which may be used. We don't want to compel them to use any one particular one, but I think there might be a list, which will be used as a basis for the examiners in this examination.

Mr. Gibson—There is no question but they must be examined in the studies they have gone through in the schools.

Mr. Bowman—I move that the Board of Examiners be authorized to issue a printed prospectus of the different subjects and text books recommended by them for the preliminary and final examination.

The President—There is an examination in plane superfices, and it seems to me there is nothing in solids; the idea of a surveyor going through and not knowing how to measure a cube or a sphere does not seem right.

Mr. Dickson—In suggesting that the Board of Examiners or secretary notify students as to what they shall study, suppose they should clash with what is ordered to be taken up in the schools, how would that be?

Mr. Gibson—The Board will send out a circular with reference to these points.

Mr. Walker—I think the way that is usually done in universities and schools of science is to mention what parts they are to get up; for instance, trigonometry, the relation of the parts of triangles, logarithms, and the solution of triangles; and then anybody would see what they had to get up, and use what text book they like.

As to number of marks candidates must obtain.

Mr. Abrey—Is it the intention that candidates shall know their standing after the examination—know the marks that they have obtained?

Mr. Sankey—I may say that any candidate can see now.

Mr. Sewell—I think the percentage ought to be at least seventy-five per cent.

Mr. Walker—What are the percentages now in the examination?

Mr. Sankey—Not less than one-third was what we were governed by at the last examination.

Mr. Ellis—On one or two of the subjects I think one-third is too low.

Mr. Walker—I think as this matter has been left to them that this clause had better be left to the Council also. I suppose we are not going to decide at this meeting what number of marks on each subject is to be the maximum, and it would be as well to leave this to the Board too

Mr. Sankey—Then this clause referring to examinations is to be referred to the Council.

With regard to discipline.

"Any complaint against a member of the Association or against any other person, etc."

The President—It seems to me that is indefinite, "any other person."

Mr. Sankey—In section 5 of the Act there is a very long clause, setting out what powers the Council have for suspending or dismissing from the Association any land surveyor who is found guilty of gross negligence or corruption in the execution of the duties of his office; but the Council shall not take action until the complaint made under oath has been filed with the secretary. That governs the powers that the Council have with regard to any member of the Association. Now, the Council understood that it was the wish of a large number of the members of the Association that a by-law should be passed, giving the Council authority to take up any complaint of this kind and prosecute it against an unlicensed practitioner in any part of the province.

Mr. Winter—As the statute stands at present, could not any member of this Association do it?

Mr. Sankey—Yes; but private members don't like to do it.

Mr. Dickson—I think it should be that when any member of the profession finds any interloper coming in and working, he should simply report it with all the facts of the case to the Council and let them

prosecute him. It is astonishing how many employ these characters. I know I have had to go over a lot of their work again, and I never found it correct. But at the same time it is a very unpleasant thing for any individual surveyor to prosecute. They will write a description of a piece of land, and all the surveyors in this room could not find that land.

Mr. Sewell—It is a question whether the description of land does come within our province. I have never been clear as to whether any person could be legally allowed to write out a description.

Mr. Sankey—I think we are in the same position as the lawyers are with regard to conveyancing.

Mr. Dickson—Lawyers find a great deal of fault with others doing conveyancing, but I have had some experience with lawyers, men with Q. C. attached to their names writing descriptions, and it would be impossible to find the land.

Mr. Sankey—Then it will be, "Any complaint against a member of the Association or against any unlicensed practitioner shall be filed with the secretary . . . . at the next regular meeting of the council."

Mr. Winter—How is the council going to have power to summons before them any party that is not a member of this Association?

Mr. Sankey—They have not the power; they just rely on the truth of what they are told and make such investigation as they may have the power to make as to the truth, and then if they see reasonable grounds for commencing a law suit they will instruct it to be commenced.

Mr. Winter—What power does the statute itself give this Association to deal with parties that do not belong to the profession except just as the statute provides?

Mr. Sankey—It is not proposed that it shall; it does not give them any power at all. Any licensed practitioner has the power to bring him up before the proper courts and have him punished, and the object of this Council is to see if there is sufficient evidence to warrant them bringing him up.

Mr. Sankey—I would like to draw your attention to this in our Act, "The Association may by by-law provide that any surveyor who has been in the actual practice of his profession for a period of thirty-five years or more, and has during the entire period been a duly qualified surveyor, may be exempted from the operations of this Act."

It has been thought that perhaps it would be advisable to have a by-law passed which would enable any members of the Association who wished to avail themselves of that privilege to do so, instead of having to pass a new by-law every time a man makes application; that a by-law could be passed now, leaving the matter with the Council.

Mr. McAree—Suppose we limit the date up to which they may apply for the benefit of it.

Mr. Winter—If I recollect the reading of the statute it strikes me that that is a matter for the Council.

Mr. Sankey—When we were about getting that Act passed some of the older members of the profession wrote to us and to the Government, saying that they had been practising long years and thought it was hard lines that they should be brought under the provisions of the Act proposed, and asked if a clause like this would be acceptable.

Mr. Winter—I think it would be wisdom on the part of the Association to deal with the matter very carefully. Supposing quite a number should make that request and be freed from the control of the Association.

Mr. Gibson—Does not that apply to persons who had been 35 years practising before the passing of the Act ?

Mr. Sankey—Yes.

Mr. Bolton—That only refers to the fees.

Mr. Sankey—It is "the operation of the Act." It means he can go on and practise without paying his fees.

Mr. Niven—I think the intention of the Act is that they remain in all respects as they are, except that they do not pay their $4 a year.

The by-laws were passed as a whole.

DISCUSSION AS TO PAYMENT OF MEMBERS OF COUNCIL.

Mr. Morris—It has been moved by Mr. Foster, seconded by myself: That the members of the Council of the Association of Ontario Land Surveyors be allowed all reasonable expenses and $6 per day while in attendance at all meetings.

This is the outcome of a recommendation or hint by the Chairman of the Council in bringing in the report, that it was hardly fair for members of the Council to come to Toronto and receive no remuneration, while others who are members of the Board of Examiners receive remuneration similar to what I have proposed here. I think it is now compulsory on the Council holding their meetings twice a year, at the same time as the meetings held by the Board of Examiners. The third meeting of the Council is at our annual meeting. The question may arise, why should the Council receive remuneration at the annual meeting, while other members of the profession, attending at their own expense, receive none? Well, this is only one-third of the question. The remuneration for the other two meetings is not going to add materially to our expense, if we look at it in this way; the Board of Examiners pay probably two-thirds of the Council at those two meetings, and the only expense, coming on this Association will be for that part of the Council not receiving remuneration as on the Board of Examiners, so that though this may appear a tax on the Association, it is probably not more than a little over one-third of what it would appear here.

Mr. Abrey—I suppose it is not the intention where members of the Council are also members of the Board of Examiners to pay them twice for the same meeting?

Mr. Foster—No, that is not the intention. It is only those members of the Council who are not on the Board of Examiners. The Board of Examiners get their pay irrespective of their being on the Council at all.

Mr. Winter—It strikes me that that motion leaves the matter in a rather unsatisfactory shape, because there is nothing to prevent the members of the Council, if they happen to be members of the Board of Examiners as well, receiving pay twice over. I believe that all our officers ought to be reasonably paid for all the services they perform, and I have no objection to the motion, but it leaves the matter rather doubtful. It would be better to add something to that motion to explain that point.

Mr. VanNostrand—I think it would be better to make the motion a little more explicit. Of course we don't suppose there will be any difficulty of that sort, but there may be objections from parties who do not understand this as well as we do ourselves.

The motion was then changed to "That the members of the Council of the Ontario Land Surveyors be allowed all reasonable expenses and $6 per day while in attendance in their capacity as Councillors at all meetings, except the general annual assembly of the Association."

Mr. Bowman—I move in amendment, seconded by Mr. Miles: That the members of the Council be paid all reasonable expenses in coming to, attending and returning from Council meetings. No member, also a member of the Board of Examiners, to be paid railway fare when attending a meeting of the Board of Examiners at the same time.

If the motion is carried, we don't know what sum we may be let into. A member coming from a distance will be a day here, a day coming and a day going back; and some of their railway fares will amount to $20, so we will have $40 or $50 apiece for every meeting, and we don't know how the members will attend, there may be 6 or 7, so it will take a large sum to pay them. I am quite in favor of paying all reasonable expenses, but for the first year, I think that is quite sufficient. If we find after the first year that we have a big balance on hand and don't know what to do with the money, then it will be time enough to pay the Council.

Mr. Winter—My experience in matters of this kind is this, that if we undertake to shave down too closely the fees of the officers that are to do our business, we are making a great mistake, because we will never have our business properly attended to. I am fully convinced in my own mind, that if the revenue of the Association is not sufficient, according to the present arrangement, to pay a reasonable remuneration to the officers that attend to our business, we had better make such amendment as will make it sufficient, in order that we pay reasonably for all services and have them performed in a proper manner, and be under obligation to nobody.

Mr. Bowman—We had better find out something about what is done in other societies. It is a matter that is going to affect this Association a great deal one way or another, and I would like to know what is done in the Canadian Society of Civil Engineers.

Mr. Walker—As far as I know, there is no salary attached to the Council of the Canadian Society of Civil Engineers. They do not even receive travelling expenses; it is all done for the honour.

Mr. Morris—It is true it is all done for the honour, but the Association of Civil Engineers so far is all honour and sentiment. This is hard work. The officers of this Association have a great deal of work to do that the Canadian Society of Civil Engineers have not. And it is more of a democratic institution in this way, that the officers are taken from all over the province indiscriminately, whereas in the Civil Engineers it is more centralized and the officers are chosen so that there will not be too much travelling. I don't think they are at all parallel cases.

Mr. Walker—I think Mr. Morris is a little mistaken about the officers being selected in that way. The Council, I think, as far as I recollect, is selected from each of the provinces. There are members of the Council who live in British Columbia, there are other members in Nova Scotia.

DISCUSSION ON MR. WILKINS' LETTER *re* UNLICENSED SURVEYORS.

In regard to Mr. Wilkins' letter as to unlicensed surveyors, also the signing by Ontario Land Surveyors of plans certifying to surveys made by unlicensed persons,

Mr. Bowman said—I was under the impression that the Act named an officer to look after and prosecute unlicensed surveyors, but I can't find it just now. I think there should be some one appointed to act on behalf of the Association and prosecute these persons. There is a great deal of farm surveying done by persons who are not licensed, and we cannot take it up ourselves, because the whole neighbourhood would be down upon us; but if an official of the Association were to prosecute them, there would be nothing thought of it, and it is no more than right that it should be stopped. I would move that an officer be appointed in compliance with the request of Mr. Yarnold to prosecute on behalf of the Association the unlicensed surveyors throughout the province.

Mr. VanNostrand—I think that matter is being touched upon if not covered by the by-laws.

Mr. Tyrrell—It is a matter that concerns us all more or less, and is rather important, so that I would be very much pleased to hear that the matter is put in such a shape that it will be enforced I know just around the district where I practice there are, at least, four such men, who are continually practising, doing anything they can get hold of in the way of surveying.

Mr. VanNostrand—I think that our members are liable to lose sight of the fact that we are not acting for our own interests alone, we are acting partially in the interests of the public. We are servants

of the public in a sense, and it is certainly in the interests of the public that unregistered or unlicensed surveyors should be prevented from practising. The law distinctly states that they shall be licensed, and the law is passed, not in the interests of the surveying profession alone, but in the interests of the public generally, and I think there is a little danger of our losing sight of that fact; but there is no doubt that the rights of the profession demand that something should be done in the matter.

Mr. Niven—I would just say in reference to that communication of Mr. Wilkins' that I know of cases where an engineer has made the whole survey of a right-of-way for a railway and got a surveyor to certify to it who never was on the ground. We cannot do anything with those who are not members, but certainly I think no member of our profession should do such a thing as that. Then, with regard to unlicensed persons, we find them in various parts of the country. I know of a case in the County of Hastings, where a surveyor was called in to run some lines, and, owing to the depth of snow, adjourned the line-running until a more convenient season. In the meantime, before that more convenient season arrived, along comes a bush-ranger, who possesses a compass and chain, and he runs all these lines for $2.50 a day; and I have no doubt that that sort of thing is going on in different parts of the province. So that I think the suggestion that we should appoint some one to look after these parties is a very good one.

Mr. Gibson—I think that the simplest way to get at matters of this kind is for each surveyor who knows of a person who is inclined to practise without a license to send a notice to the Secretary at once. And then any surveyor who signs plans in the way Mr. Niven speaks of should have his name reported also, and his attention brought to the fact that he is doing what is wrong and contrary to the law. Probably the best way to get at it is just to frighten them with the majesty of the law. A list should be made of all those who practise in that manner, and also the names of persons who are practising without a license, and should be sent to them, with the warning that in case of their repeating the offence proceedings would be taken.

Mr. Tyrrell—On one occasion, I was asked to sign right-of-way plans for a railway, and I declined positively to sign the plans without having made the survey. I had been doing work for the company up to this time, but when I declined to sign the plans they had no further use for me, and I believe they got some other surveyor to sign them.

Mr. Gibson—They should be warned, and in case of their repeating the offence, they should be prosecuted. There are lots of constables all through these counties who would take the job very quickly.

Mr. Tyrrell—I have had the question raised sometimes as to what is land surveying. Is not laying out a water course, where you have to determine the areas of properties affected, land surveying?

Mr. Gaviller—That comes under the Ditches and Water Courses Act.

Mr. Tyrrell—I think land surveyors should be required to do that work.

Mr. Gaviller—I think we are a little ahead of time in this discussion, considering that this is our first meeting, and we have not even got our by-laws brought up for revision yet I think the gentlemen will be perfectly satisfied that we will appoint a man, and will also be perfectly satisfied as to how he will act.

If I recollect right there was at one time a form sent around by the Crown Lands Department—I remember getting one once—asking us all as surveyors to put down any information as to surveyors in our locality, and also anyone who was practising without a license Why should not we have a form of that kind and send it around to all the members, say once in two years or so, or oftener if necessary, and let them fill it in and send it to the secretary, and he could act on it?

DISCUSSION ON COMPILED PLANS AND SUBDIVISION OF TOWN LOTS.

Mr. Wilkie—There is a matter I wish to speak about; it is in connection with getting up a new plan of the town of Almonte in accordance with the Registry Act. I went before the local Registrar there, asking for information as to how he wanted it done, and he could not give me any information, but he said that the Inspector of Registry Offices wished to see the plan before it was finished; and, as I thought of coming up here, he said if I could bring it with me and show it to the Inspector it would be a good idea. I have done so, and one suggestion that the Inspector has made, and the principal one, is that we change the numbers of the lots; he suggests that we begin with 1 and number the lots continuously throughout the town. As it is now, every man that got a little survey made began with lot No. 1, and numbered as far as his lots went. I don't think there is a number at present above 300, and there are probably 1,500 or more lots in the town. He suggests that we begin at some convenient point, following it out systematically either by blocks or rows, or whatever way would be most convenient. Then, with regard to the difficulty in the abstract of title it can be overcome by furnishing a new set of abstract index books. In carrying it from the old book to the new, he would start off by heading a page lot No. —, Wilkie's Survey of the town of Almonte, and under that he would say Old lot No. —, so that it could be traced back to the original. The Inspector told me that that was being done at present with a map of the town of Picton, and he was endeavouring to have such legislation made on the subject as would enable him to carry out this throughout the different parts of the province, where they chose to adopt it.

Mr. Gaviller—I happened to get into the first law suit I ever got into in my life on that same subject. In the village, in this case, a great many of the lots had never had any original numbers, and the

corporation requested me to put numbers on these lots which were not numbered on the plans in the registry office, and in fact to compile these from the descriptions in the deeds. It was the first case of the kind I was on, and I thought my best plan was to submit it to the council, and it was stuck up for months before I was to get any pay. Every man was to look at this to see if he thought it was all right I submitted to this, and they accepted my plan and paid me for it. The next thing, I was summoned to court ; they said my plan was useless. It went on, and was thrown out two or three times. In that case the judge ruled that as far as the numbering was concerned in that plan it had nothing to do with the law, in fact, if the numbers were left out, the plan would have been just as legal, and I consider so myself. As far as numbers were concerned, they were simply put there at the request of the corporation. They threw the case out, and there was an end of it.

Now, as to the Inspector's idea of numbering lots, that is his idea, but what in the world that has to do with the law, as it stands now, I cannot see. It cannot possibly have anything to do with it. The corporation has nothing whatever to do with the sub-division inside ; as far as that is concerned it is simply information given to them which they are supposed to pay for and is given to them by the surveyor ; and when that is put in the registry office it is simply filed, it does not register any lot on that plan which was not formerly registered ; and more than that, it does not nullify any plan that has been in the registry office. The Act calls for the registration of the boundaries.

Mr. Sankey—I am sorry to say I have some experience in matters of this kind. I have been for the last three years trying to prepare a plan of the City of Toronto to comply with the Registry Act and Municipal Act ; and if the legislation outlined by our friend who has just spoken is going to be carried out, I am afraid we will have to pass a very big debenture by-law to pay for the cost of it. I don't suppose anyone has the slightest idea of the number of plans I have to deal with. I am preparing it on a scale of 100 feet to the inch, and if the plans were all numbered on one sheet at that scale, it would be about 35 feet long and 15 feet deep. I don't doubt at all that the idea is a very good one if it will work. As I understand it, the plans that are required under the Registry Act and under the Surveyors' Act of incorporated villages, or even of unincorporated villages, are simply maps on which the various registered plans are compiled all on the same scale ; but that the surveyor who compiles that plan should be held responsible for all measurements, bearings, courses, distances, etc., on that, the same as on a registered plan—it is simply impossible for him to do it. It is not hundreds of plans we have here in Toronto—they are in the thousands now. I have got to go back to the very first plan that was ever registered in the city, and bring it right up to date, and show every plan or sub-division of every plan on that, and surely it is not expected that any one man can be responsible for every measurement on that. All the surveyor can be held responsible for is that he has copied the plans in the Regis-

try Office. Then the difficulty comes in of making them all fit together, and I need not detail the trouble that that alone entails. Then the next difficulty that comes in—and this is one I am not personally quite satisfied as to how it should be treated—is where there is no plan at all. On the compiled plan what are you bound to show? I mean a block inside a corporation of which no registered plan exists other than the plan in the Crown Lands Department. We have several such blocks in the city of Toronto. There are some blocks, considerable blocks too, on which no registration, as far as plans are concerned, has ever taken place; and a person searching the title on that block, until very recently, at any rate, had to go back to the original patent. Every time a block was sold the lawyer, if he did not know the title previously, thought it was his duty to go back to the original plan. In this city the way they have done is this, the Registrar has blocked out the city into certain blocks, and in each block are put all the titles that refer to that particular block, and when a lawyer comes to search a title, he looks that up and takes the Registrar's certificate as true that only certain numbers affect that block, and he need not go into any of the others. That is a point as to which I don't know exactly how far I can make the plan, I am now preparing, satisfy the Registrar; as far as I can, I am perfectly willing to do so; but if in the city of Toronto we are going to re-number all the lots, as the Inspector of Registry Offices suggests, I don't know where it is going to end, and what is going to be law for one part of the province ought to be law for the whole. In smaller places it is probable there are not more than two or three sub-divisions of any one original plan.

I am very glad the subject has been brought up, because I would like surveyors to discuss this matter; and I think if there is going to be an amendment in the Act that the surveyors ought to have a strong word to say as to how this is going to be carried out. Now, in the Registry Act it says, a plan shall be made showing everything registered inside the corporation. Does that mean everything registered inside the corporation, or a survey of everybody's lands who has not had a registered plan? That is where the difficulty occurs. Of course if the Inspector of Registry Offices tells us I want this, that and something else, and the surveyor can get the muncipality to pay for it, I say by all means do what the Inspector asks for. We have a great deal better chance of getting the corporation to pay for it if he says he wants it.

Mr. Chipman—I think this section that is under discussion is capable of a broader interpretation than has been put upon it by the previous speakers. I think this means as it states here, "Where an incorporated city, town, or village, or village not incorporated, comprises different parcels of land owned at the original division thereof by different persons, etc." It strikes me that a surveyor when he is called upon to make a compiled plan of a village is obliged to show upon that plan every sub-division at the time the survey is made whether such sub-divisions were shown on any previous plan or not. I have had some experience in this work, and in one large town two

or three sub-divisions were never shown on the plan in the heart of the town. The lots were sold by metes and bounds starting from certain points. I show each of those as a distinct lot, exactly as if they had been surveyed and shown upon plans and filed. I think that is what the Act contemplates.

I don't think it would do at all to number the lots consecutively from the first. It would lead to confusion and considerable unnecessary work in the registry offices and to the surveyor, and would possibly lead to litigation. I am somewhat surprised to hear that the Inspector of Registry Offices has suggested that method of numbering lots.

The President—I think there is perhaps, on the other hand, a great deal of confusion in some towns by lots being numbered, even on the same street, with the same numbers. I know in our town it is so, on the same side of the street. I understood the way the Registrar wished it was, that these lots ought to be numbered consecutively, but that the old numbers certainly would not be abolished. They would have to be retained, for they are in the deeds.

Mr. Wilkie—I understood Mr. Johnston (the Inspector of Registry Offices) to say that it was not necessary to show the old numbers on the plan; they could be followed back from his proposed system of abstract indexing.

Mr. Chipman—There is nothing in the Act to prevent a man from sub-dividing the city, or town, or village, as the case may be, into blocks, and he can make his blocks conform as nearly as possible to the registered plans filed previously; or to taking several streets together, so that there will not be two No. 1's or two No. 2's. That appears to be the simplest way to do it.

Mr. Sankey—I would like to ask Mr. Chipman, what has the surveyor got to do to get this information? Has he got to turn himself into a conveyancer and examine every deed in the Registry Office and find out exactly how it is last held? At what date is he going to say: This is the final description of this lot. If you have not got them on the registered plans, you have got to go to the deeds, and where is that going to end?

Mr. Chipman—The day you put your name to the plan.

Mr. Sankey—I don't want for one moment to say that a big city like Toronto should govern the rest of the province, but what I am afraid of, is that the municipalities will not pay for the work of doing this, they will go on and get the Registrar to do it. In Toronto they are dividing up the city into blocks, and if I can make my plan coincide with those blocks I am going to do it, and if I cannot, I am not going to take the responsibility. The Act should be amended to make it clear as to what should be shown on this plan. If a surveyor has got to search all sub-divisions and put them all on a plan, it is a never-ending job I think it would be a very good plan for surveyors to put their heads together and outline some plan as to the matter.

Mr. Kirkpatrick—Would it not be a good idea if this Association could formulate some proposal that could be submitted to the Inspec-

tor of Registry Offices? It struck me when Mr. Sankey was speaking, why would it not be possible in this way to exempt the cities in Ontario from the particular features that would be necessary for towns or incorporated villages. As far as the incorporated villages and most of the smaller towns are concerned it would not be so difficult to sub-divide in the way Mr. Wilkie has told us of, but anybody can see that if you take the cities of Hamilton, London, Toronto, or any one of them, there would be no end to the work. If the Association could appoint a committee to just think it over and see if they could formulate some proposal, I should think it is very likely Mr. Johnson would be only too glad to fall in with any practical suggestions; because it certainly is in the interests of the surveyors themselves not to, what they practically call it, kill the goose that lays the golden egg. On the other hand, it is not wanted to make it so cumbrous that it will not be put in force by the different corporations. If there was any good plan suggested, I have no doubt that the Inspector will be able to get legislation in that direction. I don't know myself exactly how it could be done, but there should be special legislation for the cities, or something of that kind, I think.

Mr. Bowman—From what Mr. Wilkie said, I think that the Inspector leaves it optional with the corporation to adopt this new system or not, as they please, and I imagine that only the smaller places would adopt this system of consecutive numbering. That would get over the difficulty of preparing a plan with registered surveys on it, and at the same time a large number of small pieces that have been sold by metes and bounds that have not any number. I know in my first year of actual practice I prepared a plan of the village of Elmira. About half of that had been surveyed and plans filed, and the other part had been sold off by conveyancers with a tape line. Half the plan was taken up with these little chunks, some of them over-lapping each other, but there was no way of telling one from the other. They were simply part of lot No. so and so, in township so and so; and I think that this system would be only adopted in these small towns. I think, however, that the Surveyors' Association might do something in the way of correcting abuses in preparing these compiled plans. The Inspector orders a plan, then the town or village council gets tenders from different surveyors what they will do it for, and they have no more idea when they start how they are going to do it than the man in the moon. I think a good move would be, if new legislation is to be introduced on this subject, to have the renumeration left with the Inspector at so much per day, what he judges the actual time to be put in by the surveyor.

Mr. Niven—I don't think there is any part of surveying that gives more trouble than the compilation of these plans. A number or years ago I compiled a plan of the town of St. Marys. I don't remember now the exact number of registered plans I found there, I think somewhere about 30, and the town council got it into their heads that they wanted a complete map. They advertised for tenders, and my tender was $300 and another one was $200. It took the council a whole year to decide which they would give it to, but finally I got the

contract, and I am sure I put $600 worth of work into it, and in the end found it very unsatisfactory. These plans in the first place would not fit together. Then, there were large pieces that they did not cover at all, and I had to make an actual survey of the whole corporation, had to put in the river and Trout Creek that runs through there, and fit in the railways, and had an immense amount of labour over it. It was not satisfactory in the end, and it is not satisfactory to this day, and I think they are now about devising some scheme to get a re-survey of the town. I think if this Association could appoint a committee to look this matter up and make some suggestions in the line that Mr. Kirkpatrick has suggested, that they would be doing a good work.

The President—There is no question at all, there is a great deal of confusion at present in the towns in the country, and the assessors have great difficulty with two or three lots having the same number. There is no question at all, but that if you could get those consecutive numbers it would be the best thing, if it could be done. In the north-west the system is blocks and numbers; block No. so and so, and then the numbers don't run so high.

Mr. Foster—I think the Inspector's idea of consecutive numbering is not a bad one in small places, but in a place such as a town the size of Chatham or London it would be perfectly impossible. I suppose the entry books would be made with two columns, one with the old number and the other with the new one, and it could be easily referred to. But where blocks are laid out by descriptions it would be very different; it would be then very hard to follow. I cannot suggest just now any way of getting over the difficulty entirely, but I think some system of having both the new and the old numbers could be carried out.

DISCUSSION IN REGARD TO FEES CHARGED BY SURVEYORS.

Mr. Dickson—Is there no way of disciplining members of our profession who work below the usual charge? I charge $6 a day in my locality, but I know other surveyors who actually work for $5, though they profess to charge $6. Is there no way of giving these gentlemen a hint that it is unprofessional or unbecoming a member of the profession to bring down the charges for surveying. I don't know if there is any way of reaching them, but if there is, it should be done.

The President—I think there is one clause in the by-laws referring to that; when any surveyor knows of any illegal practice by any surveyor or unlicensed practitioner he is to report it.

Mr. Dickson—I mean licensed practitioners working for less than the regular charge. As I understood it, that point just covered men not licensed. These gentlemen are of the same standing as myself, and they come in and work for improper fees. I think it is very unfair, and should be frowned down. Go to the lawyers and they have their prices, go the doctors and they have all the same prices for attending a person; the surveying profession is the only one I know of that does not.

The President—The draft of the bill presented to the Legislature provided for our charging the usual fees, but it was impossible to get this through the House. The only thing is to discipline the members.

Mr. Niven—Some years ago, we appointed a committee to bring in a tariff of rates in the old Association, and they gave $6 a day as the minimum, and we are supposed to be working under that tariff. Now, as the President has stated, it was proposed to give the Association power to fix their fees by the Act, but Hon. Mr. Hardy advised us, that that Legislation would not pass the House, and we had better strike it out; we could accomplish the same end, by bringing the members under discipline. That is, if this Association will now appoint a committee to bring in a tariff, or adopt a tariff, then every member is in honor bound to observe that tariff, and should he not do so, he could be called to account by this Association. That is how I understand the Act.

Mr. Butler—I don't entirely see how you are going to be able to tell a young man starting out that he shall work for so much or starve. I think every surveyor in the room believes that he should not work for less than the schedule, but still I don't see that you have any right to punish him, if he sees fit for the purpose of making his living to work for somewhat less till he gets a start. Young men cannot be expected to come in on a level with the old men, and I think these things are fixed largely by supply and demand. Other than the expression of the Association against accepting less, I do not see that we have any power, or that we ought to exercise any authority in regard to the matter.

Mr. Winter—It strikes me very plainly that if we are to keep up the standing of the profession at all, it will never do for us to run down the price for which we are working. I can understand very well, that it is not well to overdo a matter of that kind, but before I became a member of this Association at all, I understood what the feeling of the Association was, that the charge should be $6 a day, and I have adopted that for years back, when not a member of the Association at all. And although I did so, I know members of the profession in the western part of the province, that are working for less than $4 a day now. Now, is this sort of thing to go on, when the incorporated Association has made known to the members that it should not be continued? If something is not done, or if this Association does not see fit to exercise its influence in some way to prevent it, I fail to see how we are going to succeed in keeping up the standard of the profession.

Mr. Chipman—This is a vital question, but as a matter of policy I think we had better leave it alone this year. We are only just now incorporated, and to put the thing on the shelf till next session I would move, seconded by Mr. Butler, that the incoming Council be hereby instructed to report upon the question of a minimum tariff at next annual meeting.

Mr. Winter—I would move in amendment that if the matter is taken up by the Association or by the Council of the Association, that

in no case shall they fix the fees below what the Act allows the members of the profession for attending court as witnesses.

Mr. Bowman—I have had cases as to that where lawyers look up the Revised Statutes of 1877 and say it is $4, but it has been fixed at $5.

Mr. Winter—I had occasion for a lawyer to look up that question this very day, and after looking it up he paid me $5.

Mr. Morris—There is great danger in fixing a minimum tariff, lest those who charge a higher rate should have it pulled down. Now in my locality I am competing with men who charge $10 a day, In the Association of Quebec they charge $1 an hour and for 10 hours they charge $10. The Ontario Surveyors who hold the Quebec certificate have fixed the rate in that locality at $10 and nothing less; so if you fix a rate it is going to have a bad effect.

Mr. McAree—The fixing of a minimum might have a tendency to hamper those who are charging more. I think, looking at the thing altogether, we had better leave it alone for another year.

Mr. Chipman—We find lawyers commanding their own prices, engineers command prices, perhaps not what is due them, but relative to their attainments anyway, and I think surveyors, if they are to be a profession at all, should stand on the same basis. A man will be paid about what he is worth. I think this matter should be left for the Council to report on at the next meeting, and by that time the members will have thought the matter over. If we now fix a tariff of fees, or a minimum tariff without due consideration, and in a thin meeting like this, we will rouse the opposition, not only of the Legislators and the public generally, but perhaps among the members of our own Association.

(Mr. Chipman's motion was then carried.)

DISCUSSION IN REGARD TO A STANDARD MEASURE.

Mr. Dickson—About the old standard measure, some are of the opinion that if it were possible to get 66 feet steel tapes made and furnished to surveyors, marked with links on one side and feet on the other and stamped, it would be a good thing. They could be kept and only used for the purpose of testing the chain. I don't think there are any of them in existence, but I don't see why they should not be.

Mr. Abrey—Those tapes are already in existence. The Dominion Lands Office have them and I think the price is $8. They are made at Ottawa, under the authority of the Office there, and all Dominion Land Surveyors can get them, and I presume anybody else can too, by simply remitting the price. They are 66 feet long and stamped by the Dominion Government.

Mr. Butler—I am under the impression that we are all liable to be fined for using unstamped chains. I think we are compelled to submit them to the Inland Revenue Office and have them stamped.

Mr. Chipman—Now that we have a testing apparatus in the school of Science, we have the means of testing standard measures. That is under the control of our Provincial Government, and we are under the wing of our Government, and I think it is a good move for the Board of Examiners to furnish standard steel tapes. We have outgrown altogether these pine window sticks that they have sent around to us, furnished with little brass squares on them. I never heard yet of a surveyor comparing his tape with them.

PRESIDENT'S ADDRESS, 1893.

GENTLEMEN OF THE ASSOCIATION OF ONTARIO LAND SURVEYORS:

Permit me in the first place to thank you for the honor you have conferred on me, in electing me as your first President under the Act of Incorporation, and to crave your indulgence for any errors that I may make in filling so responsible a position.

It is my sad duty to refer to the loss which we, as a society, have sustained, through the death of two of our members, viz: Mr. D. S. Campbell, of Mitchell, and Mr. I. L. Bowman, of Berlin; both of whom were honored members of our profession and respected and esteemed members of society. Mr. Campbell was present on the first day of our meeting a year ago, when he was taken suddenly ill and died shortly after reaching his own home.

On behalf of the Association, I welcome those of you who are here for the first time to-day, and trust that year after year our annual gatherings will continue to be not only pleasant, but also profitable, and tend more and more to the elevation of the profession to which we belong. I think we have good reason to congratulate ourselves on the position that we now occupy.

About seven years ago a voluntary Association was formed, composed of a considerable number of the Provincial Land Surveyors of Ontario. In the formation of that Association it was thought that nothing but good could result from interchange of thought between its members, and with that idea in view, annual gatherings were brought about. The proceedings of each of these meetings were embodied in a report and printed, and by means of these we were enabled to make exchanges with similar Associations, both in Canada and the States, and thus to furnish most valuable information to our members, worth many times the small cost of membership. Then there were important amendments in the old "Act respecting Land Surveyors and the Survey of Land" necessary, and through the exertions of that Association, these were obtained; and finally, during the last Session of the Ontario Legislature, with the assistance of the Government and especially of the Commissioner of Crown Lands, the important step in advance was taken, by which we became a corporate body, with powers and responsibilities similar to those enjoyed and assumed by other professions, and it is in that capacity that we meet for the first time in our history to-day.

Now, there is one point regarding this matter that I wish to emphasize, and it is this, that the old Association, recognizing that the legislation asked for, affected, not only those of the profession

within, but also those outside, the Association proceeded with the utmost caution in every step taken. It was considered not only advisable, but essential, that there should be no opposition in our own ranks, and with this in view, a copy of the draft of the Bill was sent to every member of the profession, whose address could be obtained, asking his opinion regarding it. The result was practical unanimity, and I believe to-day we start with a body united in its loyalty to what has been done, and prepared to carry out, and not only to carry out, but to assist in working out and perfecting what has been done ; for it must not be assumed, that now, that we have become incorporated, we can rest and be thankful and cease our exertions in behalf of our welfare. On the contrary, we have only obtained a vantage ground which will enable us to do more than was possible heretofore for our advancement.

As you are aware, we have now practical control of the examination of candidates desiring to enter the profession, and it will be our own fault if the standard of admission is not kept sufficiently high to enable us to take rank with the other learned professions of the land. There is another point that might be mentioned, in the legislation that we have obtained, we believe that it will not only be beneficial to us as a body, but that it will be found to be in the public interest as well. On this point, there was, I believe, some misapprehension. It was thought that we were asking the Legislature to grant us powers under our by-laws by which we might profit to the detriment of the community. In reply to this, we have only to refer to the Act itself, which certainly gives no such arbitrary powers, either directly or indirectly.

While acting as a voluntary Association, we became affiliated with the Association of Dominion Land Surveyors. I am happy to say that our relations with that body have always been most cordial, as certainly becomes two bodies so closely related, and I trust that in the future the same harmony may always continue.

It has occurred to me, that we might profitably reciprocate still further with our sister Associations, by inviting each one to send a representative to visit us at our annual gatherings and to be a guest at our dinner. This is not an uncommon practice with other societies, and I am confident that it would add very much to the interest of our meetings if we could have with us professional brethren from other fields than our own, and I presume that they would be quite willing for us to send representatives to their meetings, and the reports of the latter would also be interesting and profitable to us.

In addition to the ordinary business you will have at this session the ratification of by-laws, in accordance with the provisions of the Act. Other matters necessitated by the change in our status will require your attention, and, in view of this, I feel that I would be trespassing on your time by detaining you longer ; but I cannot close without expressing a hope that our deliberations may be conducted in the same spirit in the future that they have been in the past. While we have had many discussions where difference of opinion was entertained and expressed, yet during all those years I do not recollect

any member ever violating the amenities of debate, or being called to order by the chair.

In this respect I feel like challenging any body of men, either lay or clerical, to show such a record, and with such an example I shall feel that if there unhappily should in the present session be a departure from it, it will have to be attributed to your presiding officer.

I will now, gentlemen, ask your attention to the various subjects on the order paper.

I thank you, gentlemen, for the kindness you have shewn me, while I have been presiding over this meeting. There is just one little matter that I think in the future, perhaps, we might attend to and it would expedite business very much, that is, that all motions be written out and handed in before being put. I know it would save a good deal of trouble. There has been no change, I am happy to say, in the cordial relations that have subsisted in the past between us. As I said in my address, I don't think there is any other body that can shew such a record as we have shewn. We have never had any discord whatever, either in committee meetings, so far as I know, or in open session, and I am very glad to know that this meeting has been no exception to the rule, and I hope concord may continue in the future.

PAPERS.

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

GEOGRAPHICAL SURVEYING.

By L. B. STEWART,

O. L. S., D. T. S., Toronto.

During the past summer I was one of a party of five that made an exploratory trip through that portion of the Rocky Mountains lying between the Bow and Athabasca rivers. Although our chief business was pleasure, each member of the party undertook some special work, so that we might bring back some results worth preserving. Two undertook to look after the geology of the country passed through, and another agreed to act as photographer, while I took upon myself the duties of topographer. We expected to travel at the rate of fifteen or twenty miles per day, so I set to work to devise some means of making a rapid survey of our route, unaided, at that rate. Doubtless many surveys of the sort have been made in a systematic manner, but very few making such surveys, I think, have committed their methods to writing, so that others may have the benefit of their experience; at least I was unable to lay my hands on anything that was of any service to me. I resolved, therefore, to adopt the following method:—I provided myself with a prismatic compass, a pedometer, and a sextant and artificial horizon; the pedometer to be used in making a rough traverse of our route, and the sextant in determining time, latitude and azimuth. The distance given by the pedometer would of course be greatly in excess of the straight line distance between two points, but the ratio between the two would be pretty nearly constant, and a plot of a traverse joining two points at a moderate distance apart would give the direction of the line joining those points with considerable accuracy, though its length might be greatly in error. The determination of the latitudes of the two points, however, would serve to correct the distance, as long as the line did not make too large an angle with the meridian. The pedometer was adjusted to my pace before leaving Toronto, though I did not expect that adjustment to hold good for distances along an Indian pack trail.

On July 8th we left Morley, a point on the C. P. R. forty miles west of Calgary, and for the first few days kept among the foot-hills. On reaching the Red Deer river we followed that stream for some distance, entering the mountains, passed the forks of the river, and kept to the north-westerly branch for about twenty miles. We then left

the Red Deer and struck across a height of land and reached the Clearwater. I found the method of survey admirably adapted to the country through which we travelled, the valleys of the rivers extending in long, straight stretches for many miles, so that sometimes it was only necessary to read the pedometer at the beginning and end of a day's march, and to take the general bearing of the valley through which we had come, while at other times it was necessary to take bearings every mile or two from one rise to another over which the trail passed. The bearings could best be taken backwards, as it was easier to tell the direction from which we had come than that which the trail was going to take in advance of us. Bearings were taken also to prominent mountain peaks, which served both to locate those points and also as checks on the general traverse. The topography was also sketched in detail.

Observations for latitude and time were taken whenever possible; where neither of these was known I found a good method to be as follows:—At noon a number of altitudes of the sun were measured, and the time noted, and also the greatest altitude for latitude, and towards evening a number more were taken for time. A value of the latitude was found from the maximum altitude, which was used in the reduction of the time observations, thus finding the watch correction. The circum-meridian altitudes were then reduced, employing the corrected times, thus finding a value of the latitudes from each. I preferred to reduce each altitude separately to taking the mean of the altitudes and the mean of the times, as any one altitude giving a result differing widely from the others could then be rejected in taking the mean. In the case of the circum-meridian altitudes it would not be correct to combine several by taking their mean before reducing. After having determined the latitude and the watch correction, the variation of the compass was easily found by taking a number of bearings of the sun, noting the times; then the latitude and declination being known each observation gives a value of the azimuth, which, compared with magnetic azimuth, gives the variation. This method, it is true, involves a good deal of calculation, but this can be left to some future time; the present and not the future is to be considered in such field operations. The following are the results of a set of observations taken at one camp:—

CAMP 28 (APPROX. LONG. = 7 h. 45 m.)

Sept. 4, 1892.

2—alt.$\left(\frac{\cdot}{\cdot}\right)$	Watch time.	Latitude.
90° 12′ 50″	12 h. 28 m. 40 s.	51° 56′ 38″
14 0	30 18	56 40
14 30	31 28	56 47
15 50 (max.)	.....	56 46
		Mean = 51° 56′ 43″

Index Error = + 35″
Watch corr'n = − 37 m. 40 s.

Sept. 5.

2—alt. $\overline{\odot}$	Watch time.	Corr'n.
32° 49′ 20″	7 h. 47 m. 32 s.	A. M. – 37 m. 31.9 s. (?)
33 16 40	" 49 2	37 37.2
33 36 40	" 50 10	37 39.2
34 7 10	" 51 52	37 41.3
34 26 50	" 52 58	37 41.3

Mean = – 37 m. 39.7 s.

Watch time.	Mag. Az.	Ast. Az.	Variation.
8 h. 8 m. A. M	80°.2	104°.6	24°.4 E
8 h. 9 m. 20 s. "	80°.5	104°.9	24°.4
8 h. 11 m. 50 s. "	80°.7	105°.3	24°.6

Mean = 24°.47 E

The method given above of course cannot be used where it is inconvenient for the explorer to stop during the day to observe. For night observations he may proceed as follows:—Measure a number of altitudes of Polaris and also of some other star or stars near the prime vertical, noting the watch times. If the pole star is not far from its elongation any one of the altitudes may be used as the latitude in the reduction of the observations of the time stars, and the watch correction thus determined—if near the prime vertical the error resulting from an incorrect latitude is very small. The times of the pole star observations are then corrected, and form each a value of the latitude deduced. If the mean of the values so found differs much from the assumed value it may be necessary to reduce the time observations afresh, and then find the effect of the alteration in the watch correction on the latitude. This may be done conveniently by the differential formulæ :—

$$dt = -\frac{d\rho}{\cos\phi \tan A}$$

$$d\phi = -\cos\phi \tan A . dt$$

in which

$d\phi$ = the correction to the latitude.
dt = the correction to the hour angle reckoned east or west from the meridian.
ϕ = the latitude.
A = the azimuth.

In the first formula of course A is the azimuth of the time star, and in the second that of Polaris.

I was obliged to take my observations during the day, being provided with a glass horizon, which, being levelled by means of a small

spirit level laid on its surface, had to be watched continually to guard against a change of inclination ; with a mercury horizon this difficulty is obviated.

After reaching the Clearwater our trail followed that river for about twenty miles and then struck over a height of land about 7,000 feet above sea level, and a few miles further we reached a stream flowing into the Saskatchewan, which we reached on July 18. We then crossed the Saskatchewan and followed it down stream till we were among the foot-hills again ; we then turned sharply to the left and travelled in a north-westerly direction through a country distinguished by its numerous swamps, muskegs, and mosquitoes, till the Brazeau river was reached. We now re-entered the mountains, keeping to the Brazeau, which we explored nearly to its source. About thirty miles above where it leaves the mountain the river forks, the more northerly branch flowing from a lake of considerable size, which we named Brazeau Lake, as it was not shown on our maps. From this lake we crossed a height of land and soon reached a small stream flowing north-west, and we concluded that we had crossed the divide between the Saskatchewan and the Athabasca systems. This stream led us finally to a large river which the Indians call the Sūn Wapta, and which is probably the Athabasca. After following this stream for about twenty miles our trail became impassable, so we carried on our explorations on foot about fifty miles further and penetrated to a large lake, in latitude about 52.° 18′ N., that discharged towards the west, and which therefore must be situated at or near the summit of the Rockies. Provisions now began to run low, so we were obliged to beat a retreat, and by forced marches reached Morley in ten days, after an absence from there of two months and two days.

I have given merely a hurried account of the trip as there was little to distinguish it from similar expeditions through a mountainous country. We had two Stoney Indian guides, who required the usual amount of humouring to keep them from deserting us.

During the progress of the trip the courses of the rivers were sketched from some convenient height, and rough surveys of the lakes were made in the following manner : Having climbed to some point at as great an elevation as possible that commanded a view of the whole shore line, the height above the lake was determined by means of the barometer, and then compass bearings were taken to prominent points along the shore and the angles of depression of those points measured with a clinometer level, thus fixing completely the positions of those points with reference to the station point. In this way a tolerably accurate survey of a lake ten miles in length may be made in about fifteen minutes after having reached the station point, and with more accurate instruments the method is susceptible of a considerable degree of accuracy.

On my return to Toronto I found myself in possession of quite a mass of notes and observations, from which I proceeded to construct a map. I first plotted in the Polyconic projection the meridians and

parallels of the region traversed, and then fixed the position of the starting point from a reliable source. I then plotted the traverse of the route beginning at that point, reducing the pedometer distances by one-third and correcting the bearings for variation until the first point whose latitude had been determined was reached. A straight line was then drawn connecting the extreme points of the traverse, and the parallel of latitude of the terminal point, found by observation, also drawn; the point of intersection of these two lines fixed the true position of the terminal point. This method was continued until the whole was plotted. I found the mean value of the ratio of the straight line to the pedometer distance to be about six-tenths. After the traverse line was plotted and corrected the topography was added.

It is readily conceded that the method described above is only applicable under certain conditions. The nearer the general course comes to being due north or south the better the check the latitude is on the distance, but if the direction be nearly east or west the method fails altogether. In the latter case it would be necessary to depend upon longitude determinations, and these are acknowledged to be rather unsatisfactory with portable instruments. A good lunar observation would give the longitude to within five or six miles, and this does not compare with a latitude determination with the same instruments, and chronometers are too delicate to be of any use on a rough expedition. The following method might be used to advantage when the party intends to return by the same route:—Let each member of the party be provided with a good watch, whose correction is found at the starting point before leaving and also on returning, and let their corrections be also found at as many intermediate points as possible along the route on the way out, and also at the same points on the return trip; a comparison of the two corrections found at any one point together with the interval of time between them will give a value of the watch rate, and a value of the rate can be thus found from each pair of observations, and an idea of its regularity in this way gained. The watch that shows the greatest uniformity in its rate may be used in comparing the local times of the initial and terminal points, and also those of the intermediate points.

By some system such as I have outlined here a survey of a large extent of country sufficiently accurate for a great many purposes might be made in a very short time, and throughout large sections of the Rocky Mountains land will never be valuable enough to justify a more accurate survey.

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

HISTORY OF THE TACHÉ GOLD FIELD.

By HENRY Deq. SEWELL,

O.L.S., A.M.I.C.E., ENG., D.L.S., Port Arthur.

This promising gold field was first discovered during the construction of the Canadian Pacific Railway, in the year 1882, by a Mr. Baby, who found a very promising vein on the north side of the railway track, and early in the year following several good-looking veins were located by the author, Mr. Halstead, and several others. All the locations being situated about 4 miles east of Taché Station, or 177 miles from Port Arthur, or 121 miles from Rat Portage, the first place where gold was found in Western Ontario (in which place it was discovered a few months previously).

Unfortunately for Taché, it has no inhabitants other than the few employees of the Canadian Pacific Railway, Taché being only a small side station, whereas Rat Portage is an important division station, with considerable lake traffic, and consequently it has a population of several thousands. It is, therefore, not to be wondered at that whilst the richness of the "Lake of the Woods" or "Rat Portage" gold field, has been prominently and persistently kept before the public, the claims of the rich but comparatively unknown Taché Gold Field, with a very limited number of persons interested in its development, has easily been kept almost a profound secret, until it has suited the purposes of the few, who all along were acquainted with its wonderfully large and profitable veins, and which compare most favourably with the better known, but more refractory gold ores of the Lake of the Woods, to say nothing of the more advantageous position for shipping by rail of the Taché gold field. The Lake of the Woods ores having to be shipped by steamboat prior to being transhipped by rail.

After the discovery of the first claims and their subsequent location, nothing was done towards their development, beyond a small amount of stripping on some of the veins, until the summer of 1889, when the "Maple Leaf Gold Mining Co." commenced operations on the "Wawbeek" (one of the original finds) under the able management of Mr. S. V. Halstead, who commenced operations by sinking at the junction of two veins, with the satisfactory result of the assay value increasing from $2.00 gold at the surface to $15.00 gold at a depth of 12ft., the vein being about 2' to 4' in width, the quartz being of a greyish white colour, carrying iron pyrites; when work was suspended owing to water coming into the shaft.

The company having been organized as a development and exploring company, and having carried on an extensive exploration of the surrounding country, whilst mining on the "Wawbeek" were fortunate in discovering the "Black Fox" situated about 2 miles further east, or 175 miles from Port Arthur. The company have sunk two shafts on the main vein, and did some stripping of the vein, the work coming to an end about Christmas of the same year, after which all work was suspended pending an attempted sale of the property, the capital of the company being insufficient for anything beyond preliminary exploration. In the summer of 1892, however, the company was reorganized with a larger capital, under the name of the "Taché Gold Mining Company" and the "Jumbo" and "Dolina" claims, which are adjoining the "Black Fox" have been added to the company's property, thus providing for mining operations an exceedingly strong vein, varying from thirty to one hundred feet in width and averaging at least from forty to fifty feet in length, which extends throughout the "Black Fox" and "Jumbo" locations for a length of over four thousand feet, although it is capped over with soil and trap in places. The gangue of the vein consists of a very fine grained flour quartz. On the surface in some places it is somewhat discoloured from exposure, but its natural colour appears to be almost a pure white. The gold contained in the ore is extremely fine, so much so that but little mineral can be seen with a magnifying glass. The average of six assays taken indiscriminately from the vein amounts to $7.15 of gold and silver, mostly gold —some of these assays showing no silver. The walls of the vein are clear and well defined and the vein runs with the formation, which consists of Huronian blue trap, at an angle a little north of west and south of east. The vein dips 10° to 20° to the north, and shows a strong tendency to widen out as it goes down. There are also two very nice looking veins on the "Dolina," as shown on my plan, that are well worth prospecting with every probability of their turning out valuable.

The property is very advantageously situated, being about six miles east of Taché Station, on the Canadian Pacific Railway, and about half a mile south of the track, from which a spur or side track could easily be constructed to the Minne-ha-ha River, a rapid running stream about seventy feet wide, which flows through the "Dolina," and on which location there is a nice waterfall of over twenty feet that is capable of supplying considerable power for at least half the year.

The enormous quantity of ore in sight, and the ease and cheapness with which it can be literally quarried is so great, that the author considers that it could be crushed and handled very economically on the ground, for which purpose he has recommended the erection of a ten stamp mill of the latest and most approved style of seven hundred and fifty pounds per stamp, with engine and boiler, automatic feeder, breaker, two electric plates, two pulverizers and blankets over sixteen inch sluice to catch the concentrates, and with ample provision for the addition of an extra ten stamps, which could be erected and put up on the ground, say close to the waterfall, for $13,000, and

the additional ten stamps, with accessories, would cost an extra $6,000, erected on the ground when required. Such a plant, which is similar to those used generally throughout the United States, should save from 95 per cent. to 98 per cent. of the mineral contained in the ore, and as such ought to commend itself in preference to the many new-fangled experiments which are constantly being offered to the public.

The author has also proposed the sinking of a shaft in pit No. 2 to a depth of fifty or sixty feet to meet a drift run in simultaneously from the foot of the hill along the course of the vein, which should be done within a length of two hundred to two hundred and fifty feet, which procedure would open up a large body of ore sufficient to meet all the mining requirements for several years to come, besides affording ample drainage for the mine, after which the author considers that the ore could be mined at a cost not exceeding 25 cents per ton, and taken on a tramway with a down grade to the mill at the falls, where it could be treated for fifty cents a ton, thus costing 75 cents per ton for milling and treating. On this basis a ten stamp mill working, say, three hundred days per annum and crushing twenty tons a day, would crush annually six thousand tons, worth, say, seven dollars per ton, would yield $42,000 less, say, $5,000, as cost of mining and milling equals $37,000, and with an additional ten stamps, this yield would be doubled. Of course this is contingent on the assumption that the ore does not increase in richness as it goes down (a very improbable event). Also to this estimate would have to be added the cost of superintendence and contingencies, which would be the same in any event, together with the interest on capital; but from this it can be easily seen that the annual yield, even under the most adverse circumstances, would be so large as not only to cover the contingent expenses, but to leave very handsome dividends.

In addition to the development work by the "Taché Gold Mining Co.," a very important discovery, called the "Mastodon," has been made about four miles west of Taché Station and about two miles south of the railway, which the author surveyed for Mr. Arthur, of Detroit, and Mr. Halstead. The property consists of two wide veins about three-quarters of a mile apart, varying from about 50ft. to 130ft. in width. Development work is being vigorously carried on under the supervision of Mr. Halstead, with the object of placing the property on the English market during the coming summer. The formation here differs entirely from the properties of the "Taché Gold Mining Co." and all previous discoveries in that locality, where the veins run through the Huronian Blue Trap and Slates, whilst at the "Mastodon" the veins are entirely in the Huronian Talco Schist formation. The veins are composed chiefly of white quartz with streaks of mineral containing a large percentage of copper, banded with vertical seams of Talco Schist, which latter decreases considerably as the shaft goes down, giving place to the quartz.

After some surface blasting, with the view of discovering the most favourable spot for sinking a shaft, a place was selected where the vein is about 90 feet in width, at a point a little north of the centre of the

lode or vein, where a shaft has been sunk 7'x5', work being commenced on the 1st November last. The shaft is at present 40 feet deep, the vein showing so far no appreciable dip, the course of the vein being about 10° north of east. The streaks or seams of quartz average about five inches apart going in and out in a wavy manner, but keeping a straight course down, becoming thicker as depth is attained. The mineral has thus far seemed equally divided between the quartz and Talco Schist, though the iron pyrites are chiefly contained in the latter. There are also two seams carrying sulphide and copper pyrites containing gold, and are about four inches wide, narrowing and widening in places from two to ten inches, which also keep a straight course down, but twisting in and out; the two streaks being about four to five feet apart. At 35 feet down silver began to suddenly increase, taking the form of small nuggets, a very remarkable feature in a gold mine. At 38 feet down a third, though very narrow, similar streak of sulphide and copper pyrites has begun about the centre of the shaft and is increasing in width with depth.

At a depth of 40ft. the vein has been cross cut on each side of the shaft to ascertain the true width of the vein, which has thus been proved to be 28 feet wide, although from surface indications it appears probable that there may be one or more parallel veins in the lode; but be this as it may, the present ascertained width, is ample for very extensive mining operations. The main streak which occurs in the centre of the vein is 12ft. wide, and is composed principally of quartz; between that and the side walls are streaks 8ft. wide on either side. These side streaks are both highly mineralized, and are composed of mica schist full of numerous quartz stringers. The work of sinking is being carried on as fast as possible, the quartz constantly increasing in width, and the mica schist decreasing as the work goes down on the vein. The average assays at the surface were $3.00 per ton, ($2.00 gold and $1.00 silver); at 12 feet the average assay was gold $6.00, copper $8.00, total $14.00, the gold being evenly distributed, and the copper being confined to the seams, carrying sulphide and copper pyrites already described. At 30 feet, gave gold (average) $44.50, copper (from the streak) $48.87, silver 83c., and platinum a trace, total value $94.20 per ton; an increase from the surface of $91.20, and of $80.20 from the depth of 12 feet.

The general features of the country surrounding Taché would seem to indicate, that it has been subjected to great denudation during the glacial period, the country being exceedingly flat for a mineral district, and what few rocks are to be seen, are mostly low and surrounded with swamps or muskegs. Consequently it is very difficult to discover and follow up the different mineral veins in that country, and hence it is not surprising, that only a very few really good veins have so far been discovered. Generally speaking, the best veins appear to lie to the south of the railway; those found to the north of the railway being mostly north and south veins, whilst those south of the railway, are chiefly east and west veins, and generally of a greater width. There is also in the neighbourhood of Taché a very decided change of formation. From east of the "Black Fox" to

about 3 miles east of Taché Station, the formation consists of Huronian Blue Trap and Slates, where a narrow belt, running about north and south, and varying from one to two miles in width, of Laurentian Gneiss, that almost approaches to granite in appearance, comes in. This formation is followed again by the Huronian Blue Trap and Slate, which extends westward to the north of the railway, and also to about two miles south of it, where the Huronian Talco Schists comes in. It will thus be seen that the country surrounding Taché is peculiarly interesting from a geological and mining standpoint, and presents a rich field for both the miner and geologist, and one which will amply repay the careful examiner, for his labor and trouble in exploring this interesting country.

In conclusion, the author wishes to say that in the foregoing pages, he has attempted to present a short account of the mineral resources of a comparatively limited and unknown district. His remarks on the extreme difficulty in giving publicity, to the mineral resources of Taché applies with equal force to many other comparatively unknown and unvisited mineral belts, which cross and recross at intervals in near proximity to our great Canadian highway, the Canadian Pacific Railway, many of which would richly reward the patient miner, and the aristocratic geologist, in their search for mineral wealth, and geological formations ; and would also tend largely to produce the early development of our vast mineral wealth, and add greatly to the prosperity of our beloved country.

DISCUSSION.

Mr. McAree—I have never been so far west as Tache, except passing through on the C. P. R. One thing I thought was very encouraging, was the width of the veins. When you get a vein as wide as those that Mr. Sewell has described, carrying $6 or $7 a ton, it is a very rich yield.

The President—The question struck me whether it was not too wide for a well defined vein. Then again he spoke of it running with the formation ; is that a good indication ?

Mr. Sewell—Yes, I consider that is one of the best indications.

The President—I thought a fissure vein crossed the formation.

Mr. Sewell—Some of them do, but not necessarily.

Mr. McAree—I would ask if these widths that he gave include any country rock ?

Mr. Sewell—There is sometimes a little in them.

The President—I don't know whether any gentleman here knows anything about this wonderful Ophir mine—that is a mine near Thessalon. I heard wonderful reports about it the other day. I heard that there was a pyramid being sent to the Mineral Exhibit at Chicago that would astonish the world.

Mr. McAree—I would like to ask about the dip of the vein ?

Mr. Sewell—About 10° to 20° from the vertical.

Mr. McAree—Are the wall rocks the same on either side?

Mr. Sewell—Yes.

Mr. Whitson—Is there not some difficulty in getting practical mining men to interest themselves in veins that would yield as low as $6 or $7 a ton? In my experience mining men care very little about going into a vein unless it averages $20 a ton. Take a vein 2 feet wide, it is quite a common thing to get quartz yielding $15 or $20, and mining men won't look at it at all.

Mr. Sewell—I don't think there is any difficulty where you get enough of it. If you have 30 or 40 feet it makes a great deal of difference; you can get it out easy and there is less expense in excavation.

Mr. Ledyard—Perhaps you might like to hear about some very low grade ores that have paid high dividends. I can give you a few that are working on a very large scale. The Homestake mine in the Black Hills yields $3.79 in gold, and after reducing, it leaves a profit of $1.19 per ton. It is only made to pay in that way by being worked very largely. Nearly a quarter of a million tons are treated per annum. Similar results in a small way have not proved satisfactory. Then there is another with a still lower yield, the Treadwell gold mine in Alaska. The second annual report for the year ending May 31st, 1892, shows a profit of $361,000 earned during the year. 239,633 tons were mined, yielding $707,000,—an average of $2.95 per ton only. The total mining cost was 64 cents per ton; wages of drillers and labourers were high, and blacksmiths were $4 and $5 a day, but notwithstanding this the total milling cost was 38 cents per ton; the total operating and reduction cost was $1.50 per ton. Haile gold mine, Lancaster Co., South Carolina, yields only about $4,50 a ton. They are working now, I believe, about 120 tons a day. They were working 80 tons a day and made it pay very handsomely. I think the Alaska Treadwell mine has gone down to a steady width of 45 feet.

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

TIMBER SURVEYS AND EXPLORATIONS.

By J. F. WHITSON,

O. L. S., Crown Lands Department, Toronto.

In this paper I desire merely to say something that may be of some practical benefit to the younger members of this Association who have not had any experience in this kind of work. As early as 1830 the survey and licensing of timber berths was begun by the Government on the Lower Ottawa. The system as then introduced was to lay out the timber in large blocks, occasionally very irregular in shape, having a frontage on the Ottawa River of various lengths, and running back a distance of from five to ten miles, the rear boundary being parallel to the general course of the water front, or midway between two streams. This system was continued up the Ottawa River as far as Lake Temiscamingue and westward to Lake Nipissing, and extending inland on either side of most of the larger tributaries; in fact, covered the greater portion of the Ottawa valley. In 1857, base lines were commenced north of Lake Nipissing and extended westward through Algoma. These lines formed the basis of a new system of township surveys, six miles square, which were sold as timber berths; the same surveys serving for both township and limit outlines. Large townships in the Huron and Ottawa districts that were sub-divided before the timber was disposed of, were divided into several blocks and sold as limits, the lot lines forming the boundaries of the different limits.

The old system of laying out timber along the different streams was an excellent one, but the block system, especially when large, has in many instances proved unsatisfactory to the lumbermen. Though it is not my intention here to suggest any improvement relative to the different systems, yet the assumption is that it might be more profitable to the Timber Department, and more satisfactory to those who purchase limits, owing to the rapid increase in the value of pine and other timber, if the unsurveyed sections of Northern Ontario, before being laid out in limits, were thoroughly explored by good practical lumbermen or surveyors, who have a practical knowledge of timber, and sketches furnished shewing the position of the lakes, streams, watersheds and all valuable timber, and the position of the most suitable boundaries of the different limits projected thereon; so as not to include, where practicable, on limit "No. A" for example, timber tributary to streams flowing through an adjoining limit and in an opposite direction from those flowing through the former. This

was the system adopted in the survey of limits in the District of Rainy River. A thorough exploration of the country was made in advance of the survey by thoroughly practical lumbermen, who examined carefully the position of the pine, lakes, rivers and water-divides, and furnished the surveyor from time to time, as the work proceeded, with sketches of the different sections explored, showing the position of all lakes, rivers, blocks of timber, etc., with the proposed outlines of the different limits projected thereon, leaving prominent marks along the streams or lakes where they should begin and end. Occasionally there is considerable trouble in locating the rear boundaries along the height of land, but by running trial lines this difficulty will be overcome, and in the end it will be found time profitably spent.

Each explorer should be accompanied by a good bush-man, who travels with him continually, besides other assistants necessary to keep his camp outfit and supplies near the work. One of those assistants should be able to cook The camp outfit should be light yet comfortable. He should be provided with a large pocket compass, a field glass, a pair of climbers and a pedometer for estimating distances travelled. After exploring a section he should forward by his assistant his sketches, shewing all information that might be of assistance to the surveyor, who would retain the explorer's assistant as a guide while surveying that section, and return to the explorer one of his most intelligent axemen in exchange.

If estimators accompany the survey party they should each be accompanied by a good man, besides other necesary assistants to keep their camp outfit and supplies as near their work as possible. They should be each furnished with a tracing of the limit to be estimated, shewing, wherever possible, the area of the different parcels covered with pine, and where the limit is large and not divided by lakes or streams, cheap division lines should be run, dividing the limit into blocks of a reasonable size to suit the estimators, and the area placed on each block. Where the timber is unevenly distributed, the smaller those divisions the more accurate can the estimate be made, as the customary way of estimating is to first carefully travel each block of timber and then select an average acre, or part of an acre, in different parts of the block, estimate those carefully by counting the trees and estimating approximately the quantity in each tree, and by this means strike an average per acre of the whole block. From this it will be seen how important it is to have the areas placed on each block, as many an estimate has been incorrectly made, owing to the lack of information which should be supplied from the surveys. The writer is of the opinion that most men not accustomed to surveying, and even practical lumbermen, are apt to overestimate the area of small scattering groves of timber. All the information that can be procured from the survey, as well as from the exploration, should be furnished the estimators. If they accompany the surveyor much valuable assistance can be rendered them.

The plans of the survey are generally made on a scale of forty chains to the inch. All lakes and large streams within the limit should be traversed and shown on the plan. The astronomical course

and length of all boundaries, a description of all posts planted and how marked, the outlines and description of the different blocks of timber ; in fact, all information that might be of value to either the seller or buyer should be shown on the plans. On floatable streams be careful to note rapids, falls, or other obstructions.

It is of the first importance before starting on any survey to secure a good party, as on their exertions and to their intelligence depend a great deal the rapidity of your movements and the success of the expedition. The instruments I found most satisfactory and convenient for such work were : the solar compass ; Foster's improved micrometer, with base rod fifteen to twenty links long, with white porcelain discs for summer use and stained glass for winter ; a heavy steel tape ; a light compass, with four inch needle ; a link chain ; a folding drawing-table, and other necessary drawing material and instruments (do not take liquid ink for winter use.) The party should consist of the surveyor, a good assistant, who, besides being a chain man, should be able to take charge of the survey when required, a good cook with experience on similar expeditions, five or more good axemen, the more depending upon the number required in forwarding supplies.

If the survey is to be carried on in the summer season all of the party should be canoe men, if in the winter they should be able to snowshoe, pull a toboggan or drive a dog team. As the necessary camp outfit and supplies for a timber survey carried on in the summer is similar to that required in subdividing a township, and was very fully described by Mr. Burke in a paper read before this Association last year, I will therefore confine my remarks chiefly to the requirements of a winter outfit for a party of eight, the survey being remote from civilization in the northern districts of Ontario. Secure three square tents made of eight oz. duck or xxx, two of them 8′x10′, the other 10′x12′, with a two-foot wall ; three stoves made of light Russian iron 20″x12″x11″, with five feet of pipe for each stove, made so that one length can be slid inside another and all packed inside the stove. The pipes should be about three inches in diameter and each set supplied with a damper. Folding stoves, though more convenient to portage, do not give as good satisfaction. Two heavy double blankets for each man, and if possible each couple of men should secure a rabbit skin blanket, as there is more comfort in one of them than in two woollen ones of double the weight, and without your men are made comfortable you will have no end of trouble through sickness, or men deserting you. A folding reflector and two light sheet-iron bake kettles, beside the other usual cooking utensils.

If the survey extends over a large tract of country, where much moving about is required, procure two good dog trains (six dogs in all) and two large toboggans, eight feet long by fourteen inches wide, made of well-seasoned white oak or beech, made in two pieces of equal width, for if made of one board they become high in the centre and are apt to slide off the trail. Smaller toboggans, six feet in length, should be supplied to each couple of men, except the cook, whose work when moving camp begins when the others end. Three good dogs will draw from 300 to 450 pounds fifteen to thirty-five miles per

day, depending upon the condition of the trail. They are fed once a day, after their day's work is done, and will consume on an average per day a little over one pound of corn meal and a-third of a pound of tallow per dog; if fed on fish three pounds per day, but will not work so well on the latter as on the former. The dogs should be all chained up at night, as no matter how well they are fed they like a dessert of snowshoes, or poke their nose into the cook's affairs. On one occasion, while camped at Pine Portage on the Dawson route, the Hudson Bay Company's dogs unearthed the bean kettle from the hot ashes and were in the act of pawing off the cover when the cook arrived with his shovel. Each member of the party should provide himself with a pair of good snowshoes and sufficient showshoe filling for repairs during the expedition, three pairs of moose or caribou moccasins and a pair of seal moccasins for use during the soft weather in the spring, a pair of smoked glasses and some sulphate of zinc to prevent snow blindness during the latter part of February and March.

As to provisions, men will consume about one tenth more in winter than in summer. It would be well to calculate on $1\frac{1}{4}$ pounds of flour, $1\frac{1}{4}$ pounds of bacon, and one-half pound of beans, besides the usual allowance of tea, sugar, evaporated apples, etc., for each man per day.

DISCUSSION.

Mr. Dickson—I have been a great deal out in the winter season, and I have never had any experience with stoves at all. Mr. Whitson says that each man requires two pairs of blankets; but I was out all last December and up to the 22nd of January, and I had no stove in my camp. I had a rabbit-skin blanket for myself and one pair of blankets under, and the other two men had three pairs between them, and I found that quite sufficient. Of course there is a great difference in men. If they have stoves in their tent, I suppose they would do with a good deal less. But I have no doubt Mr. Whitson speaks from practical experience. With regard to provisions, I find it very difficult to say what quantity of provisions to take. I sometimes take two or three men out and find myself run short, and then take two or three different men and the same quantity of provisions and have three or four days' rations left. With regard to getting good men, I cordially agree with him that the very best man is the cheapest; and above all you want a first-class cook, no matter what he costs. The provisions must be well cooked, and the utensils must be taken care of. I have had cooks that within a fortnight ruined a set of utensils altogether that would do other cooks six months, or perhaps two years. With regard to tents, I find that common double-twilled cotton is just as good as any heavy duck you can get, and much easier carried round.

The President—There is one point there that is worthy of attention, that is regarding the division of the limits so as to correspond with the water sheds. It is very important, indeed, that these limits when they are sold should be on the same water shed as much as possible.

The President—With regard to what Mr. Dickson says about stoves, my experience is that for the sake of fuel alone it pays to take a stove.

Mr. Dickson—I think if ever I am out over winter again I shall try and get a stove just for that very reason. I have never suffered from cold, but I am satisfied it would save a very large amount of labour to have stoves.

The President—Some years ago I made a trip from Rainy River to Prince Arthur's Landing, and I had stoves. We started through in the fall, and it took us until January to get to the Lake of the Woods. We met another party who had not stoves; they had a big log-heap and a big fire on, but they were nearly frozen that night. The man in charge told me he would not have stoves, and advised me to throw them away, but the man who was with me said he would turn back if I threw them away.

Mr. Morris—I have used them and found them very useful. They are made so as to fold up, and put together with pins along the side, and I think they weigh about six or eight pounds. The pipes fold together, and the whole thing takes up very little room.

Mr. Sewell—I have always found in my experience it is far better to have shed tents and a log-heap. I have tried the stoves, tried everything, and I believe in nothing but just simply having a nice sheltered tent made out of light cotton, as light as possible. It is best to put them up in pairs, one facing the other, with your log fire in the centre, something on the principle of the Indian wigwam, and I don't think there is anything so comfortable as that.

Mr. Kirkpatrick—My experience is this, the more comfortable you can make yourself on a winter survey the better work you will do, and the better you feed your men the better work they will do. I thoroughly believe in making yourself comfortable with stoves. I have been out in winter, on the north shore of Lake Superior, with the thermometer 35 degrees below zero, and we were always just as comfortable as anything, and we never had those beautiful inventions of now-a-days, rabbit-skin blankets. But I remember Mr. Pearce, who is one of those who do not care much for comfort, spent a whole winter in Manitoba and never had a fire at all. He had a bag, and he used to get into this bag and shut himself up in it, and lie down in the snow, and he came out of it perfectly well. But my belief is that surveyors have got to be like everybody else, they have to take care of their constitutions, because if they don't they will be miserable rheumatic individuals when they come to be old men. As to the division of timber limits to correspond with water sheds, we have had a good deal of trouble with the surveys in the Upper Ottawa district. Just as the timber gets more valuable, the lumbermen begin to question the validity of a survey, no matter when it was made or how long it has been there; they think if it is not exactly in the centre between two rivers it must be re-run, and they ask for instructions every now and then to re-run those lines, which, of course, were not

run absolutely and accurately to an inch. It is a very difficult thing to run such a line—in fact, it is almost impossible for two surveyors to run the line the same. They go to work and traverse a river, and use their best judgment. Their lines may cross and re-cross each other, it does not amount to very much in the end, but it makes the two lumber firms bad friends. My belief is this, that when these lines are run there ought to be legislation to make them permanent.

The President—Those descriptions went to the water shed.

Mr. Kirkpatrick—Yes; they don't allude to the line that was run at the time they were first commenced. Then the lumbermen get an idea, and I believe the courts have held too, that the descriptions will hold, and not the work on the ground. I am told decisions have been given time and again in Ottawa in these timber surveys in which the license holds against the work on the ground.

Mr. Morris—No; I think the impression now, is that the work on the ground will hold before the license, and I think the lumbermen are beginning to understand that. They are getting over this looking for flaws in the lines.

Mr. Dickson—I think one great difficulty is the lines not being well blazed when they were first run. I know I have followed some of those lines, and it was very difficult, because they had not been properly blazed. I don't think it is possible for any surveyor to be too careful in blazing his lines. Every tree should be well blazed with three blazes on it.

THE DUTIES OF A LAND SURVEYOR ON THE MAINTENANCE-OF-WAY STAFF OF A RAILROAD.

By W. L. INNES,

O. L. S. London.

It is a somewhat difficult matter to define exactly what the duties of a land surveyor on the Maintenance-of-way Staff of a Railroad—in his official capacity—really are. He will be called upon, of course, to do everything that cannot legally be done by anyone but an authorized land surveyor, such as laying out boundaries of properties. Besides this, he will probably also be required to perform a great many other duties which merge into the engineering.

In this paper the writer will attempt to describe in a very brief and imperfect way what are usually taken to be his duties. His principal duty as an authorized land surveyor on the maintenance-of-way staff of a railroad is to look after the real estate of the railway company.

His first step should be (if indeed it has not already been done) to very carefully compare the right-of-way plans with the deeds, and see that they show correctly the land actually owned by the company, then to go carefully over the ground and see if the fences are in the correct positions.

It will not unfrequently be found (unless those in charge of construction are more careful than usual) that in a large number of cases the fences are not in the correct positions, and generally speaking, that they are not "out" far enough.

Having discovered that a part of the right-of-way fence is not in the correct place, the surveyor should take steps to have it changed to its proper position, if it has not been the undisputed boundary of the right-of-way for more than ten years, in which case, of course, according to the "ten years statute of limitation of action" it forms the unalterable boundary.

Sometimes the railway company will actually hold the deed of a strip of land on one side of the centre line, fifty feet wide, while the fence only includes thirty-three feet. If, as is frequently the case, this fence has formed the undisputed boundary of the right-of-way for more than ten years, the seventeen foot strip not included by the right-of-way fence, is lost to the railway company, and may be credited to those who had the fencing in hand at the time of construction. If, on the other hand, the fence has been the undisputed

boundary for less than ten years, the surveyor should have the fence put in the proper place, so as to include the fifty feet actually owned by the company, as before mentioned.

The question whether or not the loss of the land is greater than the cost of altering the position of the fence should be considered, as it may happen that the value of the land is less than the cost of altering the position of the fence. So that under these circumstances the fence should be left undisturbed and its position shown on the right-of-way plan.

It may seem peculiar that while there are a great number of cases similiar to the above, there are comparatively few in which the right-of-way fence includes more land than that actually owned by the company. When a railroad is first being put through, it is frequently more economical to cross a ravine with a trestle than with an embankment; this is also sometimes done for other reasons. At the end of the life of the trestle, of course it is necessary to either renew it or replace it with some other structure; usually, if circumstances will permit, a culvert of wood, or better, of stone, is made for the water, if there is any, or may be as a cattle-pass or undercrossing, and the trestle filled in. In all probability, if the trestle is at all high, it will become necessary to buy an extra piece of land on one or both sides of the track, in order that the new dump may not cover any land not owned by the railway. The surveyor will be required to make the necessary sketches and descriptions for the deeds of the extra pieces of land to be purchased; and after purchase to stake them out on the ground, so that the right-of-way fences may be put up in their proper positions. Speaking generally, the sketches and descriptions are simple, as the shapes of the pieces of land being transferred are generally rectangular, one side being the existing boundary of right-of-way, another parallel to it, and the other two perpendicular to it; however to eliminate errors, care is necessary.

In cities, towns or villages, the railway company may require a certain part of a building lot for right-of-way purposes, leaving the remainder of the lot of little value to the original owner; the owner will therefore generally under these circumstances require that the whole lot be taken. In the course of time, perhaps a manufacturer, a coal and wood man, or a grain merchant, may wish to locate somewhere convenient to the tracks of a railway company, and he may therefore wish to buy the portion of the lot not actually required for railway purposes. If it is decided to sell this land, the surveyor will be required to prepare the necessary sketches and descriptions for the transfer; or perhaps he may only wish to lease the land for a term of years, or the railway company may decide to only lease and not to sell the land. In this case also, sketches and descriptions are required for the lease similar to those for a deed.

Very often grain merchants and others seek permission to put up buildings on the railway company's property for the better carrying out of their own private business. The granting of such permission generally requires that they execute a lease for the land occupied by the site of the building, and of course a sketch and description is

needed for this. As these buildings are usually placed parallel with the track, a description by metes and bounds is not required as is the case in most of the foregoing examples: a much simpler form of description may be adopted. The following blank form for such cases is very convenient.

Description of Site of....., at.....,
to be leased to.....

In the.....of.....,County of.....
and Province of Ontario, being part of the.....Station
grounds of the said Lessors, situate on.....Lot Number.....
in the.....Concession of the said Township of.....
and described as follows:—

A rectangular shaped parcel of land,.....feet.....
inches in length, and.....feet.....inches in breadth,
the.....side being parallel to the centre line of
.....of the Railway of the said
Lessors. The.....boundary thereof is distant.....feet
.....inches,.....at right angles from said
centre line, and the.....boundary thereof, produced, is
distant.....feet.....inches.....
along said centre line from the.....
.....
.....

Said parcel being shown coloured pink on the attached sketch.

Sig.....

Engineer's Office,.....
.....189

As already stated, the principal duty of the surveyor is to look after the real estate of the railway company, and he may have to do this under the head of "extra land for numerous purposes," such as, for instance, ballast pits, road diversions, at bridges, at stations, for sidings, etc.

The right-of-way of branch lines a few miles in length is generally taken up by the company's surveyor, and have to be dealt with as new lines. For full particulars on this important subject, Right-of-way Surveys, you are respectfully referred to three valuable papers read before the Association of Provincial Land Surveyors of Ontario, at its fourth annual meeting held in Toronto, in the year 1889, and now embodied in its proceedings, by Messrs. H. J. Browne, Jno. Davis and H. D. Ellis.

As the sketches of extra land, land to be sold, land to be leased, sites of buildings etc., are continually accumulating, it becomes quite an important matter to have them properly filed, so that they may be

easily and quickly found for future reference and for the purpose of making copies. A system that has proved to work very satisfactorily is to always prepare the sketches on tracing-linen in such a way that clear and distinct blue-prints may be made from them; file the tracings by pinning them to the leaf of a blank circular book of proper size, with the pages numbered, and index this book.

In order to obtain clear blue-prints, fairly heavy opaque lines must be used on the tracings, and for this reason black lines are to be preferred. It may be assumed that if the tracings with all black lines (except dimension lines, and they may be of carmine) are sufficiently clear, the blue prints also will be sufficiently clear.

The tracing should never be allowed outside of the office; send instead a blue-print which is just as good. Keep the tracing as the original, as a photographer does (or should do) a negative. Then, years afterwards it may be, when a copy of the sketch is required, it is only necessary to look up the index, unpin the tracing and make a blue-print to obtain an exact copy of the original sketch and that too without any comparing, which is necessary when a tracing is made. By this system a great deal of time may be saved and mistakes avoided, as also a great deal of annoyance. It may also be added that this system of filing plan complies exactly with section 70, chapter 152, of the Revised Statutes of Ontario, a part of which reads: "Every land surveyor shall keep exact and regular journals and field notes of all his surveys, and file them in order of time in which the surveys have been performed."

A very convenient method of filing field-notes, is to number the field-note books and also the pages, and index up the notes under the head of the nearest station, using of course sufficient particulars to define what the notes are about.

A good method of filing all plans larger than those already referred to, whether they are rolled up or not, is to attach to the upper left hand corner of each plan, a small ticket with the number of the plan and number or other designating mark of the drawer or pigeon-hole to which it belongs, and by observing always to put the ticket on the same corresponding corners of the plans; in the index to place the number of the plan and number of the drawer or pigeon-hole opposite the corresponding entry, and to place the plans in the drawer in the same relative positions, so that the tickets with the numbers on are always together in the drawers, and in the pigeon-holes always on the outer end, no difficulty will be experienced in quickly finding them again, providing always, of course, that they are properly returned to their proper places.

DISCUSSION.

Mr. Morris—With reference to that description, the custom, specially in the city of Toronto, I understand, has been to give a description not by metes and bounds but with reference to the centre line of the railway without any tie to any concession or road allowance, that is a governing boundary. I have had a good deal to do with

making these descriptions and duplicate plans for railways, and it was with the greatest trouble that I was allowed to expend the time in preparing proper descriptions; and I make it a point to make the description for a right-of-way property similar to a description of any other piece of land, so that it can be defined on the lot just the same as you could take a description from the registry office of any piece of property by metes and bounds. What made me think of that was, that not long ago a lawyer came to me and referred to that point, saying that it was impossible in some cases, in giving a title to a lot through which a railway ran, to define where this right-of-way was, that it might go through a valuable part or not. There was no way unless by going on the ground. So I have always made it a custom to give a more complete description, tying the ends of the centre line to some governing boundary.

Mr. Butler—Our deeds are all printed in that way. We attach a little plan to each deed, and the whole description is, the land shewn on the plan hereto attached coloured red, and those plans are filed in the Department of Railways and Canals. They are filed in the registry office for the county through which the railway runs, and on that plan is shewn the tying of the centre line to all the township and county boundaries.

Mr. Morris—Is the distance given in the description or on the plan?

Mr. Butler—Only on the plan.

Mr. Morris—Suppose the plan becomes detached from the description?

Mr. Butler—I hardly see how it could happen. We glue them all, and it has always worked satisfactorily so far.

Mr. Gibson—Would you make the location of the centre line to be governed by the corner of the lot?

Mr. Morris—Yes, the distance from the intersection of the lot boundary to the road allowance, whatever it might be.

Mr. Bowman—That is more or less quantities?

Mr. Morris—No, measure in most cases, and the survey made so as to make this accurate or nearly accurate. This distance is a check. I include the plans coloured red in the description also. The distances given might vary a foot or a few feet, owing to the concession lines varying in their course a little, which would be the difference.

Mr. Butler—There is one other duty a man has to see to, and that is that the taxes are paid.

Mr. Gibson—I have sometimes come across these descriptions. I remember one case in the county of York where the description referred specifically to the angles of the lots, and the centre line was governed by specific measurements, not plus or minus or anything of the kind, and you can just imagine what kind of a centre line that kind of a railway would have. I think both are necessary; it should refer to the corners of the lots by plus or minus. The possessory title and

the actual line of survey should correspond. I think the centre line should govern positively, but I think reference should be made to the corners of the lots, otherwise you can't locate the property. I know I would always insist upon that.

The President—Suppose you have *both* marked on the map, which is going to govern ?

Mr. Gibson—It is a wrong description, that is all. It should be marked plus or minus, because you cannot possibly shift that centre line.

Mr. Bowman—I have asked Mr. Butler whether he puts plus or minus to the distance of the centre line to the corner of the lot, and he says no. I think that is where the difficulty comes in, by not having a proper description by metes and bounds in his deeds. The plans might easily become detached from the deed, and they are not copied as the deeds, and that is why I think a description should be included with metes and bounds.

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

LOCAL IMPROVEMENTS.

By P. S. GIBSON,

O. L. S., C. E., Willowdale.

THE object of the paper is to refer to certain parts of the law and procedure as to Local Improvements in which we are now particularly interested when called to act as engineers, and which may give rise to a discussion on the system which will be of much more importance to the Association than what I may say.

That the Local Improvement System has, on the whole, been a success may not be questioned, and that it has been abused is beyond question.

While any one may be able to shew serious defects in the system, yet it would be difficult to suggest a system which would accomplish the objects in view much better.

1. The leading principles of the system are, that persons in a particular locality may have improvements made at their own expense, and that the cost of such improvements may be extended over a term of years; and that by the corporation furnishing or raising funds for the same, the rate of interest may be low, and that the payments to be made shall be according to the foot frontage of the real property fronting or abutting upon the road upon which the improvements are made; or in some cases, where properties are *specially* benefitted, but not fronting on the improved road, a proportional part of the cost may be put upon them. While, generally, the rate is according to the foot frontage, in some cases it may be according to the area.

2. Again, in order to relieve parties who have improved localities by a large expenditure of money by themselves, a provision is made that under certain conditions the corporation may pay for the improvements already made and charge the same on the lands benefitted.

3. Again, in some cases the corporation may pay a part of the cost out of the general funds of the municipality, and in others may not.

Again, there may be a general by-law passed, with the assent of the electors, by which all expenditures of certain classes shall be specially assessed upon the property benefitted.

4. The above reference to a few of the features of the system show how general may be its application.

Another point for consideration is, that while for a time the advantages of the system were confined to cities, towns and villages, they

were a few years ago applied to townships. So that the system is well worthy the careful study of every member of our association, whether he be located in a city, town, village or township. In making a study of the system the same difficulties arise as in the case of the Survey Act: the law has been so often amended and consolidated as to make it difficult to get a clear understanding of it, and yet it is of the utmost importance that the engineer shall have a clear and positive knowledge of the same, as it may be said that the success of the whole system depends on the knowledge and management of the engineer, as will appear.

5. Works may be commenced on petition or on initiative.

In either case it is of the utmost importance that the council should pass a procedure by-law, setting forth clearly the duties of each official.

6 In this general by-law it should be provided as to the form in which the petition should be drawn up. While the statute does not state as to form of petition, yet if the petition sets forth specifically the lands to be immediately benefitted where the assessment is to be made on the immediate frontage, it facilitates the work on the part of the corporation engineer and other officials, and more particularly so when the cost of the works is to be assessed upon lands fronting on other streets; and in either case it assists very much in the work of the court of revision, as any one signing the petition cannot afterwards claim that he or they were not aware as to how the costs were to be assessed. It also is of the utmost importance to the clerk or assessment commissioner, who may have to certify as to proportion in number or owners who have signed and as to the proportion in value of lands owned by them, and without such a provision it would be impossible for him to say until the engineer should make his report as to the lands benefitted.

The petition should be signed by all the parties who are to be assessed if possible, instead as required by statute by two-thirds, or three-quarters, or a majority; it should also set forth whether the petitioners desire the council to pay a part of the cost of the work, and if the cost is to be extended over other lands than those fronting immediately upon the improved road.

7. Another point should be carefully noted, that the petition should not ask for work to be done as pavements and sidewalks in the same petition asking for bridges, culverts, embankments and such other works as may be and are required to have the cost extended over roads not immediately benefitted; and also not include in such a petition an application to pay back to certain parties the cost or portion of the cost for work already done.

8. In the said general by-law the procedure should also be clearly stated as to the manner in which the council should act in initiating work, and the council should be careful to confine the initiation of the work to such as they have statutory right to do.

As a rule the initiation of local improvements should be avoided by corporations, as it is likely to give rise to the abuse of the system, and at same time cause litigation and a great deal of trouble to the council and officials.

The general by law should also provide that no petition should be referred to the officials for reports, or action taken by the council till a deposit of such a sum of money as may be considered necessary to cover the costs or expenses connected with reports of officials and advertising, and special meetings of council, where members of the council are paid. This will prevent many wild schemes being brought before the councils, and thus save much valuable time and also money.

It should also provide that such sums of money advanced should be recouped to the parties as soon as the works are proceeded with.

9. The flankage by-law may be included in the general by-law—the object of the flankage by-law being to make a suitable allowance for corner lots, by which say an allowance of 60 feet is usually made off the longer side of a corner lot, and in case of triangular or irregular shaped lots, a frontage of 1 foot is taken for each 100 feet of area. A question may arise in this connection as to what the frontage is of a goring lot, even if not a corner lot, where a street is on different bearings.

10. The general by-law should include the duties of the clerk and assessor or assessment commissioner, by which they determine if the petition be sufficiently signed, as whether two-thirds in number representing one-half the value of the property according to last revised assessment roll for ordinary local improvements have signed; or where lands, besides those immediately benefitted, as lands fronting on adjoining roads are specially benefitted and require three-fourths in number and representing three-fourths in value to sign; or in case of old works to be paid for, whether three-fourths in number representing two-thirds in value have signed; or in case of corporation initiating work and the owners of lands to be assessed, petition against, whether the majority of the owners representing at least one-half in value have signed. It is plain that for a clerk or assessment commissioner to decide as to the signatures as above he must have at hand a complete and exact assessment roll, which in cities and towns and villages, where complete plans of same have been made, or in which plans of sub-divisions have been obtained, it may be all right, but in cases where the plans have not been arranged, or in cases of townships where the assessments are not made according to statute, or any other rule, it is a work of great difficulty unless as heretofore suggested the petition be got up to show the lands to be benefitted. To avoid difficulties of this kind the general by-law should require the petitioners to have a plan attached giving the required information.

11. The most important part of the general by-law refers to the engineer, a part of whose duties may be as follows:—

So soon as the clerk or assessment commissioner gives a certificate that a petition for work has been sufficiently signed the petition is referred to the engineer, who should make a first or preliminary report, recommending or not the work. In preparing this report he

should carefully examine the petition, not only as to whether the work is advisable and necessary, but also as to the difficulties which may arise; as, for instance, damages to properties which, unless settled before the work commence, may amount to as much as all the work; in which case he should report recommending the work, provided parties who may claim damages agree to not claim the same, or are willing to accept a reasonable amount, which is to be charged to the local improvement.

Again, he may find that the petition asks for different kinds of work and that the cost of the whole shall be assessed over frontages besides those upon which the work is done, he should then report that as pavements or sidewalks, for instance, should only be assessed on the immediate frontage, while bridges may be built and also culverts and streets opened up and extended and cost levied on different roads; that the prayer of the petition is that the whole cost be spread over different roads, and where work not done, and in this case likely only the two-thirds in number, representing one-half in value have signed the petition, whereas three-fourths in number, representing three-fourths in value, is required, and then in townships only; that it would be advisable to have the petitioners put in two or more petitions, according to the class of works, and so the assessment may be suitably allocated, and debentures issued to be paid within life of the different works. Again, a petition may be put in for a sidewalk on one side of the road; if in a village or township a sidewalk on the other side may not be required for some time. Difficulties may arise in this case; both sides are benefitted, and if both sides to pay, the rate may be fixed for the side on which the sidewalk is to be laid, and the other side to pay one-half a rate, or in case only one side of the road is to be built on for a time and the other a side slope; in any of these cases it is well to have these difficulties pointed out in first report.

12. Again, a petition may ask for the opening of different roads, running in different directions, and asking to have certain lands assessed for such work; it would be well to ask that separate petitions be made for each road.

Again, a petition may ask for a road to be opened up over 66 feet in width in a township; it would be well to point out that the sanction of the county council will be necessary so the work may not be delayed.

13. Without further reference to difficulties to be attended to for making a first report, many of which will occur to you, let us assume that the first report required by the general by-law has been made by the engineer and approved by the council, he has next his second report which requires him to state in a simple case, (1) What real property will be immediately benefitted; (2) the probable lifetime; (3) the probable cost; (4) the proportion in which assessment is to be made; (5) to report total frontage or area, frontage or area exempt from taxation, and frontages or areas liable to assessment. A report of this kind to the engineer of a city or town where the plans of properties are available, and the assessment rolls are got up correctly, and

where an assessment commissioner is appointed, may not involve a great deal of work, but to a township engineer it is sometimes a formidable undertaking. In the first place, there is no complete plan of the part of the township, and likely few if any of the registered plans are in the corporation vault. Again, the township assessments are made in such a manner as to be practically of no use; so the engineer has to look up the plans and likely make a careful measurement of the whole frontages, from which he will prepare a plan shewing each individual front. The probable lifetime has to be fixed, as the running of the debentures depends upon that. The probable cost sometimes involves considerable work, where the improvements extend over a long road. As to the proportion in which the assessment is to be made, if the cost of the improvements is to be assessed over a wide tract of land, for improvements on one road, and nearly all the land is sub-divided into lots and streets, as in case of opening a new road, building bridges, culverts and embankments. If, on the road the improvements are to be made, one side for part of the way has a block of land not sub-divided, and the assessment is to be made according to foot frontage, the assessment may be made by fixing one rate for a particular frontage of lots, and then, in case of the block fronting on the improved road, put say two rates on that front, as it may have a very considerable depth, two or three times that of the ordinary town lots, and on the fronts of lots running into the improved road put two-thirds of a rate; and on lots fronting on roads running parallel to the improved road put one-third of a rate, and so on; sometimes one-twelfth of a rate, according to location and value of the land. It need hardly be said that in case of the assessment being spread over say 200 acres of land, which may have twenty registered plans, that a complete plan must be made, showing all the plans. From this complete plan all the other statements can be determined, and the plan can be referred to at courts of revision and used by the clerk.

The second report having been passed by the council, as per general by-law, the publication and holding the court of revision follow, after which the contracts are let and work carried on to completion.

DISCUSSION.

Mr. Butler—I would like to ask a question. Taking any town in a county, assuming that a majority of the residents on any street desire a sewer and petition the council asking for its construction under the local improvement plan, can the council be compelled to construct the sewer? I signed a petition myself without knowing all about the details to construct a sewer on the street upon which I live; all the ratepayers on the street signed the petition, and then the town council refused to put it in force or to order the construction of the sewer, declaring that they did not want to provide an outlet.

Mr. Gibson—Your scheme should include an outlet. The council are not bound to go and find an outlet. If you guarantee an outlet it is a different story. The courts will jump on them at once. The board of health is where you want to go to; get them to act.

The President—There was a remark made in relation to fractional parts in making assessments. I have always found it much easier for

calculation to keep fractions out. I remember a few years ago we had a drain running through part of the town. There were a number of lots affected, and the party who went over it first was not a professional, and he made an estimate of the cost and he took about 300 lots and divided them into two or three divisions and assessed them in that way. We did not think that was fair, and I went over it and I made I think ten the highest and one the lowest, graded them in that way, 1 to 10. It kept fractions out, and you can easily calculate at once what they would be.

Mr. Gibson—The trouble I find in that case is this, a man commences at one rate and tapers it down to half a rate and so on down, then he thinks it is all right, but if you put one man 12 times as much as another they won't stand it.

Mr. Ellis—In regard to what Mr. Gibson was saying about damages to property. Very often in the case of paving or grading a street you are bound to go above or below somebody's property, and in most of these cases we have been in the habit of making a tracing shewing the profile of the street as it will be when it is completed, shewing exactly where the toe of each slope will run out to, and the cutting on each property and then going to the petitioners and saying: You must sign this plan and waive all damages, or if not, come to a settlement, or else have a clause in the petition in which it is stated that they will waive all claims for damages.

Mr. Abrey—That is all very well if all sign the petition, but in no case do all sign the petition. Then the difficulty comes in with those who have not signed. In my experience there has been that clause, where any person signing the petition waives all claims for damages usually. Lately we have also drawn a profile as Mr. Ellis suggests; but there are always some that don't sign the petition and they are the difficult ones to handle, and I think the only good practice is to go slow in that. This summer we have been sending agents around in all cases. For instance, a place like the Davenport Road where there are a great many persons interested and buildings have to be torn down, and three-quarters I suppose have signed the petition without any trouble; there are a few of them though that claim damages; some have their lots too long, others have their lots too short. We have been bargaining with these people all the summer and all the winter and we have reduced them down to four or five that have not come to some bargain. Formerly we rushed along too fast. Take Keele Street, it cost about $60,000 for work and $250,000 for damages. We have learnt better than that though, for this summer we have had no damages whatever; and I think by going slow and using a little more discretion, in nearly every case damages could be got rid of.

Mr. Ellis—In regard to the assessment of damages I find that sometimes if you will explain to the petitioners that every payment for damages is going to be assessed against everybody on the street and not paid out of the town or township rate it has a very cooling effect.

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

A PLEA FOR A TOPOGRAPHICAL SURVEY.

By WILLIS CHIPMAN,

O.L.S., C.E., Toronto.

Without due consideration (in a "moment of weakness," as we Engineers put it) I yielded to the solicitation of our esteemed Secretary and offered to present a paper at this meeting on "Summer Resorts." For reasons which will soon be apparent, the paper to be presented, if under its advertised title, would resemble Josh Billings' lecture on "Milk," which no doubt some members of this Association have listened to. Not wishing to appear as an imitator of this great American "moralist," I will take the liberty of changing the title of my paper to that of "A Plea for a Topographical Survey."

In commencing my investigations *re* our summer resorts, I very naturally began to study the "Map of the Province of Ontario, shewing counties, townships, railways and post offices, 1889," issued by the Department of Crown Lands. In examining this map previously I had discovered several errors, chiefly clerical errors, if they may be so called. In lithographing the draughtsmen who prepare the drawings on the stones may misinterpret the copy sent in, and during the printing some defects may make themselves manifest, from abrasions on stones, faulty manipulations, etc.

I was wholly unprepared, however, for the unpardonable and unexplainable blunders exhibited in this map of our Province that is now being presented to the civilized world, and is to be found hung in the offices of surveyors, lumbermen, capitalists, tourists, and persons who are sufficiently patriotic to be proud of their country.

I will now call your attention to some of the inaccuracies, beginning with that which first arrested my attention when investigating our summer resorts.

The Lake of the Thousand Isles is famed the world o'er for its beauty, and attracts thousands of tourists every year, yet there is no trace of it on our Crown Lands map.

Passing down the St. Lawrence, where are the great rapids, and those river expanses Lake St. Francis and Lake St. Louis?

Travelling up the Ottawa, where are the beautiful Lake of Two Mountains, the Chien Lake, Lac du Chat, Lac Allumette, Lac Calumet, and the Coulonge?

In my native county, if the township of South Crosby were cut out from the map and the names erased, I am convinced that there is not

a resident of the township that would recognize it. The central part of Frontenac is a *terra incognita.*

About twenty-five years before the present map was perpetrated, the greater number of the older counties in the eastern part of the Province were mapped by private enterprise and sold by subscription. Glengarry, Stormont, Dundas, Grenville, Leeds, Frontenac, Addington, Lennox, Lanark, Carleton, Russell and Prescott, in the east, were so mapped, and much credit is due to the publishers for the way in which they performed their work. The basis of all these maps were the plans in the Crown Lands Department, but the straight concession lines and boundary lines of the Crown Lands Department plans were shown as they were actually run. By a house-to-house canvass for subscriptions, information as to depths and widths of township lots, lands in surveyed lines, location of streams, sketches of lakes, etc., etc., was obtained.

Why did not the Crown Lands Department avail itself of these old and comparatively reliable plans in compiling its new plan of the Province? If this had been done there would now be little to make complaint about in the eastern part of Ontario.

In our Canadian North-West Territories, and in a large part of the area between the Rocky Mountains and the Mississippi River in the United States, the aridity of the climate produces many lakes and ponds without outlet, which thus become alkaline. A person settling in this alkaline country, unacquainted with Ontario, would from a glance at our Crown Lands map infer that a great portion of Northern Ontario was an alkaline desert, dotted with innumerable lakes and ponds without outlets, a region unfit for the abode of man.

In Frontenac examine the townships of Miller and Barrie; in Lanark the township of Levant; in Hastings the townships of McClure, Faraday, Limerick, Herschell and Cashel; in Peterborough the townships of Galway, Chandos and Methuen; in Victoria the townships of Carden and Longford; and in Renfrew the townships of Radcliffe, Jones, Wilberforce, McKay, Buchanan.

Are the physical features of these townships as shewn on the original plans of the surveyors who made the survey? If so, re-surveys are needed.

I believe that better plans of these townships could have been compiled by the bush-rangers of the various districts, without reference to the surveyors' plans in the Department.

In the Haliburton District we find in the following townships evidences of errors that would be apparent to an aborigine or a school-boy: Havelock, Eyre, Lawrence, Hindon, Guilford, Harburn, Bruton, Harcourt, Cardiff, Dudley and Anson. One of our ex-presidents has work enough here in his native district to keep him fully employed for the remainder of his natural life.

In the Muskoka and Parry Sound District we come to surveys of recent date, where the surveying instructions are more concise, the compass not used exclusively, yet we find in the following townships errors of the same nature as those referred to in the preceding counties and districts: Hardy, Mills, Gurd, Brown, Wilson, Strong, Lount,

Ferrie, Burton, Hagerman, McKellar, Spence, Chapman, Proudfoot, Christie, McMurrich, Perry, Bethune, Humphrey and Foley. Mowat is all right apparently, also Laurier.

In the Muskoka District glance at the townships of Wood, Morrison, Oakley and Stisted. Are they correctly mapped?

In the south part of the Nipissing District please examine Lyell, Preston, Freswick, Cameron, Osler, Guthrie, Biggar, Butt, Hunter, Sproule, Canisbay, Master, Bishop, Murchison, McLaughlin, last but not least, the two townships named after two renowned (for different reasons) surveyors, Niven and Fitzgerald.

I doubt if there is a township in this southern part of the District that is correctly mapped.

In Figure 1 the township of Biggar, as shown on this Departmental map, is given, and in Figure 2 the principal lakes and water-courses, as given in the returns. This township was surveyed in 1882.

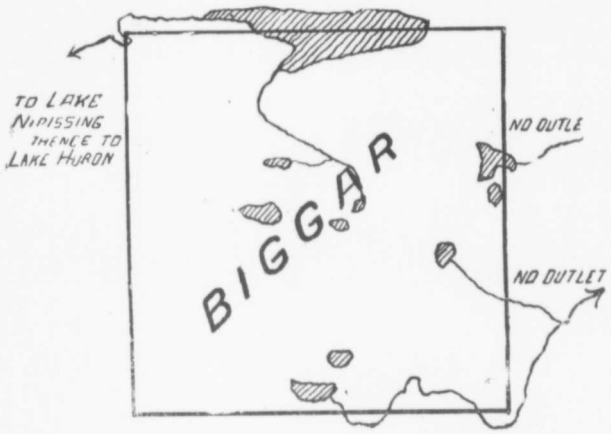

TO LAKE
NIPISSING
THENCE TO
LAKE HURON
NO OUTLE
BIGGAR
NO OUTLET

FIG. 1.

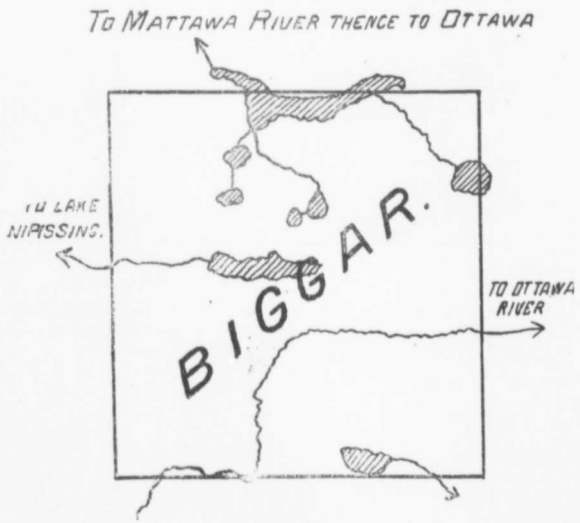

TO MATTAWA RIVER THENCE TO OTTAWA
TO LAKE
NIPISSING.
BIGGAR.
TO OTTAWA
RIVER

FIG. 2.

In the north part of the District, where I have surveyed four townships, the same gross mistakes appear. For example, here are the two townships of French and Muloch, surveyed in 1884 and 1886, several years before the map of the Province was issued. Figure 3 gives the physical features as shown in the Crown Lands map. Figure 4 gives the physical features as they actually are and as returned to the Department.

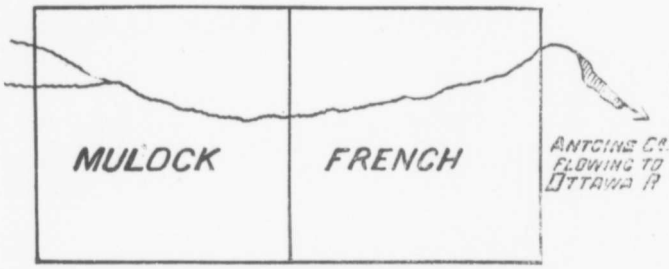


FIG. 3.

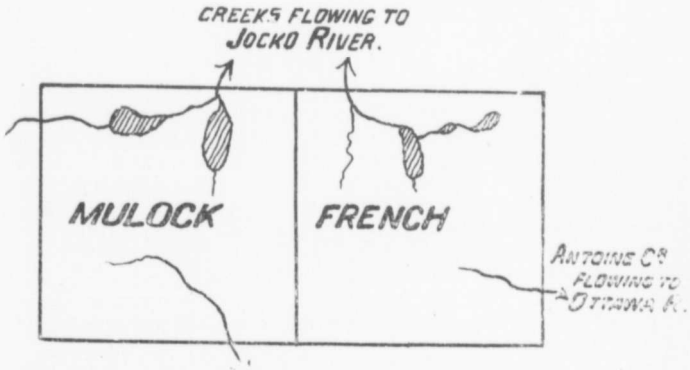


FIG. 4.

Hawley, Broder, Grant, Phelps, Widdifield, Olrig, Kirkpatrick, and many others are blanks. (Kirkpatrick has a railroad.)

In Eastern Algoma the many surveyed townships that are "waterless" is astonishing, while Mack, Plummer, Meredith, Galbraith, Waters, Ermatinger, the land of Goschen, and dozens of others are alkaline deserts.

Through all the northern districts of Ontario are lakes from five to twelve miles in length, nameless.

Even in older Ontario we fail to find the following rivers:—the Petawawa, the Clyde, and the Carp.

In the west and central:—the Eremosa, the Conestoga, the Nottawasaga, and the Saugeen are not named.

Endeavour to trace on the map the watershed between the rivers flowing into the Ottawa and those flowing into Lake Huron, or the watershed of the Madawaska from that of the Bonnechere or the Petawawa.

Is it of no value to our mill-owners and our capitalists to know this? Is not a thousand square miles of watershed of great importance in determining the value of a water power?

I think I have adduced sufficient evidence to convince any member of this Association that the best map we have of our Province, and issued by the Department, is grossly incorrect, and is misleading to the settler, the prospector, and the investor.

I would not dwell at such length upon this matter, nor would I specify particular townships that are in error, if I did not feel that some portion of the disgrace attending this matter falls upon this Association, many members of which have furnished the Government with correct plans of the surveys made by them, and the public should know that the surveyors of this Province are not responsible for the grosser errors the map contains.

Since 1887 the Dominion Association has been urging upon the Federal Government the importance and necessity of a triangulation survey of Canada, but so far their efforts have not been crowned with success. During these five years our Association has done nothing, leaving this matter entirely in the hands of our Ottawa brethren.

I now propose that this Association devote a portion of its energy in educating our legislators and the public in this important matter, without infringing on the rights and duties of the Dominion Association.

The determining of the latitude and longitude of several principal points in the Province, and the primary triangulations, I would place in the hands of the Dominion Topographical Surveyors who are members of the Provincial Association. The hydrographic work might also be placed in the hands of the Dominion Government.

The secondary triangulations and all topographical work should be done by the Provincial Government, the degree of minuteness depending in general upon the density of population.

We must have a topographical survey made of our Province—the sooner the better—and I believe that this incorporated Association is the proper body to take the initiatory steps. Our Legislature will not proceed with the work until it is demonstrated fully that it will pay to have this work done, and it lies with us to compile facts and figures to show the cost, the method in which work is to be done, and its utility when completed.

I am of opinion that our Standing Committee on Engineering should be abolished and that we appoint in its place a Standing Committee on a Topographical Survey.

DISCUSSION.

Mr. Dickson—I have been struck myself with the number of akes in that plan that are not as accurate as they might have been. The route of streams is not shown. I have always maintained, and I think I mentioned it once before this Association, that all the water should be shewn connectively as it runs through the townships. A great many of our surveyors don't do that; they simply shew a body of water without any outlet. It is not at all difficult for them even to trace creeks with dotted lines.

The President—I think that perhaps Mr. Chipman is not finding so much fault with the plans in the Crown Lands' Office, as with the compiled plan here. Is that not so, Mr. Chipman?

Mr. Chipman—Yes.

The President—Well, when we look at the size of this plan it would be impossible to put all the topography in correctly.

Mr. Kirkpatrick—With a great deal of what Mr Chipman says I cordially agree, but as I had a good deal to do with the construction of that map I may say that the fault lies with the surveyors themselves. The inception of that map took several months, and I was so particular that every county should be accurate that we sent pieces of each county to every surveyor in that county asking him to put on everything topographically that he knew of, every post office and everything; we sent to each post office inspector of the province copies of the map, asking that all the post offices and all information of any value should be given; and we sent to every railway company copies of the map, asking that all the railways should be put on. In the Ottawa and Huron districts there are thousands of lakes which could not be shown on that map. All the maps on which alone we could act in the eastern territory were the original maps in the Department of Crown Lands, and on these there are no outlets shewn. Lakes are unnamed, and the lakes that are on the map I am perfectly well aware, just as well as Mr. Chipman, that they form no resemblance to the lakes on the ground. That is no fault of the Department; it simply shews the necessity of a topographical survey. Unfortunately, we have only been able to act on the information that we have. With regard now to copying county maps, that might be very well as a private speculation, but it would be utterly impossible for the Department to take county maps over which they have no control and lay down information from these county maps, because we are not aware how much labour has been expended and we have not the local knowledge of how much these county maps show accurate surveys, or are drawn on the imagination of the canvasser who went through the county. In the Huron and Ottawa Territory a great deal of what Mr. Chipman has mentioned is perfectly true, that the lakes are unnamed; but we have not got a microscopic press, and if we named every lake in the Parry Sound district there would be nothing but a succession of names. It is utterly impossible. I am aware that those lakes spoken of are the head waters of the Madawaska, but I cannot undertake to make the

maps shew what the maps in the Crown Lands Department do not shew. Mr. Dickson has brought it to our attention before this, and we have put it expressly in the instructions, "You will please shew courses of the streams with the inlets and outlets of all lakes." But the point I want to make is this, that to every surveyor that we knew of—and most of them that are here will bear me out in remembering it—copies of these were sent, because I sent them myself, with the request that they would put on all the information they could so as to make the map perfect. Of course it will bear criticism, but I have also been told over and over again that it is the best map that has ever been published in Ontario, with all its faults. But we hope to make it better with every edition.

Mr. Chipman—While it is perfectly true that in the older parts of the province this is probably the best map that has ever been published, I can see no reason why in the northern portions the map does not shew the water sheds of the chief rivers as the surveyors reported them to the Crown Lands Department, as shewn on the original surveys of these townships. In three townships that I surveyed the physical features were correctly noted, and so returned to the Government, but they are shewn quite differently on that plan; and these surveys were made several years before the map was published —one seven, and the others four or five years. I can see no reason for that. I don't complain about the small lakes not being shewn, you cannot expect that, but there are lakes shewn 8, 10 and 12 miles long that have no name at all. I think it would be much better if we named the larger ones and omitted the small ones altogether. Then there is no reason for not shewing which river is the Madawaska and which is the Bonnechere. It is known by every bush-ranger up there which is which, and which lake is which. I went over the County of Renfrew with Mr. Morris yesterday or the day before, and we found it was full of inaccuracies. There are large lakes in there that have been known for years, all about them, which way the outlet is and everything, but they are not so shewn on the plan.

Mr. Niven—As far as names of lakes are concerned, I think sometime ago a paper was read before the Dominion Land Surveyors' Association suggesting that the lakes of our country should be named after some system; it was very confusing putting down the names of lakes as they were named by surveyors. You will find a dozen Loon lakes and a dozen Bear lakes, and Crow lakes innumerable, and all sorts of names I have in many instances refrained from putting a name of a lake on my plan at all. I think, unless the proper name is known, it is better to let the name go. The Indian name should be retained when practicable.

Mr. Chipman—In tracing water sheds for ascertaining and determining the volume of water in our great rivers I found it impossible to determine which was one river and which was another.

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

SHALL IT BE A TILE DRAIN?

By HERBERT J. BOWMAN,

A. M. Can. Soc. C. E., Berlin.

THIS question arises in connection with the drainage of a number of farms at the headwaters of Cedar Creek, in the Township of North Dumfries, in the County of Waterloo.

In a cedar swamp, just south of the road allowance between concessions 11 and 12, is the actual and never failing source of the creek, but the lands to be drained are situated above this, where there is in reality no creek at all, but simply a run of water in the spring and after very heavy rains. This flood-water is carried off in a shallow ditch joining a series of marshes, as shewn on the accompanying sketch; but as the fall is very slight, less than 1 in 1,000, the low ground along this watercourse dries out very slowly, and chiefly by evaporation, which by its chilling effect renders the ground too cold to grow any crops successfully. This low ground extends all along the watercourse, widening out at the marshes, and is estimated at about 200 acres requiring underdraining. All the land is cleared along the watercourse.

There is no doubt but that a large open drain could be dug to carry off the flood-water in the spring, and at the same time afford the necessary outlet for the lateral tile drains required through the low ground. Objection is, however, made to this plan on account of the trouble and expense in keeping the ditch open, especially through the several marshes, where the ground is soft and peaty, and where cattle will be pastured. Another objection advanced against the open ditch is, that it adds greatly to the labor of working a farm, more particularly where it runs diagonally across the fields; also, if the ditch is deep and has proper side slopes the land taken up by it is considerable.

Hence a number of the owners of these farms are desirous of having a covered drain, if one of sufficient capacity can be constructed at a reasonable cost. In fact they have been figuring on a drain to be made of 10-inch ordinary agricultural tile, and have put the cost at about $2,000 for the 18,000 feet required.

Before going into the question of the required capacity of the tile drain, it will be necessary to know the amount of the rainfall in this district, which may be obtained from the following table kindly furnished by the Director of the Meteorological Service:—

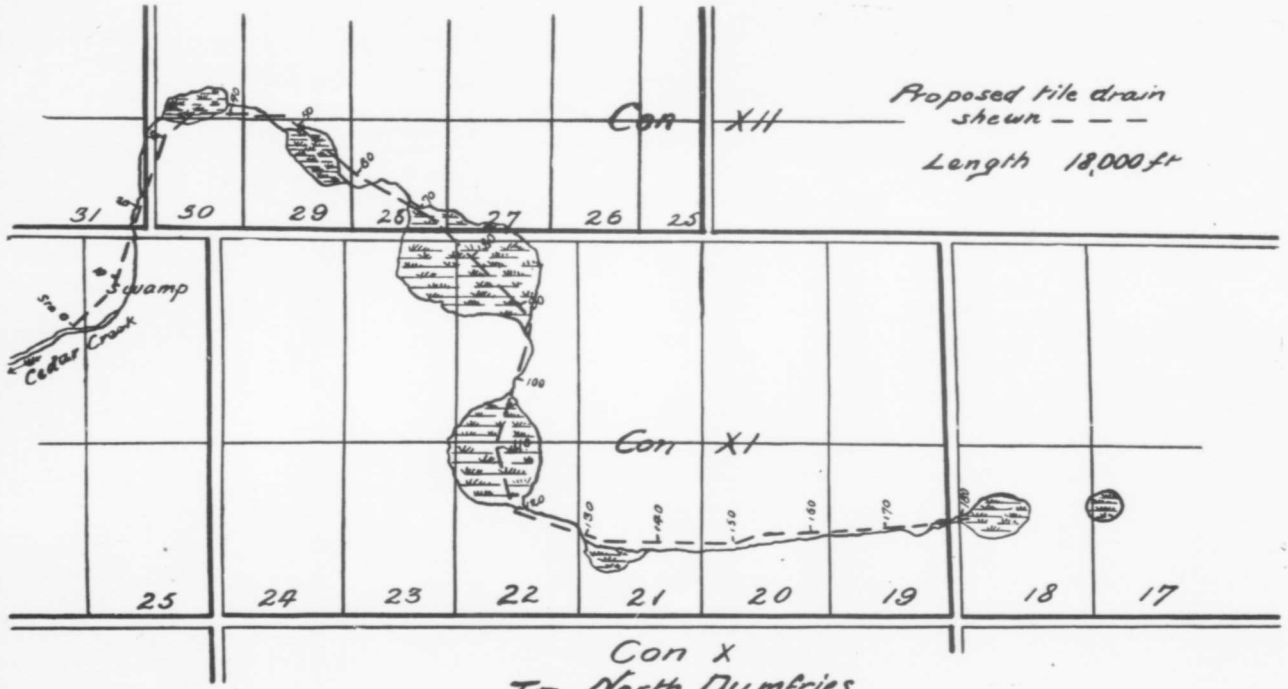

Proposed tile drain shewn – – –
Length 18,000 ft
Con XII
Con XI
Con X
Tp. North Dumfries
Swamp
Cedar Creek
31
30
29
28
27
26
25
25
24
23
22
21
20
19
18
17

TABLE GIVING AVERAGE TOTAL PRECIPITATION (rain & melted snow).

STATION.	YEAR.	JAN.	FEB.	MAR.	APR	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
Guelph	1881-92	2.32	1.78	1.67	1.45	2.07	2.73	2.12	2.51	2.07	2.11	2.37	2.42
Galt	1878-90	2.25	2.66	2.20	2.29	2.34	3.13	2.88	2.48	3.12	2.52	3.42	3.00
Fergus	1883-90	4.09	3.65	3.00	2.70	3.20	3.83	2.58	2.34	2.48	2.93	3.58	3.96
Conestogo....	1880 90	3.35	3.10	2.61	2.11	2.95	3.94	1.96	3.14	2.26	2.94	3.39	3.22
Stratford.....	1860-87	3.36	2.94	3.21	2.45	2.89	3.35	3.19	3.36	3.16	3.56	3.63	3.87

10 inches of snow is taken as equivalent to 1 in. of water.

Meteorological Office. CHARLES CARPMAEL,
Toronto, 2nd Feb., 1893. *Director.*

In this part of Ontario, during the months of December, January, February and March, the ground is frozen and does not absorb the precipitation, which is mostly in the form of snow. Part of this is evaporated, as it is a well-known fact that a block of ice will diminish in size even in the coldest weather, but by far the greater part is carried off over the surface of the frozen ground by the spring freshet. Hence the rainfall of only the remaining eight months of the year will be carried off by a tile drain, and perhaps not even all of that, for in the heaviest storms some of the water will flow over the surface and be carried off by the present shallow drain. From the table it will be seen that at Galt, less than five miles from the drain, it was found by systematic gauging for 13 years, that the rainfall averages 22.18 inches in depth for the eight months, April to November, both inclusive. This depth will be found to be almost exactly equal to the average of all the other stations given in the table, these stations being all within a distance of thirty miles of the drain.

Now 1.00 in. of rain on 1 acre of land yields 22,622 gals. Imp. of water.
" 22.18 " " " " " " 501.755 " " "
" 22.18 " " 200 acres " 100,351,000 " " "

which may be taken as the amount of water to be discharged by the main drain in a year.

There is no doubt, however, that in very heavy rains, some additional water will reach the area requiring drainage from the surface flow off the adjoining high lands, but the greater part of this will be carried off, as before mentioned, by the present shallow drain. Provision should be made to retain the rainwater on the high land, so that it may be absorbed, or it will carry off the finer or more soluble parts of the land over which it passes. This may be done by running the furrows, in plowing, horizontally along the hills; and in grass lands, by having frequent, small, horizontal ditches, for the same purpose, for, "in descending through the soil, this water, in summer, gives up heat which it received from the air and from the heated surface of the ground, and thus raises the temperature of the lower soil. The fertilizing matters which it has received from the air—carbonic acid, ammonia, and nitric acid—are extracted from it, and held for the use of growing plants."

Again, some additional water will reach the area requiring drainage, from below the surface; that is, from springs, being in reality rainwater which has already given up all its fertilizing matters to other soils more or less distant. Its effect is chilling and hurtful, and it should be kept down from the surface and removed as rapidly as possible.

On the other hand, the quantity of water to be removed by the tile drain is lessened by the amount taken up by the growth of the crops raised on the land, but of this there does not seem to be any available data. Evaporation also lessens the amount to be removed. It has been found from experiments made in England that the average evaporation of water from wet soils is equal to a depth of two inches per month, from May to August; and in this country it must be even greater—in the summer months, in all probability, being nearly equal to the rain-fall, besides removing the dew which is no inconsiderable item. However, in well drained land the amount of water evaporated is reduced to a minimum, and will not be sufficient to so lower the temperature of the soil as to retard the growth of the crops; but at the same time a large portion of the rainfall must be removed in this way.

From the foregoing it will be seen, that although there are additions to the actual rainfall on any area of ground, which vary according to the surroundings, at the same time there are forces always present tending to lessen the amount of water to be removed by the tile drains. It must also be borne in mind that the main drain will not remove the total rainfall in the summer months unless the whole area is thoroughly drained by a system of lateral drains. Where the depth of these drains is four feet, the distance apart may be forty feet, and on this basis each acre would require 1,100 lineal feet of lateral drains, and 200 acres, the area in question, would require 220,000 feet, or upwards of forty miles of drains. It is very doubful, however, if even half of this work will be done within the next score of years, so that ample capacity will be obtained if the main drain is designed to carry off in the 365 days of the year, the water resulting from the rains in the months of April to November, both inclusive.

Therefore, the question becomes one in hydraulics, and is: Will a 10 inch common tile, which is about the largest size made, carry off 100,351,000 gallons of water in a year, the available fall being only 1 in 1,000.

From Chezy's general formula we know that where

A = area of cross section of conduit in feet,
C = co-efficient determined by experiment,
R = hydraulic mean depth in feet,
S = fall in any distance divided by that distance, being the sine of the slope.

Then the discharge in cub. ft. per sec. $= AC\sqrt{RS}$

$$= AC\sqrt{R} \times \sqrt{\tfrac{1}{1,000}}$$
$$= 20\,095 \times \sqrt{\tfrac{1}{1,000}}$$

This value of $AC\sqrt{R}$ is taken from a very handy little book of tables by P. J. Flynn, C. E. (VanNostrand's Science Series), calculated by Kutter's formula for finding value of C. The highest value given in these tables, however, for the co-efficient of roughness is $n = .013$, which is probably rather low for a tile drain. Therefore, to be on the safe side, about 10% has been deducted from the calculated discharge, leaving it at 300,000 gallons (Imp.) per day, at which rate the 10-inch tile drain will discharge the rainfall from the 200 acres, namely: 100,351,000 gallons of water, in considerably less than a year, or to be more exact in 335 days.

DISCUSSION.

Mr. Tyrrell—Would not the greater part of the water be required to be carried off in the spring when the snow melted, during a very small fraction of the year?

Mr. Butler—It always seems to me that the problem is not what is the annual rainfall? but, what is the maximum rainfall within a given short period of time? Perhaps within a couple of hours some inches of rain might fall, and that is the rain that does the damage. Without going into the calculation for the size of the pipe, which seems to be ample for the purpose according to the calculation there shewn, still the question would rise naturally, if two inches of rain fell on that area, say during the night, would that ground be saturated to such an extent as to scald and destroy the crop? That is the way I would approach the solution of a problem of that kind. If it could not be relieved within the next four or five or six hours, at the outside, I would consider that the drain was inadequate.

Mr. Miles—According to that demonstration the rainfall that took place in 240 days will take 335 days to carry it off?

Mr. Bowman—Yes. In regard to the question Mr. Tyrell brought up, I assumed that during the months of December, January, February and March the ground would be frozen, and I think you will find that in frozen ground very little of the water would be absorbed; it would go off over the surface instead of sinking in. Of course some of these marshes might absorb more, but that is just a suggestion of mine, and I would be glad to have your opinion on it. I don't think it comes to a question of the rainfall of one day being discharged in that day. We will suppose we have the soil well drained to start with, the water being well drained off, as in summer. (Draws diagram on the blackboard.) Here is a tile drain every forty feet. Supposing an inch of water-fall in 24 hours, which is about as large a quantity as we need figure on—there are heavier storms sometimes than that, but still there are some years without even an inch in 24 hours. It has been found that that inch of water will sink down through the ground four feet, in perfectly well drained soil, and that one inch can be taken up between the particles of the earth in about four inches of depth, so that it would not effect vegetation at all; it would be down three and a-half feet anyway below the surface. I don't expect the rainfall of one day

will be carried off in that day. Tiles run all the time, so I was giving the whole year, 365 days, to run off the rainfall, and you will find it will do it in 335 days.

The President—You did not make any allowance for evaporation.

Mr. Bowman—I allowed evaporation and water taken up by the plants to counter-balance the water from springs and any surface water that might come in from the higher ground at the side.

Mr. Abrey—The assumption would be that the drain would be running full all the time?

Mr. Bowman—It would be making its maximum discharge.

Mr. Abrey—In dry weather it would not be doing that, therefore in the balance of the season it would not carry it off.

There is no reason why it would not be running full all the time if there is water there to carry off. In fact it might be running under a slight head sometimes, in which case it would discharge more.

Mr. Winter—I think you will find that that drain is not large enough. I think the principle of the paper is wrong. It would have to be calculated so that when there would be a heavy flood for a short time it would carry off that water. When there would be a heavy fall of rain one day you could not give it more than another day to run off. I think the principle of taking up the full year would not give you a large enough drain.

Mr. Tyrell—As far as my experience goes, I may say that it appears to me that the great bulk of the water flows away in the spring and fall of the year. In low, swampy ground the frost does not go into the ground to any extent. I know in a swamp out in Wentworth of about 2,000 acres, which I drained two or three years ago, during the summer months very little water passes down the drain, whilst in the spring of the year it always has been full up to the top. However, it is just an open drain about six miles long.

Mr. Morris—I think from the information we have got you would expect in certain wet seasons of the year quite a large lake to form at the upper end of that drain with probably a washout, because you can hardly calculate the drain to even up the time during the whole year to discharge the water, especially in large quantities. In a level country like that it would hardly be carried off by a drain of ten inches.

Mr. Bowman—I think you have not quite got the situation. There is a shallow ditch there now, and this land gets along very well in the flood time now. They plowed this low land, but the water comes up and so chills the ground that they cannot raise any crops on it. This man that owns it says it is not worth $10 an acre to him now, but if he can have it thoroughly drained it will be $70 an acre.

Mr. McCulloch—You propose to put it so that it will absorb the rain and prevent the water accumulating on the surface?

Mr. Bowman—Yes.

Mr. McCulloch—I was hoping Mr. Bowman would give some solution of the question whether it should be an open or tile drain. I happen to know a little of that locality myself. He seemed to object to the tile drain for the reason that he could not get water in during the time the ground was frozen. I think by putting in catch basins along that drain the water can be taken off very quickly in the spring without having that objection, by building branches on the surface of the ground to these inlets.

Mr. Ellis—How do you propose to lay those tiles?

Mr. Bowman—I propose to lay them very carefully by putting up sights for them every 500 feet and then with a boning rod, and then probably have an inch plank, six inches wide, under them the whole distance. They have to be laid very carefully. A few inches of fall lost would seriously retard the flow. There is only one foot fall in 1,000. I have found that tile drains work very well at one in 1,000, Central Park, New York, has its main drain laid one in 1,000, and I think they are 10-inch too.

Mr. Ellis—In Central Park they lay them with tar paper at the joints.

Mr. Tyrell—I think with Mr. Bowman's explanation that the surface drain could still be maintained to carry off the flood water, that it would no doubt be a good thing for agricultural purposes.

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

THE MEXICAN AMALGAMATION PROCESS.

By SAMUEL BRAY,

C. E., O. L. S., Ottawa.

It is to be hoped that in the near future surveyors will be called upon to make surveys of mines and mineral properties more often than in the past. Surveyors are fairly versed, at least at the time we pass our examinations, in the general characteristics of minerals, and I have no doubt that some of our members will drift from the survey of mines into the actual working of them, either as owners or as managers.

For years, for centuries rather, the mines of Mexico supplied more than one-half of the silver used throughout the world. Practically the whole of this silver was extracted from its ores by the process known as the "Mexican Amalgamation Process." This process was eminently adapted to a warm country where wood and water were scarce and where it was consequently necessary to resort to animal power. It is not adapted to Canada, and will probably never be adopted, but as silver has been found in large quantities and will probably be found in the future in much larger quantities in different parts of the Dominion, I have thought that a description of this process may be of some interest to our members.

Those ores of silver, commonly known as "chlorides," can be successfully treated by this process, and sulphurets, after having been submitted to a continuous heat in a reverbratory furnace, also yield good results.

The ores are crushed under the ordinary dry stamps and passed through $\frac{3}{8}$ inch sieves; they are then ground to an impalpable powder, or rather fine mud, in very primitive, but very effective mills, called "arastres." These mills are circular, usually 12 feet in diameter and paved with rough granite blocks two feet long and eight inches thick, set on end. An upright axle in the centre of the mill carries four arms; to each arm is attached, with plugs and ropes, a large rough granite block, about four feet long and two feet through. These blocks are dragged around and around on the paved floor of the mill by a pair of mules hitched to one of the arms, which projects for this purpose beyond the rim of the mill. The rim of the mill is made of three-inch stuff set upright and close together like the staves of a cistern. The mules are blind-folded, otherwise they will require constant driving to keep them moving. Two pairs of men, who relieve each other every 12 hours, are usually in charge and do all the work required in con-

nection with twelve of these mills. The mules are also in two sets, but they relieve each other every six hours. A large silver reduction works or "Hacienda de Beneficio," as it is called, will have about 70 heads of stamps, and 70 of the above described mills, which will crush and grind about 30 tons of ore per 24 hours.

About half a ton of crushed ore is placed in each mill, water is added from time to time, and finally, when the grinding is complete the mass has become very thin mud. This is now run off into tanks of masonry and allowed to settle, the water drawn off, and the residue spread out in the amalgamation yard into large circular or oblong masses about 10 inches thick, called "tortas."

Common salt is now scattered evenly over the torta; the quantity required is in proportion to the richness of the ores, which is previously ascertained by assay—6¼ per cent. may perhaps be an average. Also the quantity of salt required is regulated by its pureness. If the common "sal tierras" are used a larger quantity will be required, and as these "sal tierras" vary exceedingly in the percentage of pure salt contained in them, it is well to assay them before deciding on the quantity required.

The salt and all the other ingredients used are mixed into the mass or torta by horses or mules treading through it. A torta of 120 tons will require about 20 or 25 animals; these are driven by one man in continuous circles around himself, he takes care to keep moving over the torta in order to insure that the whole of it is evenly and thoroughly mixed. This man is provided with a long whip and simply holds a rope as a halter-strap, about 15 feet long, leading from the head of a leading horse of five-abreast, which are simply tied together by a rope from neck to neck, sufficiently short to keep the horses together and yet allow them room to move freely; from the neck of this leader a rope passes back to the second leader of a similar set of horses, five-abreast; and similarly a rope passes from this leader to another behind him and his set of five horses, and so on. I have seen fifty horses driven in this manner by one man on especial occasions and for a short time, but it is not advisable to allow more than 25 to be driven by one man.

In a large hacienda, such as I have mentioned, about twelve tortas will generally be under treatment at one time. These are mixed in the above described manner on an average of every other day for about one month, so that six or seven of these tortas are being trod by horses and mules every day—say 130 animals plod through this mud day after day driven by only six or seven men. It is surprising how rarely an accident occurs, especially when it is to be borne in mind that the animals detailed for this service are those that are either unbroken or nearly worthless for any other work. Sometimes a couple of animals will quarrel and mix up the whole lot in almost inextricable confusion, or perhaps one may fall and entangle the others; in these cases the driver and the other men at work at the torta have to be as quick as possible in untieing and cutting the tangled ropes, as in less than one minute a horse might be lost by having his head pinned down into the mud by his companions.

The day after the salt is applied, sulphate of copper is added to the torta, either in a pure state, as obtained from the Mint, where it is a necessary residue in the operation of extracting the gold contained in nearly all bars of silver received at the Mint, or it is applied to the torta in a finely pulverised and calcined ore of copper, called "magistral." In case magistral is used it is advisable to assay it in order to ascertain the percentage of sulphate of copper it may contain. As pure sulphate of copper cannot always be obtained, all large silver reduction works using the Mexican Amalgamation Process are provided with reverbratory furnaces for the purpose of preparing their own magistral. The copper ore is stamped, ground in the arastres and allowed to dry. In the dry state it is necessarily in small hard lumps. In order to pulverise these lumps so that the ore may be evenly acted on by the heat in the furnaces, a mill is commonly used; probably the same style of mill was used in Eastern countries two or three thousand years ago. It consists of a large circular stone through which a wooden axle passes; the stone is about 5 feet in diameter and 2 feet thick, standing on edge; it revolves around near the outer end of the axle, which is drawn around in a circle of about 25 feet in diameter by a mule attached to its outer end. The pulverised ore is dark grey, but when sufficiently acted on by the heat in the furnaces it assumes a dull red colour. A very simple test is necessary to ascertain when the ore is sufficiently roasted; a small quantity, after being allowed to cool, is held in the hand and dipped into water, a considerable quantity of heat will be evolved but not nearly as much as in the slaking of lime. The magistral is of a painfully disagreeable odour and the particles are so fine that the slightest movement stirs them up, consequently the workmen while spreading it over the tortas have to tie cloths over their mouths in order not to inhale the particles. The quantity of magistral required may amount to 2¼ per cent. and if pure sulphate of copper is used the quantity required rarely exceeds one-fourth per cent.

Immediately after the sulphate of copper is mixed into the torta, quicksilver is added, about 1½ lbs. for each "mark" (8 ounces) of silver the mass contains; more quicksilver is added from time to time until the whole amounts to about 3 lbs. per mark. The quicksilver is added to the mass by being strained through canvas. It is first weighed and distributed around the torta in the common iron quicksilver bottles; several workmen are each provided with a square of good thick canvas; a quantity of quicksilver is poured into each square of canvas, the four corners being held by the workman, thus making a bag which he swings about him as he walks over the torta; the quicksilver is thus spread over the torta in very minute particles.

It requires a very considerable amount of absolutely necessary experience to manage the reduction of these ores by this process. If sufficient salt is not used the whole of the silver will not be extracted; if too much, the excess of salt is a loss and salt was not a cheap article in Mexico before the advent of railways; if sufficient sulphate of copper is not used the silver will not be extracted at all, or at best, only what native silver the ores may contain will amalgamate with the

quicksilver; and if too much sulphate of copper is used a serious loss of quicksilver is the result, although this mistake may be counteracted to a great extent by the judicious use of some common ashes or quicklime, or better still, a small quantity of precipitate of copper; but should the quantity of sulphate of copper be far in excess of the quantity required the result will not only be an irretrievable loss of a large quantity of quicksilver but the process will be retarded for an indefinite length of time.

Six to seven men are required to attend to the torta while it is being mixed by the horses; their duties consist of applying the salt and other ingredients as ordered; of adding sufficient water to keep the torta at a proper consistency, otherwise the heat of the semi-tropical sun would soon dry up the mass; to throw back with flat wooden shovels the edges of the torta as they spread under the feet of the horses, and to bathe the horses every day when their work is finished. If this were not done the mud carried away by the horses would be a very serious loss. Each set of horses is bathed in a temporary bath constructed by the men adjacent to the torta; the whole of this bath is distributed over the torta the next time it is under treatment.

From time to time a trial, called a "tentadura," is made to ascertain the condition of the torta. This tentadura consists of washing carefully in a black saucer or gourd a large handful of the mud gathered evenly from every part of the torta. The globule of quicksilver obtained by washing should be covered with a gray scum, and the residue of sand should have a rim of fine gray particles of silver and quicksilver; these will gradually disappear, and the quicksilver will become more and more dense as it amalgamates with the particles of silver. When the tentadura shows that all the silver has become amalgamated, this part of the process is complete.

The chemical action that takes place is, I believe, somewhat as follows: the sulphate of copper acting on the salt liberates muriatic acid, which acts on both the quicksilver and on the chlorides of silver contained in the ores and these through what is termed "electro-chemical" action combine, making the amalgam or form in which the mercury and silver now appear.

The mud is now carried, usually in primitive hand-barrows, to be washed in a large tank constructed for the purpose. This tank is usually about eight feet square, and three feet deep; a small stream of water is kept constantly flowing into the tank and from one to four men stand in it bare-footed and bare-legged who keep stirring the mud up in the water with their feet. The particles of mud are carried away with the water leaving amalgam only at the bottom of the tank; quantities of amalgam and light particles of silver and mercury are also carried away with the water, but these are caught in long continuous launders constructed with ridges and with troughs at intervals. Some quicksilver is poured along the launders before the washing begins with which the floating particles of silver and quicksilver will unite. Boys, bare-footed, are employed moving up and down in the launders to prevent the heavier particles of the mud

from settling in the form of sand, as in this case the particles of silver would pass over the sand without coming into contact with the quicksilver.

When the washing is completed the amalgam is emptied into a long conical bag made of extra-thick canvas. About 75 per cent. of the mercury will oose through the canvas in practically a pure state which is caught in receptacles usually made of raw-hide supported on frames of wood. A very thick dry amalgam is left in the bag; this is packed solidly in triangular bricks; these bricks are carefully built into a circular prism 18 inches in diameter, leaving spaces between the bricks, on an iron rack standing over an iron cup through which a small stream of cold water is made to run and to discharge into a tank. A large iron cup, called a "campana" or bell, is then placed over the prism, its lower edge is carefully cemented to the floor with bone dust and ashes. An open dry wall of fire-bricks is built around the bell at about one foot from it and a fire of charcoal in this space is kept at white heat for about 12 hours. The fumes of quicksilver coming into contact with the stream of cold water are immediately condensed into quicksilver, which is caught in the tank into which the stream of water discharges. After being allowed to cool, the bell is lifted off, the prism of silver is now found in a very porous form and much reduced in size; it is broken up and cast into bars of about 120 marks (60 lbs) each and in this form it is sent to the Mint. Nearly the whole of the silver contained in the ores is extracted by this process and in a very pure state, and the entire loss of quicksilver amounts to about 12 per cent. of the quantity employed.

The water after leaving the launders above mentioned discharges into a large tank of masonry where the heavier portions of the mud (tailings) are allowed to settle. This is concentrated in a very primitive manner and when a sufficient quantity has been concentrated from a number of washings it is re-ground in the arastres, spread into a torta and treated in precisely the same manner as above described.

This process, as I have before stated, requires about a month and is well adapted to a warm country and where only animal power is available. A similar result is obtained in 24 hours by placing the finely ground ores with the necessary salt, sulphate of copper and quicksilver, in barrels which are constantly kept revolving by steam, water or other power, but the resulting amalgam is frequently charged with a very undesirable amount of iron, copper or other metals, thus making the subsequent process of purifying the silver very expensive.

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

PERMANENT STREET PAVEMENTS: THEIR DURABILITY AND COST.

By J. W. TYRRILL,
O. L. S., C. E., Hamilton.

THESE are not the only characteristics to be considered in order to be able to arrive at a wise solution of one of our most urgent municipal questions of to-day, namely: "What description of pavement should we adopt?" but they are certainly two of the most important.

Other considerations should be, cleanliness and sanitary conditions, resistance to traction, foot-hold afforded for horses, facilities for removal and repair, amount of noise created, and appearance; but as a volume of no small proportions would be the outcome of an exhaustive paper upon the whole subject of permanent street pavements, we will confine our remarks at this time to the questions of durability and cost.

WOODEN PAVEMENTS of various designs have been tried in many of our cities, but they have failed to give satisfactory results, and most grievously so, upon streets of very heavy traffic. In any case, wooden pavements have proved to be most expensive luxuries on account of their necessity for constant repair and frequent renewal. They have, however, served a purpose in educating us to the point of realizing the necessity of something a step farther in advance. Wooden block pavements have, beyond doubt, some admirable qualities possessed by few, if any other pavements; but, upon the whole, experience in this country has proved them to be sadly lacking in many important respects. We will not make further mention of wooden pavements, as they do not properly belong to the subject of this paper.

Neither will we take into consideration MACADAM or GRAVEL PAVEMENTS, for, though when properly constructed and cared for, they are well adapted to the requirements of many localities, they are not suitable or economical upon city streets of comparatively heavy traffic, and it is for such streets especially that we shall endeavour to reach a solution of the question.

It remains for us, therefore, to make our selection from pavements constructed of STONE BLOCKS, of BRICKS, or of ASPHALT.

The *durability and cost* of a pavement are in a sense inseparable characteristics, from the fact that the annual cost necessary to perpetuate a pavement depends largely upon the durability or number of years the pavement will wear; and also from the fact that a pave-

ment of inferior durability, requiring constant repair and frequent renewal, is an abominable nuisance to the travelling public, and the cause of serious loss to local business.

Durability is of itself, therefore, a quality of the greatest importance, and, consequently, with the object of arriving at some reliable comparison between a number of available paving materials, the following experimental tests were made by the writer:—

THE SPECIMENS. The specimens procured for the tests were as follows:—

No. 1. Grey Aberdeen Granite. Two small pieces, weighing about four pounds, were procured from local dealers. I endeavoured to obtain a piece large enough from which to have an ordinary granite block, such as is generally used for paving purposes, cut, but was unable to do so.

No. 2. New Brunswick Red Granite. Of this a roughly-squared block about half the size of an ordinary paving sett was used.

No. 3. Stanstead Grey Granite. This sample was a roughly-squared block about $6'' \times 5'' \times 1\frac{3}{4}''$. It was of much finer grain than the New Brunswick granite, but much similar in appearance to those from Aberdeen.

Nos. 4 and 4A. Hamilton Limestones. These were two specimens obtained from quarries in the neighborhood of Hamilton ('4' from Mr. Galagher's quarry, and '4A' from Mr. Handcock's). They were roughly dressed to the form of rectangular blocks. No. 4 was of a dark steely grey colour, and '4A' was of a lighter bluish grey.

No. 5. Hamilton Freestone. This specimen was a rectangular block, $8'' \times 6\frac{3}{4}'' \times 3''$, but, judging from its sad experience under test, I am inclined to believe that it could not have been a fair sample.

No. 6. Hamilton Vitrified Brick. This brick was furnished me by Mr. Campbell, of the Hamilton and Toronto Sewer Pipe Company, and was said to have been manufactured from Hamilton clay by that Company. The brick measured $8\frac{1}{2}'' \times 4'' \times 2\frac{1}{2}''$, and was of a dark, reddish brown colour. Sixty-one of them laid on edge would make a square yard of pavement.

No. 7. Hamilton Sand Brick. This was a sample brick manufactured from Hamilton sand and Hamilton cement, but made in the United States by some patented process. It was a handsome-looking brick of a brownish colour, resembling a good deal in appearance Credit Valley stone. It was not recommended to me as a paving brick, being manufactured only for building purposes.

No. 8. Hamilton Common Hard Brick. This was an ordinary hard building brick.

No. 9. Metropolitan Block. This block is manufactured in Canton, Ohio. The several samples, which were expressed to me upon application, were of exactly the same size, measuring $9\frac{3}{16}'' \times 3\frac{1}{16}'' \times 3\frac{3}{16}''$. It is a very handsome specimen of a repressed brick, having smooth surfaces, rounded corners, and being of a chocolate brown colour. The rounding of the corners, it is claimed, prevent the edges from becoming chipped by the pounding of the horses' shoes, and also affords good foothold. The blocks are exceedingly hard and fracture

with a smooth surface, being thoroughly vitrified. In the process of manufacture they are brought to a white heat and kept in that condition for six days. Forty-four blocks will lay one yard of pavement, and their cost, delivered at cars for shipment, is $14.00 per 1000.

No. 10. Imperial Block. This specimen was virtually the same as the Metropolitan Block, with the exception of being smaller, it only measuring $8\frac{1}{4}'' \times 4\frac{1}{8}'' \times 2\frac{1}{2}''$. It, and the block just described, are manufactured in Canton, Ohio, by the same Company. Sixty-five of these would lay one yard of pavement, and they are delivered at cars for shipment at a cost of $10.50 per 1000.

No. 11. Vitrified Brick, also from Canton, Ohio, and the manufacturers of the last two numbers; but in appearance it is a very different brick from either of them. It is not what is known as a repressed brick, and is much rougher looking. Its corners are not rounded, and it breaks with a rougher fracture—not being so highly vitrified. Its colour is of a dark reddish brown. Size, $8\frac{1}{4}'' \times 4\frac{1}{8}'' \times 2\frac{1}{2}''$, and cost, delivered at cars, $9.50.

No. 12. Hallwood Block, from Columbus, Ohio. This block is of peculiar construction, and is patented by the makers. It's dimensions are $9'' \times 4'' \times 3''$. It is made by the re-press process, and is finished with glazed surface, which feels decidedly oily to the touch. The angles are rounded off slightly more than those of the other repressed blocks above described, and passing longitudinally around the block are two grooves, which, it is claimed, give additional strength to the joints of the pavement. Forty-four blocks lay a yard of pavement, and their cost at cars is $18.00 per M.

No. 13. Vitrified Brick, also from the manufacturers of the Hallwood Block. The sample was a large brick, measuring $9'' \times 4\frac{5}{16}'' \times 2\frac{7}{8}''$, but inferior to the block, being only once pressed and of rougher appearance, with sharp angles. Price, $12.00 per M.

No 14. Fire Brick, from New Brighton, Pa. This was the only specimen of fire brick received. It was of a light buff colour; measured $8\frac{3}{8}'' \times 4\frac{1}{8}'' \times 2\frac{3}{8}''$, and was of the single pressed description, with square angles.

No. 15. Dry-pressed Building Brick. This sample, with a variety of other very handsome building bricks, was kindly furnished me by Messrs. Taylor Bros., of the Don Valley Brick Works, Ontario. It was subjected to my tests out of curiosity to see how it would compare with the vitrified bricks, rather than with any expectation that it would be suitable for paving purposes. I might just remark here in this connection, that Messrs. Taylor Bros. are at present putting up a new plant for the special manufacture of paving bricks.

Having collected the above fifteen varieties of paving materials, the weight of each specimen was carefully noted.

The use of an ordinary cast-iron "rattler," such as is commonly used in foundries, was then procured, and the specimens—together with about two hundred pounds of coarse shot and small scrap iron—placed therein.

The rattler, or cylinder, which was about two feet six inches in diameter by four feet in length, was then given 500 revolutions at the rate of about twenty turns per minute, and the sample taken out and again weighed. The object of this first rattling was merely to reduce all specimens as nearly as possible to the same condition, preparatory to receiving a second and severer test. More iron was then placed in the rattler with the specimens, and pieces of larger size and greater weight. The broken castings, for firepots of stoves, and sharp angular pieces, varying in weight from 5 to 15 pounds, were made use of.

The cylinder was then given 1,500 additional revolutions, after which the surviving samples were again taken out and carefully weighed.

I may just mention here that this was the second time that I had performed these tests. In the first instance the per centage of loss in the granites was remarkably small, as I had depended upon the samples themselves, and the iron shot, to produce the wear. But, in considering the matter afterwards, it occurred to me that this would not be a fair test, for the softer samples would be reduced by the harder ones, but the hard ones would be but little affected by the hammering of the softer ones. Therefore, I repeated the tests with the addition of the scrap iron, as above described, with the result that the loss of weight of the granite was increased 700%, whilst the increase in the loss of the bricks was not more than 25%.

I have, therefore, adopted the second tests for the purposes of any comparison, excepting when otherwise noted. Tables numbers 1 and 2 have been prepared, shewing the results of my experiments.

In table No. 1 the first column gives the numbers of samples for convenience of reference, and the letter A affixed means a second sample of same material.

The second column gives names of the specimens and places where manufactured, or from which obtained. The 3rd, 4th and 5th columns give the weights noted before and after each rattling. The 6th, 7th and 8th columns give the percentage of loss of the original weight in each case, but it is upon the figures given in the 7th column that I have based my estimates of durability, as they represent more fairly the comparative loss under similar conditions than the next table, giving total losses. And in the ninth column is noted the mean losses of specimens in second rattling, when two samples of the same kind were used.

In table No. 2 the surviving (I say surviving because in some cases the specimens were hammered out of existence) specimens are re-arranged in the order of merit. In the second column are given the comparative losses in terms of Aberdeen granite; and in the third, the estimated life of pavements constructed from the various materials tested. My reason for adopting Aberdeen granite as my standard of comparison is, not that it possesses any special merit or superiority over many other granites, but because it, having been in use in the city of London and elsewhere for a great many years, experience has taught us what its capabilities of endurance are. Although, when we attempt to seek for records of the *amount of wear* for a *certain traffic*,

even for this extensively used paving material, it is remarkable how scant such information appears to be. There is no trouble in finding records of the amount of wear of a pavement on a certain street in a given time; for instance, we are informed by various authorities, that on Blackfriars Bridge, London, setts of Aberdeen granite wore down one and a half inches in thirteen and one-fourth years, and that Guernsey granite wore only one-fourth of an inch in the same time, but the amount of traffic passing over the pavement is not given. The information is only valuable, therefore, to show the *relative* durabilities of the two stones. We are also informed of the results of Mr. Walker's experiments with several varieties of granite setts, which he placed under heavy traffic for a period of seventeen months; but, again, no idea of the weight of traffic, producing the results noted, is given, from which could be estimated the lives of the pavements for different degrees of traffic.

Though I have searched eleven or twelve authorities upon street pavements, the best information to the point that I have been able to find is given by A. T. Byrne. On page sixty-eight of his valuable book upon Highway Construction, published in 1892, he states that "On London Bridge, which has a traffic of over 15,000 vehicles in twelve hours, the wear of granite blocks has been found to be at the rate of .222 of an inch per year, or that the number of years required to wear away one inch, is four and one-half." Even in this case the description of the granite is not given—though it is doubtless the Aberdeen stone, as it is used now almost entirely in London—nor is the width of the bridge. It would evidently make a very great difference whether the 15,000 vehicles passed over a width of thirty feet, or were distributed over a width of say seventy-five feet. However, I have—without going over to measure it—been able to discover the width of the bridge which is given in the Encyclopedia Britannica as being 53 feet between the parapets. This would probably mean thirty-three feet—room for four vehicles, in the centre, and a foot-walk of ten feet on either side. Working upon this assumption, we have the amount of traffic on London Bridge as 1,364 vehicles per yard of width per day of twelve hours, and it has been observed that under that amount of traffic granite blocks have worn down to the extent of .222 of an inch in a year. From what has thus actually been observed to take place, it is a simple matter of calculation to determine what should be the amount of wear for any given traffic, and thus to determine the life of the pavement for that traffic.

In order to apply this theory to practice, I have kept count for several days in succession and ascertained the amount of traffic upon two of the principal streets of Hamilton—James and York streets.

The number of vehicles passing on either street was found to be about the same, being 135 per yard of width per day of 12 hours—exclusive of portion of street occupied by street railway tracks.

Upon James streets about 82% of the traffic was observed to be light, the remaining 18% being medium and heavy; but on York street the percentage of medium and heavy was about 35% of the whole.

As we have, however, no information as to the character of the

traffic upon London Bridge, we will disregard that consideration, and deal also only in numbers of vehicles.

Now, if the wear for a traffic of 1,364 vehicles per yard of width per day has been found to amount to .222 inch, the amount of wear for the same pavement (granite) for a traffic of 135 vehicles would be .022 inch; or, for the traffic of James and York streets, it would require in order to wear the pavement down to the extent of two inches, a period of 91 years, which would represent the life of the pavement for those streets; for experience has shewn that by the time stone block pavements have become worn to the extent of two inches they require to be taken up, though after being dressed they may be relaid.

Then, assuming that the durability of the pavement is proportioned to the durability of the specimen tested—and I think this should be a fair assumption—we can readily calculate what should be the life of each pavement constructed of materials such as our samples. For example, the wear of Aberdeen granite being taken as 1, that of a specimen of Vitrified Paving Brick, made by the Hamilton & Toronto Sewer Pipe Company, was found to be 1.44; therefore, the life of the brick pavement should be $\frac{1}{1.44}$ of that of the granite, which would amount to 63.2 years. In this way the lives of pavements constructed from such several materials as tested have been computed and noted in table No 2. It may be remarked by some, that in the estimates of durability thus obtained no account has been taken of the influences of the weather; but it will be readily seen that this is not the case.

Whatever effect the weather or atmosphere may have upon the granite pavement, such effect will be applied to each of the other pavements just in proportion to the wear of the specimen in the rattler test. For example, the influences of the weather upon the granite would be multiplied by 9.93 in the case of the common hard brick; that is, my estimates of durability include the assumption that the common hard brick would be affected by the weather to the extent of about ten times that of the Aberdeen granite.

This would probably closely represent what would actually take place, so that, with perhaps the exception noted in the table, I think we have good reason to believe that the durability of pavements estimated as above described, and as noted in table No. 2, should be attainable in practice.

By way of supporting this opinion, I will again quote from A. T. Byrne, who says that "Brick has been used for upwards of a hundred years in the Netherlands, and pavements laid half a century ago are still in good condition. There are several brick pavements in the United States from ten to eighteen years old, which are still in good condition."

ASPHALT. As to the durability of asphalt pavements, experience has shewn that their life is not by any means proportional to the traffic they sustain. In fact, even an extremely heavy traffic appears to produce scarcely any perceptible wear.

An asphalt pavement in Cheapside, London, after fourteen years traffic of 13,772 vehicles per day having passed over it, was found to

have been reduced in thickness by only seven-eighths of an inch, and this reduction was chiefly due to compression.

Another asphalt pavement, which has sustained a very heavy traffic for sixteen years in the city of Paris, was found when taken up, to have lost only five per cent. of its original weight, though twenty-five per cent. of its original thickness. Some of the streets of London, carrying the heaviest traffics of any streets in the world, have been paved with asphalt and been in constant use for from 16 to 19 years before having been renewed. Similar pavements, sustaining very much lighter traffics, in other cities in England and America, have exhibited no greater powers of endurance, so that I think we may reasonably agree with Mr. Haywood, who, as Mr. H. P. Bulnois, City Engineer of Liverpool, informs us, places the life of a good asphalt pavement at seventeen years—and as it appears, irrespective of the traffic it has to sustain.

Conclusion. With regard to durability we are, therefore, bound, from the foregoing, to draw the following conclusions namely: that for extremely heavy traffic such as exists on some of the streets of great cities, asphalt stands far ahead even of granite blocks; but that for streets of somewhat lighter traffic, say 700 vehicles per yard of width per day and less, granite blocks would give better results, and for more ordinary traffic, of say 500 vehicles per yard of width per day and less, a good quality of vitrified brick pavement should give excellent results, and be preferable to asphalt.

Cost. As to the cost of pavements, I cannot do better than simply give a table of the prices which have been paid during the past few months for different pavements in various places in this country and in the United States.

The following table, giving the first cost only of work, has been compiled chiefly from the contract prices reported from time to time in the *Engineering News*:

LOCALITY.	COST OF BRICK.	COST OF GRANITE.	COST OF ASPHALT.
Anderson, Ind	1.73		
Avondale, O	2.53 to 2.80*		
Burlington, Ia	1.53 to 1.65		
Buffalo			3.00
Chicago	2.00	3.13	
Detroit	2.80		2.78–2.85
Huntingdon, Pa	1.80		
Montreal, P. Q			3.43–3.97
Moberly, Mo	1.35†		
New York		2.50–4.50*	3.25–4.50
Philadelphia			2.50
Rochester	2.25*		
Toronto		3.00–3.80	2.50–3.00
Wilmington	1.98–2.26		
York, Pa			2.43–2.97

* Concrete foundation.

† Sand foundation and exclusive of grading and curbing.

It would now be interesting and instructive from the above figures of the cost, and my table of comparative durabilities, to make out a table of annual costs necessary to perpetuate the different pavements for various degrees of traffic, but in preparing this paper I have not had the time to devote to this. Anyone who may be sufficiently interested can, from the data furnished, make these calculations for himself, or I may have an opportunity of taking up the subject again at some future time.

TABLE NO. 1. (7 A)

TABLE GIVING LOSSES OF SAMPLES OF PAVING MATERIALS SUBJECTED TO RATTLER TEST.

No.	Name and Locality.	Weight in Ounces.			Percentage of Loss.			Means of 2nd.	Remarks.
		Original	After 500 turns.	After 2,000 turns.	In 1st.	In 2nd	Total.		
1	Grey Granite from Aberdeen.	32.75	32.50	31.25	.76	3.81	4.58	3.06	Slightly worn.
1 A	" " " "	32.50	32.00	31.25	1.54	2.31	3.85		
2	Red Granite from N. B.....	66.75	66.25	65.00	.75	1.84	2.62	1.84	" "
3	Grey Granite from Stanstead	69.00	68.50	67.50	.72	1.45	2.17	1.45	" "
4	Limestone from Hamilton....	91.00	90.00	87.00	1.10	3.30	4.40	.....	Broke at "dry."
4 A	" " "	204.00	199.50	192.50	2.21	3.43	5.64	3.37	Worn smooth.
5	Freestone from Hamilton....	190.00	171.50	.....	9.74	.....	.....	.....	Broken to fragments.
6	Vitrified Brick from Hamilton	113.00	107.00	102.00	5.31	4.42	9.73	4.42	Corners evenly worn.
7	Pat'd Sand from Hamilton...	110.00	96.00	.....	12.73	.....	.....	.....	Ground to powder.
8	Common Hard Brick Hamilton	77.30	57.50	34.00	25.61	30.40	56.01	30.40	Broken and worn evenly
9	Metropolitan Block, Canton, O.	159.50	156.00	144.50	2.19	7.21	9.40	.....	Spalled. Not worn.
9 A	" " "	161.30	155.50	146.00	3.60	5.88	9.48	6.55	" " "
10	Imperial Block, Canton, O...	115.50	114.00	108.00	1.30	5.19	6.49	.....	" " "
10 A	" " " ...	112.50	103.00	98.50	8.44	4.00	12.44	4.60	Fractured in 1st test.
11	Vitrified Brick, Canton, O...	113.00	108.00	103.50	4.42	3.98	8.41	3.98	Evenly worn on corners
12	Hallwood Block, Columbus, O.	137.50	131.00	124.50	4.72	4.72	9.44	4.72	" " "
13	Vitrified Brick, Columbus, O.	139.50	136.50	124.00	2.14	8.97	11.11	8.97	Chipped and worn.
14	Fire Brick, New Brighton, Pa.	103.50	99.50	91.00	3.87	8.21	12.08	8.21	" " "
15	Pressed Building Brick, Don.	97.50	77.00	50.00	21.03	27.69	48.72	27.69	Fractured and worn.

TABLE No. 2. (7) B

Names and Localities in Order of Merit.	Loss in Terms of Aberdeen Granite.	Life of Pavements for a Traffic of 135 V. per yd.
Grey Granite from Stanstead.....	.47	193.6 years
Red Granite from N.B.....	.60	151.6 "
Grey Granite from Aberdeen.....	1.00	91.0 "
Limestone from Hamilton.....	1.10	*82.7 "
Vitrified Brick from Canton, O.....	1.30	70.0 "
Vitrified Brick from Hamilton, Ont..	1.44	63.2 "
Imperial Block from Canton, O.....	1.50	60.7 "
Hallwood Block from Columbus, O..	1.54	59.1 "
Metropolitan Block from Canton, O.	2.14	42.5 "
Fire Brick from New Brighton, Pa...	2.68	35.0 "
Vitrified Brick from Columbus, O...	2.93	31.0 "
Pressed Building Brick, Don.....	9.05	10.0 "
Common Building Brick.....	9.93	9.2 "

* This estimate is probably too high, as experience tends to show that limestone does not wear well as a paving material.

DISCUSSION.

Mr. Dickson—What is the asphalt composed of?

Mr. Tyrrell—I am speaking there of Trinidad asphalt. Of course it is not used in its natural state; it is mixed with oils to bring it to its proper consistency.

Mr. Abey—I may say in reference to those vitrified paving bricks, I put some of them in water for 36 hours, and they absorbed about half an ounce of water in that time. They are very hard; quite as hard I think as granite. The ordinary brick such as we use for sewers will take in a pound or two of water.

Mr. Chipman—In speaking of the relative values of the different pavements, I think there was one matter that was not taken into account in determining the value, that is, the sanitary aspect of the question, and I may be pardoned, perhaps, for drawing the attention of the Association to it. It is something that should not be overlooked in my opinion. A wooden pavement should never be laid in any city, especially in large cities. I believe that the brick is the coming pavement.

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

THE EDUCATION OF OUR DRAUGHTSMEN.

By F. L. FOSTER,

O.L.S., Toronto.

As the subject of the early training of the students of our profession has, I think, not been touched upon, or at all events, not treated of to any extent in our discussions and reports hitherto, and having been requested to contribute a paper for this meeting, I have ventured to choose the topic of education with special reference to draughtsmanship, in hopes of its being followed by contributions from other members, giving their views regarding the other branches of training, so desirable in forming the finished practitioner.

In answer to the possible question, "of what practical use is this subject, seeing that we have Schools of Technology, and Universities to teach all that is required in this connection?" I will say that many of our students at a distance from centres of education have not an opportunity of benefiting by these institutions, and to such, some practical hints may be useful.

The utility of a certain amount of artistic training for our students will, I think, be readily conceded by at least some of the veterans of our profession, when referring to their field-notes, plans and sketches of old but important surveys; and many a strong expression of regret has been uttered that they had not been more carefully instructed when young, in the art of note-keeping and sketching.

It goes without saying that good and useful field-notes must be taken clearly and legibly, but the application of the artistic faculty is not so apparent.

The knowledge of the most rapid and correct methods of conveying to the senses the appearance of objects by a few strokes of the pencil, is to my mind, an acquisition worthy of much study and practice, enabling one as it does, to note facts and figures, ideal as well objective, in the best and most convenient form. It is the shorthand method of the artist, and will serve the purpose of the surveyor and engineer just as well.

The practical application of this knowledge may be illustrated by supposing an exploration survey to be in progress for the location of a railway line.

How much more rapidly taken, and perfect will the notes of the location engineer be, when sketched by means of the artistically trained eye and hand.

From any suitable points on his exploration lines he can make rapid sketches in any required direction, and by adding approximate heights and distances to the points in his sketches, can in a short time record all necessary information, both in plan and perspective view—

In taking notes of most, if not all kinds of surveys, this knowledge can be usefully applied.

The fundamental rules and principles of geometrical and isometrical perspective should be taught the student of surveying or engineering, and the rapid estimating of angles and distances as well as the judgment of proportions between objects should be frequently practised, so as to give facility in placing the shape, apparent size and approximate position of these objects rapidly on paper by a few strong and firm outlines. The knowledge thus attained is the ground work or basis of the most important part of every artist's education; and it is principally by the out-door study of the outlines and interior structural lines of natural and artificial objects, more, perhaps, than to their light, shade and colour, that he gains the power of transmitting his views of the character of each object to his paper.

We all know how much expression can be given by a few lines, but the power of doing this is only attained by careful study and considerable practice.

The trained eye will see more in an object than that of one unused to sketching, because of the frequent observation with a view to transmitting objects to paper. This training also improves the memory so much that objects, and even scenery of a complicated nature, can be readily recalled and sketched with a fair amount of accuracy many years after being seen.

The utility of the photographic camera, although very great, cannot obviate the necessity or desirableness of the training just mentioned.

Successful photographs require conditions of light and atmosphere not necessary to the sketcher. The camera, we know, records all in view—the sketcher, only the few objects which he may require. In fact, so widely do the two methods of recording objects differ, that a comparison is obviously unnecessary; however, the fact that an instrument like the camera can be used for so many purposes in the practical work of surveying and engineering, with such a little expenditure of skill, or even thought, should not, I think, prevent our students from cultivating the artistic faculty, for by doing so they develop latent possibilities that cannot but be a benefit to them, apart from their strict application to the duties of their profession.

In conclusion, I wish to state my opinion, that the subject of draughtsmanship has never had the attention it deserves from our Board of Examiners, and that as the power is in their hands to compel the attention of students to this necessary branch of education, the subject should be placed on the list of requirements, from the candidates for final examination. I think that a knowledge of the rules of perspective drawing should be required, and that a fair proficiency in free-hand lettering, and whatever constitutes the Topo-

graphical Draftsman's Art, should be shewn and tested by the construction of finished plans from given field-notes in a stated period—say one day during the progress of the examination.

By means of these requirements, students would necessarily educate themselves accordingly, and a corresponding benefit to the profession would in time undoubtedly follow.

DISCUSSION.

Mr. Niven—The suggestions thrown out, I think are worthy of consideration. So far as the Board of Examiners are concerned, of course that is one of the subjects, but it has never been looked at in the way that Mr. Foster suggests. I think the suggestion is a good one, and I shall have much pleasure in bringing it before the Board at their first meeting.

Mr. Morris—A better knowledge of drawing would give to the surveyor a means of giving information that to many is not now possible. So many of us have to appear before the judges of the province to give information as to questions in dispute, that very often the surveyor not in a position to show in some artistic way, a rolling country, or a country diversified with water is at a disadvantage, and experts who are called in sometimes, throw the surveyor in the shade; so that if we were in a position to give this information in explanation of our notes, it would improve our standing very much.

Mr. Winter—It strikes me very forcibly that if there is to be any move made towards getting a topographical survey of the country, it is a matter of very great importance indeed, that our young surveyors coming into the profession now should be equal to the occasion. At all events we should not be content to sit down and make no progress. The country is progressing and the world as well, and we ought to keep up with the age.

Capt. Gamble—I feel that Mr. Foster has expressed in his paper almost everything that need occupy our attention. As he suggested, a day or half a day might be given at the examination to a practical exhibition of the students' ability in that direction. It is a very different thing I think for a man to be able to plot correctly from field notes in a short time, to sitting down and preparing a map, which most people can do if you give them time enough. The examiners should have an opportunity of seeing what facility a young man possessed as to expressing himself on paper in short time. I think this is a very important thing. And as Mr. Winter has just said, should we be instructed either in the near or distant future, to make a topographical survey of the Province of Ontario, it would be very necessary that we should have many who would be properly instructed in the art.

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

THE TRANSIT, AND HOW TO USE IT.

By CYRUS CARROLL,

O.L.S., C.E., Hamilton.

I SHALL endeavour to confine my remarks to such ideas and knowledge as I have gained in an experience of over thirty years, avoiding as much as possible anything you may find in books concerning the Transit.

In the first place, let us consider the tripod. This should be good and strong, the wood tops of legs at least 2 in. square, in correspondingly large brass bibles, the bolt to have washers and thumb-nuts, to be relaxed every time the legs are folded together. I once bought an imported transit for $225. The tripod was much the same as is used with English Dumpy-levels—small top, small brass bibles, and brass ends of legs fitting between them. It worked well in the office, and for a few days in the field, after which it was unsteady. This was not annoying to the maker nor to the dealer, but was decidedly inconvenient on the plains of Manitoba, 500 to 1,000 miles from an instrument repairer.

In a triangulation with a good instrument I found the resulting triangles generally 3′ short of 180° in the 3 interior angles. This was the experience of Mr. H. Munro McKenzie, Mr. John Robinson, Mr. C. W. Biggar, Mr. Marcus Smith, and other eminent engineers.

In the imported instrument the plumb-bob was suspended from a hook rigidly fixed into the tripod-head, and extending 4″ down. I had of course to remove the hook.

As to the instrument itself, there is no need of having a great quantity of metal. The weary transit-man has weight enough to carry in any case. Light, well made transits are the best. My own predilection is for 6″ limb, inside verniers splayed both ways, reading to 15 or 20″, Verniers marked A and B.

Graduation one way zero to 360°, *i. e.* to the left; an inner numbering zero to 180° to the right. This will be of great use in setting out curves to the right, as it saves a very laborious and awkward figuring out of the Tangential Angles, which must be done with an instrument reading only one way. But should you have an instrument reading only one way, I would say so choose your first sight that in turning off your angle you can read it direct. Avoid any manner of working by which you have to figure out results, not so much on account of

the labour involved, but chiefly, because by so doing you increase the chances of error.

Have the compass-card read 0 to 90 degrees each way from north and south, for the same reason. A card reading 0° to 360 is a first class nuisance

Have the axle boxed in tight. Never buy an instrument with the axle in wyes, to separate in boxing up. If you use such a transit three weeks in succession in hot weather the small rubber tips over the axle will give out. Then the axle will rise and ride in the wyes. Do you say you would prevent that by packing it down? Well, perhaps you would, and perhaps you would not. Generally speaking in such a case you have to interview the instrument-maker—perhaps 1000 miles away—while you have a party on your hands, say eight men at round wages, eating your pork that stands you 40 cents a pound, and grumbling at its flavour. Instrument makers do not care about these things, but you do.

In chosing an instrument, see that the tube travels truly in line. In my imported instrument, the tube was drawn only—not bored out; the wires wobbled off the line in fixing the focus for long and short sight. Vertical circle should be not less than five inches, with two verniers, reading to minutes.

All tangent screws should have compensation springs to even the motion and prevent jumping.

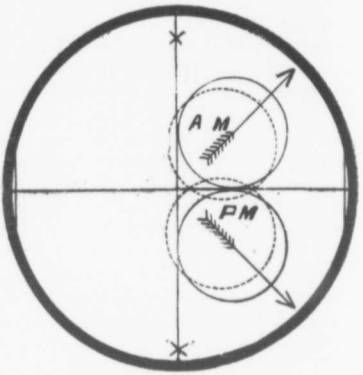
You may make a very useful michrometer by placing vertical spider's lines as near the outside of the tube as you can see a small portion of them, one on each side. Set up your instrument on a level piece of ground and measure say 1,000 feet straight away from its focus, then place a picket very carefully in line of each of these outside wires, the line joining pickets of course being at right angles to the line from transit. Suppose the distance between centres of pickets is forty feet; $1{,}000 \div 40 = 25$, which is your scale; that is to say, one foot in width for every twenty-five feet length of base. It follows that if we measure the distance between centres of pickets within one inch, we have the distance within twenty-five inches. If we measure it within one-fourth of an inch, which we can, then we have the distance within six inches.

In crossing quaking bogs or deep beaver ponds it is much quicker and more accurate than direct measurement. It is doubly as correct as the michrometer which reads the vertical rod, on account of subtending double the distance. You have of course to find the true value of your scale, and so use it whatever it may be.

As you intend your transit to be fit for all uses that such an instrument can be put to, do not have any but horizontal and vertical wires.

The inclined or × wires cannot be used in observations of the sun for azimuth, as you must take the direction of the sun as well as its altitude at one observation. Besides the central vertical wire is useful in keeping the picket plumb.

In observations of the sun in the forenoon, use only the lower and following limbs, applying the semi-diameter of course to suit the case. In the afternoon use only the upper and following limbs.



The reason for always using the following limb, is that you can plant the vertical wire × × on the sun (as shown by the dotted line,) and take the observation the instant the sun quits the wire. You can always do this more accurately than you can place the wire ahead of the sun, and note the contact.

The lower and upper limbs are to be used in the forenoon and afternoon respectively, for the same reason, namely : that the sun is receding from under the wire, so that the last contact can be anticipated, and got and used more easily and accurately than can the first contact.

In the diagram, the arrows show the direction of the apparent motion of the sun at each observation.

With the fingers of the right hand on the horizontal tangent screw, and the left on the vertical tangent screw, the observer can so range the wires that the sun will pass off from them simultaneously. Having taken and read the vertical and horizontal angle, and noted them, take another observation—take several in fact—and, so far as practicable, with the same intervals of time between each.

The results can be easily worked out on the spot. All this is very convenient in practice, as it is done in the best part of the day.

The only objection I have to observations of the pole star, is the miserably, untimely hour of the night at which, for the greater part of the year, the observations have to be made. Often in desolate places, difficult of access, with the after long cold drive through bad roads, rousing up sleepy toll-keepers, porters, livery-men, etc.

It often happens, that within an hour's time of the elongation, or perhaps within a few minutes of it, a cloud obscures or covers the star, and the observation is lost.

The same thing may, and often does happen, for several nights in succession. If any other surveyor gets paid for all his work of this nature, I want to hear from him.

Now let us enquire whether it is necessary to lose the observation, if we have the instrument set up, and are following the star for an hour, more or less, before or after an elongation.

By calculating the azimuth, not only for the elongation period, but for intervals, from a few minutes to an hour before (and after) I find, that although there is a very perceptible motion of the star in azimuth, right up to the time of elongation, the amount of such motion in azimuth for the last few minutes, is very small—so small in fact, that it may be entirely neglected.

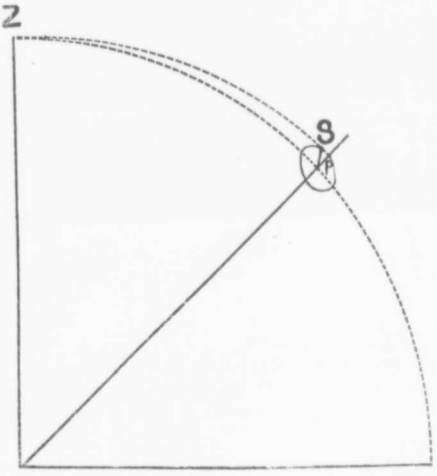
Also, that an error of five minutes in the time of observation, at about one hour from elongation, is only about half a minute of

azimuth. This is the maximum error to be allowed for, and is equal to only nine inches in a mile, or say one inch in every ten chains; which is nearly always quite close enough for our work. But the error in the time need not exceed two minutes, which would reduce error in azimuth to less than one-fourth of a minute, say four inches in a mile. Let us therefore take our observations, if we choose, any time within an hour of the elongation. Will it be necessary to get special legislation to make this lawful?

While on the subject of the meridian, allow me for once to digress a little.

Cannot we surveyors make it necessary to have all our surveys give the astronomical bearing, and discard the "magnetic?" At present, bearings are mixed, confusing, and of but little use.

Let Z represent the Zenith, $Z\ P$ represent the Co Latitude, S represents Polaris at five hours after Transit.



To find the Azimuth SZP—

We will assume the Latitude as 43° 39′ 40″ N that being about the mean of Toronto.

90°–lat. 43° 39′ 40″ = co lat ZP = 46° 20′ 20″ SP = polar distance per almanac 1° 15′ 28″.

The hour angle SPZ = 5 hours = 75° 0′ 00″.

Thus in the triangle PZS, we have given ZP, PS, and the included angle ZPS.

To find the Azimuth PZS:—

Log secant	$\frac{1}{2}\ z\ p + p\ s$	= 23° 47′ 54″	= 10.038594
: " cosine	$\frac{1}{2}\ z\ p - p\ s$	= 22° 32′ 26″	= 9.965488
:: " cotangent	$\frac{1}{2}\ s\ p\ z$	= 37° 30′	= 11.115020
: " Tangent	$\frac{1}{2}\ z\ s\ p + s\ z\ p$	= 52° 45′ 35″	= 10.119102
Log cosecant	$\frac{1}{2}\ z\ p + p\ s$	= 23° 47′ 54″	= 10.394136
: " sine	$\frac{1}{2}\ z\ p - p\ s$	= 22° 32′ 26″	= 9.583577
:: " cotangent	$\frac{1}{2}\ s\ p\ z$	= 37° 30′	= 11.115020
: " tangent	$\frac{1}{2}\ z\ s\ p - s\ z\ p$	= 51° 04′ 17″	= 10.092733

$\frac{1}{2}\ z\ s\ p + s\ z\ p = 52°\ 45′\ 35″$
$\frac{1}{2}\ z\ s\ p - s\ z\ p = 51°\ 04′\ 17″$

1° 41′ 18″

That is to say, the Azimuth at one hour from elongation, is 1° 41′ 18″.

Now let us try fifty-five minutes from the elongation, using the same rule.

L sec	23°	47′	54″	= 10.038594
" cos	22°	32′	26″	= 9.965488
" cotan	38°	07′	30″	= 10.105238
tan	52°	8′	10″	= 10.109320

AND

L cosec	23°	47′	54″	= 10.394136
" sine	22°	32′	36″	= 9.583577
" cotan	38°	07′	30″	= 10.105238
" tan	50°	26′	20″	= 10.082951

52° 08′ 10″
50° 26′ 20″

Azimuth 1° 41′ 50″ for 55 minutes before elongation.
" 1° 41′ 18″ " 1 hour " "

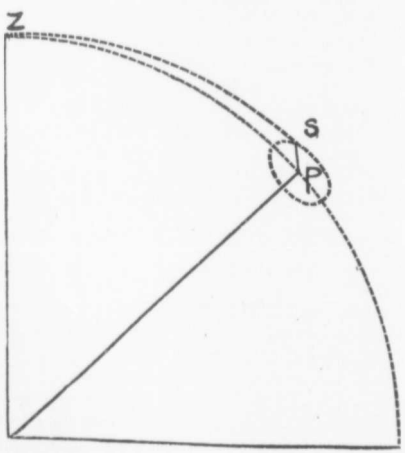
32″ difference of azimuth in 5 minutes of time.

This is about 9 inches in a mile, or say 1 inch in 10 chains; which is I think near enough for general use.

I find that 15 minutes from the time of the elongation, there is a variation of azimuth of only 22″—say one-third of a minute.

Here an error of 5 minutes in time would octiate the result only about one-tenth of a minute.

I think I have sufficiently proved that we may use calculated azimuths up to 1 hour from elongation, at least.



Before closing this matter of calculcation let me suggest another mode as a check on our work.

Let $P = 5$ hours or 75°, and let fall the perpendicular SA.—

Find PA

cot $p\ s$ =	1° 15′ 28″ =	11.6584.78
: rad		10
:: cos p =	75°	9.412996
: tan $p\ a$ =	0° 19′ 32.4″ =	7.754518

Find AS

radius		= 10
: sine p =	75°	= 98.34144
:: sine $s\ p$ =	1° 15′ 28″ =	437
: sine $s\ a$ =	1° 12′ 53.6″ =	8.326381

To find ZA—

ZP =	46° 20′ 20″
− PA =	0° 19′ 32″
= ZA =	46° 0′ 47.6″

To find Z the Azimuth :—

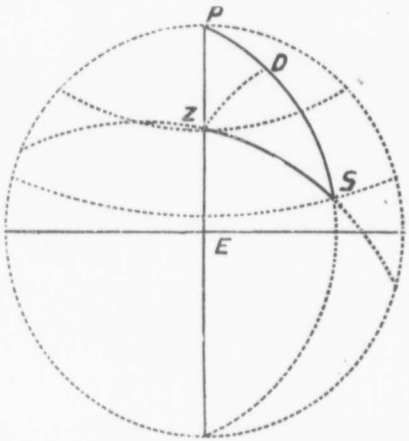
log tan	$a\ s$	1° 12′ 53.6″ =	8.326475
radius			10
sine	$z\ a$ =	46° 0′ 47.6″ =	9.857033
cotan	z =	1° 41′ 18″ =	11.530558

This is as easily done as the first method of computation, and is, as I said, a check on our work.

In observations of the sun for azimuth, we have as the result of knowing our latitude, and the declination (corrected for time of observation,) and the altitude by the observation—

the co latitude ZP
" co altitude ZS
" co declination PS

P being the pole, S the sun, Z the zenith of observer, E the equator, EZP being regarded as the meridian of the observer.



We have in fact the spherical triangle PSZ, in which all the sides are given, from which we find the angle PZS, which is the azimuth from the north.

Here again we may let fall the perpendicular ZD—find the segments SD, DP, with right angles at D—from which to find the angles PZD and DZS, as by Napier's rule of the circular parts.

But to return to the Transit:

Keep it clean, box it when not in use, oil frequently, but leave no surplus of oil. Have oil-silk cap with draw-string for it, to use on wet and dusty days; leave all clamps loose when carrying.

Caution assistants against setting the transit down roughly. I once had an assistant that let the tripod down on a rock heavily, after the manner of a drill. The rock was solid rock road-bed, and the man was tired. Now had I hit the tripod a smart blow on end with an axe, the man would have expected injurious results. It was not easy to convince him that he had subjected the instrument to the same sort of blow.

You take an engineer or surveyor a month out on the prairie where he can only travel 100 miles a week, and be 500 miles from anywhere, give him a watch telescope that he can easily attach to the lower plate of his transit, so that he can be sure of accuracy in his angles, no matter how shaky his tripod has become, do this and note his delight.

The writer once had to anchor a syrup keg firmly on posts, and with his transit secured on that, take an angle that had to be taken.

Instrument makers do not like watch telescopes, they refuse to put them on—pity they do not spend a summer on the prairie with a transit, it might be instructive to them. The last man I asked for a watch telescope, looked at me as Mr. Littimer looked at David Cop-

perfield; he looked as if he thought I was very young. He had no use for watch telescopes.

While making a pet of your transit, do not discard the compass.

You have to traverse the margin of a river or lake, amongst willows and water, where the general trend only counts—use the compass—tying on concession, section or lot lines as you can.

Exploring—traversing small lakes for area only—use the compass; it is rough and ready. Save your transit for its truer and better work.

Avoid perforated axis and lamp. A lantern held near the object-glass is better.

In the matter of taking angles, avoid the too common practice of taking a back sight, revolving the telescope forwards, and then taking the angle, as you incorporate thereby any error of adjustment.

Keep it in perfect adjustment, be satisfied with nothing less.

In producing lines forward, I will not repeat instructions that have been printed about setting two points on same hub, with the instrument reversed, and taking the middle point—I will merely ask you to read it again. But I will say that it is well if the ground will admit of it to set two points a head—one say at one-fourth mile and one at one-half mile, and after setting both again try if they are in line, then on going to the last point so produced, try the line backwards as far as you can see it. If you have long tangents, use targets at convenient points; you can make them by using 2 pieces of black silicia 6″ square, pinned on a piece of cotton 12″ square—the whole tacked to twigs and nailed to a picket to be left on the line.

Such targets can be carried in the pocket, cloth-pins and tacks.

When you traverse entirely around a piece of land, use latitude and departure not only for area, but to prove correctness of the work; or you may prove angles only by the rule that the sum of the interior angles of any rectilined figure is equal to twice as many right angles as the figure has sides, less four right angles.

Note the magnetic bearing of every line you sight on. It is a check and a very useful one on your reading and noting of the angles.

Keep full field notes on the spot, leave nothing to the memory or to be written down after getting back to the office. When the instrument is not in use, it is well to allow the needle to balance freely on the pin, but raise and secure it before carrying.

If in slipping or falling, you have to take a quick option between hurting yourself or damaging the instrument, I will not say you should hurt yourself, but you should save the instrument.

I have said that light instruments are best for general use. Aluminum on account of its lightness appears to be an excellent material for transits, though on account of its softness it has to be reinforced, and in some places replaced by brass.

I know of but one such instrument, it is owned by Mr. Abrey, of Toronto; it is a very fine instrument, but too expensive for general use.

A word as to impromptu repairs. It is never to be forgotten that repairs of many sorts are likely to be required when you are far from civilization; when to go home and return would mean to lose the season or be equivalent to ruin. Be prepared as best you can for such emergencies. Have with you more than one adjusting pin, large and small screw-driver, very small ones for the smallest screws, pliers, fine files, gum, spiders webs, copper wire, brass screws etc., oil, chamois, soft cotton, etc. Have with you a white silk handkerchief or white silk thread. In case you have no spiders line, dissect carefully with a fine needle a thread of the silk. It is often a good substitute. If gum fails, remove some from off the closing-flap of an envelope, place it on the ring, wash and dry the fingers, apply the line, stretching it straight, but taking care not to break it; hold thumbs on long enough to let it fasten, remove thumbs with a twisting motion to avoid detaching the line. Remember you can get the best of oil from the badger or coon or bear, any of which you may get while on your work. Have extra bubble-tubes along, in case you get a tube slightly cracked, cover the crack with white paint. If the liquid evaporates till the bubble gets too long to do its work, take a small needle, and by gentle tapping, drill a hole on top near each end of the tube. Make a cup of putty or white lead about each hole, pour in alcohol or water till the bubble is short enough, then put white lead on the holes, saturate a thread in white lead and wind a portion of the tube about each hole. A tube so repaired will last till you get ready to go to the repairer.

Use your transit yourself, never lend it. As a horse that is lent is spoiled for your driving, so is your transit after lending spoiled for your own use.

Have I said too much about the transit. Ask not the maker or the repairer, nor the mere tenderfoot theoretical engineer, no matter how high his attainments. Rather inquire of the hard-working surveyor, one who has worked for months together in the wilds, who had to meet emergencies as they occurred, one who has made his mistakes and paid dearly for them; he may tell you that if somebody had discoursed to him as fully as I have in this paper, he would have been saved many vexatious and costly mistakes.

DISCUSSION.

Mr. Abrey—Perhaps there are a few good points in the paper in reference to any person caught out some place where he is obliged to make the best of the circumstances, but otherwise I should not like to take the advice generally in reference to the transit. I don't like to criticise the instrument very much—perhaps I have done too much of that sort of thing heretofore, so I would like to hear some of the others. In reference to the aluminium transit, I might say that I think aluminium is good and will answer all purposes. The instrument is very light and it is strong, but it is very soft. The expense,

of course, at the present time is a mere nothing compared to what it was at the time I got mine; at that time it was very expensive, but now the cost of it should be very little more than the ordinary brass instrument, so I think it is the coming metal for that purpose. I don't like to go into a general criticism of the paper without having seen it, but as to the method of taking observations, of course we don't all do that; we take very much more refined observations than he speaks of there. Probably the paper was only intended for rough general work; I think we may assume that that was the case.

Mr. Niven—I don't profess to be an authority on instruments such as some of our surveyors, but I think there are many valuable hints in that paper to a man caught out in the woods, where he sometimes finds his instrument gets out of order. On the whole, I think that the intention of Mr. Carroll in sending his paper was good, and he has evidently given us a great amount of his experience.

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

DRAINAGE DIFFICULTIES IN THE SOUTH-WESTERN MUNICIPALITIES OF ONTARIO.

By HENRY WINTER,
O.L.S., C.E., Thornyhurst.

1. The writer having learned from your Secretary, that the Association, at the next annual meeting thereof, contemplated taking into consideration the drainage question, with a view of suggesting amendments to the Drainage Laws at present in force in this province, has much pleasure in availing himself of the privilege of submitting for the consideration of the Association, a statement of a few of the difficulties that have come under his observation in connection with this question, during his residence in a part of the country in which extensive drains have been constructed and others are yet required; believing that the nature of the training required by members of the Association in order to enable them to become members of the profession, renders the Association competent to deal intelligently with this difficult question.

A number of the large drains in this section of the country were constructed by the Government, under the Act 36 Vic., C. 38, Sec. 6., and by township municipalities, under 36 Vic., C. 48, Sec. 451, which Acts required that the drains should be extended only far enough to obtain sufficient fall to carry the water beyond the limits of the locality to be drained, without any regard whatever to the effect produced upon lands in the vicinity of the terminus of the drain; and the drains constructed under the above Acts, almost invariably carried the water from the lands in one locality and flooded those in another, actually causing about as much damage to the latter as benefit to the former, and resulting in a great deal of trouble, litigation, and unnecessary expense.

2. The Amended Acts require drains to be extended to sufficient outlets; but as the party proceeding with the work is the judge of the sufficiency of the outlet, and those liable to sustain damage have no voice in the matter, the amendment has been productive of little benefit; and very few of the drains in this section of the country have been skilfully constructed, or extended to sufficient outlets, or so constructed as to benefit one locality without injuring another.

3. In proceeding with the construction of drains in which two or more municipalities are interested, the drainage laws now in force contain no adequate provision for restraining the municipality in

which the work is instituted from locating a drain and proceeding with the construction thereof in such a manner as will prejudicially affect the lands in another municipality.

4. In proceeding with the repairs of drains heretofore constructed, the same difficulties arise as in the original construction thereof; that is, the repairs, in many instances, are proceeded with in such a manner that the attempt to remedy one evil creates another.

It therefore appears to the writer, that while the drainage laws at present in force in this province, contain ample provision for equitably apportioning the costs of drainage works, and for the adjustment of claims for damages that may arise during the progress, or in consequence of the construction of such works, they contain no adequate provision for restraining those undertaking the same from proceeding with the construction thereof in such an improper and unskilful manner as to cause serious damage to those who have no right to interfere until the damages have been actually sustained, and then only by means of tedious and expensive litigation.

The difficulties that have arisen under the Amended Drainage Laws, have resulted in an attempt on the part of a number of township municipalities to divert the water from the natural water-courses or outlets, by means of cut-off drains on the limits between the localities benefited and those damaged by the construction of the original drains, under the Acts above quoted.

5. These cut-off drains have, almost invariably, failed to accomplish the purposes for which they were constructed, and have neither been successful as cut-off drains on the one hand, nor outlet drains on the other.

6. So that the drainage difficulties have passed through three stages, or rather have passed through two stages, and are now in the third stage of progress, viz:

1st. The drains constructed under the Acts above quoted, without sufficient outlets.

2nd. The attempt and failure to extend those drains to sufficient natural outlets.

3rd. The attempt, by the construction of cut-off drains, to avoid the expense of improving natural outlets or water-courses.

ADDITIONAL REMARKS BY MR. WINTER.

We have difficulties in the west with regard to drainage matters that I don't think you realize in this part of the country. I do not need to give any lengthy explanation to shew that difficulties do exist, because you can assume that from the fact that the Ontario Government found it necessary to appoint a commission to enquire into those difficulties.

(With diagram on blackboard.)

The law under the first drainage Acts required the drains to be constructed just far enough to drain the locality which was intended to be drained, without any regard to the effect these drains would have in another locality. They were constructed in accordance with the literal wording of the law. They were constructed without running

them to any natural or sufficient outlet. The natural consequence was that one part of the country was drained and the other part was flooded. Probably, when I stated that they did as much damage to one part as benefit to another, I hardly stated it correctly, because the area of the locality flooded did not equal the area drained, although the damages were so great as to render it perfectly useless for any purpose until the drains were farther extended. It would be naturally supposed by those who have not had any experience in the matter, or who have not personally observed the difficulties to be faced, that there would be no trouble in making arrangements to extend those drains to proper outlets, but in reality the municipalities met with a great deal of difficulty in this way; one section was drained and one section was flooded by the very drains that were drying the other section. And when the municipalities wished to extend those drains it had to be done by special rate upon the lands to be benefited. Well, the owners of the land up here say: We have our lands drained, we have all the relief we want; but these men down here were flooded by the water off those lands, and they urged the extending of those drains to sufficient outlets, which they had a perfect right to do. But the difficulty was, How were they going to compel the owners up here to assist? However, after a good deal of litigation and trouble, there was an attempt made to extend those drains to sufficient outlets, but the difficulty met with there was in apportioning the expense. They did extend a number of them until they came to natural water-courses that were sufficient to carry off the water before, but were entirely inadequate to carry off the water poured down by the drains above. The end of the story was that they were never extended far enough to reach sufficient outlets. The water-courses in that section of the country are quite different from what they are here. There they are only a few inches below the general surface of the country, so if water is poured in in greater quantities than the natural outflow it does a great deal of damage.

The muncipality, or the party constructing the drain, can locate and construct the drain just as they see fit, and any party who is liable to suffer in consequence of the construction of that drain has no voice to restrain them from constructing it in such a way as to produce that damage until the damage is actually sustained. That is the way I understand the Act, and that is the way I understand it to work.

It is the same in regard to a municipality. One municipality undertakes to construct a drain, and the adjoining municipality may be perfectly satisfied that the construction of that drain will damage lands within their boundaries, but they have no power to restrain the other municipality from proceeding with the drain. They have no power to act in the matter except to pay their share of the expense, until the damage is actually done, and then they must seek redress by litigation. This has caused a great deal of difficulty between municipalities there.

In order to avoid the difficulty in apportioning the expense of extending the drains a number of the municipalities, instead of going on to improve these natural water-courses, as should have been done,

undertook to make cut-off drains, to cut off the drains from the natural water-courses and run them east and west different from the natural flow of the water.

They have attempted to run drains east and west where there is no fall whatever except what they actually make artificially by the construction of the drain ; and in time of a freshet or flood the water pours down and fills up these drains and frequently gets over and damages the land down below. And besides that, in the construction of these drains, they throw up a dam that actually keeps the water back on the land that was dried by the original construction of the drains.

We are in the midst of the third difficulty now. The whole question now amounts to this : What amendment do the drainage laws require in order that that third difficulty can be got rid of? I am satisfied from my own experience that there is only one way of dealing with that third difficulty, because these cut-off drains, where there is no fall at all, will always be a failure ; they never can be constructed in such a way as to be a success. So that there will have to be some amendment to the drainage laws that will enable our municipalities to extend those drains and improve the natural outlets in order to make the drains successful, and specially rate all the parties that ought to pay for the work. I am anxious that this matter should be discussed and some opinion expressed as to what ought to be done, for this reason, that I have been in conversation with some of our legislators from the western part of the country and I am told that in taking up the question of the amendment of the drainage laws at the next session some members of this Association will be called before the Legislature and consulted in regard to this matter. The probability is that it will be some of those members who are not quite so far off as we are up in our end of the province, so that if I can manage to make the members here thoroughly conversant with our difficulties, then I have accomplished all that I have set out to accomplish. I speak particularly on this point, because in talking with our legislators in that section I have been informed that they have had some members of our Association up before them when dealing with this question, and that they did not seem to know anything more about the matter than the legislators themselves. Now, I have no doubt that there is a great deal of truth in that ; but I asked them whether they were able to explain to these professional men whom they called before them the cause of the failure in their drainage schemes and the nature of the difficulties under which we were laboring. Well, they said, they did not know that they were able to give those explanations or make it very clear. Now, there is the point ; they were never able to convey to you people here, whom they did call before them, the nature and cause of the difficulties, and therefore they could not get an intelligent opinion from you.

BIOGRAPHICAL SKETCH OF THOMAS RIDOUT,

Surveyor General of Upper Canada in 1810.

Thomas Ridout settled with his family in York, now Toronto, in 1797, and was therefore identified with the place from its earliest years. He was an Englishman by birth, from Sherbourne, Dorsetshire, where his forefathers had lived peaceful and uneventful lives. An elder brother of his had emigrated to Maryland in the old colonial days, had acquired a large property there, and also held an important position in the Government of that State. To this brother, Thomas, then twenty years of age, was sent in the year 1774. Of perils by land and perils by sea, during the stormy days of the Revolution, the young man had his full share, and a quaint account of his many adventures is still preserved in his own handwriting.

The obnoxious "tea duty" was still unrepealed, and in Boston and other colonial ports, scenes of riot and violence occurred whenever a tea cargo arrived. Mr. Ridout's first danger on landing arose from the "tea duty," and is told in his diary in the following language:—

"I took leave of my parents for the last time and embarked in the Downs, the 4th September, 1774, for New York, where I arrived after seven weeks' passage. In this vessel went also, as passenger, the merchant who had shipped, a few weeks before, some tea to Annapolis, in Maryland, against the express rules of the Convention, then sitting in Annapolis. His anxiety on his arrival was, I perceived, very great, but two days passing away, and hearing no news of his tea, he flattered himself that all things were well. The arrival of the post, however, undeceived him. He learned that his tea and vessel had been burnt by an enraged populace, and that in consequence of it his life was in danger. In an hour's time New York was in quest of him. He escaped, but I was in danger of feeling the effects of his indiscretion, to say no worse of it; for having, since our arrival, been always in his company, and lodging together, I was by many looked on as an accomplice, and, as such, was forbidden entrance to the house where I lodged. A gentleman, Hugh Wallace, who was a member of the King's Council, and an acquaintance of my brother, hearing of my arrival, protected me, and by his attentions I was secured from insult."

His Maryland brother provided him with capital to engage in trade with the West Indies and France; sugar, tobacco and wine were his merchandise, and Sindbad the Sailor's adventures were scarcely more exciting; for on the high seas between the years 1775 and 1785, each trading vessel had to run the gauntlet of privateers bent on capturing prizes, and many a time an exciting chase helped to break the monotony of a sea voyage. In the year 1787, he set off from his brother's house in Annapolis, Maryland, on a journey to the western settlements of Kentucky. On the way, however, he and his party

were taken prisoners by a party of Shawanese Indians on the Ohio, and most of his companions were slain. His life was spared, either on account of an extraordinary liking with which he inspired one of his savage captors, who thenceforward became his protector, or because he was the bearer of letters of introduction from General Washington to General Scott, from Colonel Lee to General St. Clair, and to other well-known men in the western settlement. These letters, which were examined by the Indian interpreters, may have caused the Indians to expect a ransom.

It may not be inopportune here to give a few details regarding his capture by and experience amongst the Indians, during his captivity, as written by himself :—

" I set out myself on horseback and alone from Hancock, a town in Maryland, on the River Potomac, about five miles from the warm springs in Virginia, on the first day of January, 1788. The snow at this time was about three feet deep, and the weather clear and very cold. To Old-Town on the Potomac is about thirty-six miles, and from thence to the entrance of the Alleghany Mountains about thirty miles, the same road that General Braddock cut through the mountains to enable him to pass on to Fort Pitt, and near which latter place he met with so great a defeat. After dangerous travelling by a road which lay through dismal vales and led over frightful precipices, having crossed the Monongahela River on the ice, I arrived in Fort Pitt on the fourth day. There I lodged at a house of a Mr. Ormsby, where I found my friend Mr. Purviance, who had arrived a few days before. I received many civilities from the inhabitants of this place, who form a very agreeable society among themselves. Here I remained till the 12th of March following, when I embarked in one of the boats built at Red Stone for the conveyance of passengers, etc., to the falls of Ohio ; two days before the ice of the river broke up with a tremendous noise, and the waters rose in the space of three days twenty feet perpendicular. Mr. Purviance and myself, with one John Black—his servant—together with our horses and baggage, embarked at Fort Pitt. Many other boats were preparing to set out on the same route ; although the ice was yet floating in large masses, we committed ourselves to the furious current. At a town called Wheeling, about 100 miles down the river, we were to take in the other passengers and their baggage. The second day, in the afternoon, we stopped at Wheeling, and immediately took on board those who were waiting for our arrival. We were in all about twenty persons and sixteen horses. The boat was exceedingly deeply laden. A boat, laden as we were, put off with us for Kentucky. The next day it rained throughout, and just at the close of the evening we reached the first settlement of Kentucky, called Limestone. Here we went on shore, and almost all of the party left us the next morning, taking their route by land to their respective homes. The other boat, whose company was also reduced to five or six persons, set out for the falls early that morning. We followed in the afternoon. The distance from the falls to this place was 170 miles. The weather was remarkably pleasant, and the moon being now full and the nights serene and

clear, added greatly to the agreeableness of our voyage. The spring, too, began to show itself, and the trees, especially those on the river, were already in leaf. Not often had I felt so much satisfaction or delight of heart as I did on the second morning, which was Good Friday.

"Our tranquillity, however, was soon to give place to the greatest anxiety and alarm, for on turning a point which opened to our view a considerable extent of the river, we saw, at some distance on the Indian or west side of it, a boat like our own amongst the bushes, which appeared to be the same which had left Limestone a few hours before we did. Whilst we were conjecturing the cause of such apparent delay, we perceived several people running about the shore, and a boat to put off full of people, whom we soon, to our surprise and terror, discovered to be Indians, almost naked, painted and ornamanted as when at war.

"They soon came up with us, and about twenty leaped into our boat like so many furies, yelling and screaming horribly, brandishing their knives and tomahawks, struggling with each other for a prisoner. A young man, painted black, first seized me by the arm, when another, an elderly man, who seemed to be a chief, took me from him ; this Indian was of a mild countenance, and he gave me immediately to understand I should not be hurt, holding me by the hand to show his property in me.

"As we neither did nor could attempt any resistance, none of us at this time suffered any injury in our persons, but they began immediately to strip us ; my companions were soon left almost without covering. Several attempts were made to strip me of my clothes, which were opposed by the Indian who held my hand. At length he acquiesced in the demands of one who began to be violent, and I lost my hat, coat and waistcoat. By this time we had gained the bank of the river, and were then led to a great fire, around which sat the war-chief, Nenessica, and about sixty Indians ; their whole party was ninety. To the chief I was presented by his brother, the man who had held my hand. After examining me some time with attention, and conversing with those around him, who eyed me with no less complacency, the chief gave mehis hand, and presented his pipe to me. He then made signs for me to sit down by him, which I did, when several chiefs introduced themselves and shook hands with me in particular a Pottawatamie, exceedingly well dressed after their manner, and who was one of the finest figures I had ever beheld ; he appeared to be about twenty-seven years of age, and to be upwards of six feet in height. No other prisoner received the civilities which I did. Whilst I was sitting by the chief I heard myself called by name, and looking around saw two young men tied and sitting at the foot of a tree; they had been taken early in the morning out of the boat which had sailed before us. They said a lock of hair had been taken from each of their heads, and that they had been tied several hours in the manner they now were, and apprehended they were doomed to be put to death, and as I seemed to be taken into favor, they begged I would intercede for them. Upon my requesting this favor the Indians released them.

" The prisoners were ordered to seat themselves in a row fronting to the west on the ground, having the woods immediately in their rear. On my left were two of my companions, next to me on my right was my friend Mr. Purviance, and next to him the other six : opposite to us, on the south-east, was the river. As soon as we were seated Mr. Purviance began to discourse with me of our present situation, and said that as hitherto we had not received any personal ill-treatment, he hoped we were not in any great danger; it was evident, however, that some change was to take place in our situations ; we remained not long in suspense. A sturdy thick-set Indian, painted black, of a very fierce countenance, with a drawn hanger in his right hand, came towards us, and addressing himself to the outermost man on the left hand, who happened to be the second from me, with a flourish of his weapon made him get up, giving him a kick drove him into the woods to the left of us.

" We all remained silent, everyone judging that his last moment of life approached. In a few minutes this savage returned and drove before him the man who had been sitting next to me on the left. Mr. Purviance then said to me, ' I believe, my friend, that we draw near our end.' These were my own sentiments also. I waited the return of the Indian for myself as his next victim ; words cannot express what my feelings then were, and when I saw him approach. He came and stood before me, and, after a moment's pause, beckoned me to rise and follow him, and turned round into the woods which were behind us. I saw my friend no more. I understood some time after that he was not killed on the spot, but was taken into the interior of the country and there beat to death.

" I followed the Indian step by step, expecting every moment that he would turn upon me and put me to death. After walking 300 or 400 yards, I perceived the smoke of a fire, and presently several Indians about it ; my alarm was not diminished, but as we came nearer, a white man, about twenty-two years of age, who had been taken prisoner when a lad and had been adopted, and was now a chief among the Shawanese, stood up and said to me in English, ' Don't be afraid, sir, you are in no danger, but are given to a good man, a chief of the Shawanese, who will not hurt you ; but after some time, will take you to Detroit, where you may ransom yourself. Come and take your breakfast.' What a transition ! passing from immediate danger and apparent certain death to a renovated life ! I saw no more of my savage guide, but joined the party seated around the fire taking their breakfast, of which I partook, which consisted of chocolate and some flour cakes baked in the ashes, being part of the plunder they had taken from us. Whilst I breakfasted, an Indian, painted red and almost naked, had seated himself opposite to me and eyed me with fierceness of countenance inexpressible ; his eyes glowed like fire, and the arteries of his neck were swollen and nearly bursting with rage ; he said something to me in a tone of voice corresponding with his appearance, which was interpreted to me by the white man in the following words : ' He says that you are his prisoner, and that it is more easy for him to put you to death than to tell you so.' I an-

swered calmly (for the extreme danger of the situation from which I had just escaped had prepared me for every event) that I acknowledged myself to be in his power, and that he could do with me as he pleased. This reply being made known to him his rage seemed to subside, and he said no more to me.

"The white man now informed me that in an hour or two we should begin our march, together with the other Indians and prisoners, to the village, which was about five days' journey from that place.

" About noon we began our journey into the wood, in company with about ninety Indians. The weather was dark, gloomy and cold. We passed over a rapid river on the body of a tree, which had fallen over it at a considerable height from the water. In passing my head became giddy, and I apprehended I should fall, but recollecting the yet greater dangers that beset me, I recovered a firmer step. About five in the aftornoon, we came to a valley through which ran a rivulet, the land rising gently to the westward, full of large timber, but without underwood. At this place, I understood, the Indians intended to pass the night in feasting and drinking a part of the spirituous liquors they had taken from us. As the Indians intended to regale themselves and drink to intoxication, a party of Cherokees, to the number of twelve, who had deserted from their own nation to reside amongst the Shawanese, were appointed to take charge of the prisoners during the feast, of which they, the Cherokees, were not to partake, but were to keep themselves sober. We were, therefore, committed to these Indians, who withdrew to a small eminence, a few hundred yards distance from the main body.

" When they had kindled a fire they threw a few half-worn undressed deer-skins on the ground, for us to lie upon, on the west side of the fire, and then began to secure us from making an escape. They began with me, by passing a cord round the body, then between my legs, and under that part of the cord that surrounded the body, and forcing a stake six or seven feet into the ground, they fastened the cord to it, and on the top of the stake they fixed a small bell, so that I could not stir without its ringing. Lest I should make use of my hands, they put my fists into a small leather bag which they had tied round the wrist ; then they drew the string round the wrists so tight that I was instantly in an agony of pain. It was to no purpose to complain. I could not prevail upon them to slacken it, but ordering me to lie down, they threw over me a small, old blanket. My place was the outermost of the row, next to the drunken Indians, exposed to the weather, which was very cold and tempestuous. There fell much sleet, but the agony I suffered in my wrists, hands and arms made me insensible almost to everything else.

" About midnight, I was roused by the screams and whoops of an Indian from the other encampment, who seemed coming towards us. His yells and shouts became more and more loud and terrific ; and turning my eyes towards the valley, I perceived, by the glimmering lights of the fires and of the moon, an Indian staggering with drunkenness, brandishing a knife in one hand and a tomahawk in the other, making all the haste he could towards us, and shrieking most horri-

bly as he approached where I lay. I have no doubt but that he was bent upon murdering the prisoners, and that I should be his first victim. He had already come within one step of me, and his hand was lifted to give me the fatal blow, when one of Cherokees sprang from the ground and caught him round the waist, and after some struggling mastered him and obliged him to retreat, which he did muttering.

"As my sufferings were extreme from the strictures round my wrists, I entreated the Cherokee to loosen them, but giving me a look of savage fierceness, he laid himself down again unconcerned at the tortures I endured. In the space of about an hour the drunken Indian made a second attempt to execute his purpose; but as he approached yelling and shouting, two Cherokees laid hold of him as soon as he came near the fire, and tying him neck and heels together, left him wallowing in the snow for the remainder of the night. At length the long-wished-for morning came, and my hands were set at liberty; but they were so swollen and black with the stoppage of circulation, that some hours elapsed before I could bend my fingers or use them. Soon after the sun had risen, the Indian chief to whom I had been given made his appearance. He seemed about fifty years of age, was a tall, slender man, and of a very pleasing and animated countenance. He, smiling, took me by the hand, called me 'Nacanah,' or his friend, and seeing my attention fixed on a wound, over one of his eyes, he, pointing to it, said, 'Ah! matowesa whiskey,' meaning he had got drunk with wicked whiskey or spirits, and that the wound was the bad consequence of it.

"When the evening of our day's journey drew nigh, I dreaded lest I should be treated as I had been the preceding night; but when we lay down, which was before a good fire, my friend covered me with a blanket, and only fastened me round the body with a rope, which he drew under himself and lay upon. He never afterwards used this precaution, leaving me at perfect liberty, and frequently during the nights that were frosty and cold, I found his hand over me to examine whether or not I was covered. I think it was towards the third evening of our march that we came to the banks of the great Miami, a very rocky and rapid river, which empies itself into the Ohio, and whose waters were very high. My friend, another Indian, and myself begun to make a small raft to pass over this rapid stream, which was about 300 feet wide. I went awkwardly about my work. The Indian smiled, and allowed me to desist from working. They soon prepared a small raft, and we all three placed ourselves upon it, and with the help of a pole by way of paddle, we soon gained the opposite shore, having been carried a short distance down the stream. Soon after we encamped on the left bank of a small river, having a steep hill covered with woods on the left side. A good fire was kindled, and we supped heartily on some roasted venison, part of our day's sport—for these woods were full of the finest deer, buffalo and wild turkeys.

"When the next morning came, I found myself so extremely weak and bruised, that upon making it known to my friend, he took my

burden upon his shoulders, in addition to his own, without making the least reproach. I was, however, so much exhausted, that I was but little relieved by this kind action, yet I advanced as well as I could till about ten o'clock.

" My friend was then at some distance before us, not out of sight, and the great war chief immediately following me. I found my strength entirely gone, and turning round to the chief, made a sign that I wished to sit down. He pushed me on very angrily. I found I could not proceed, and turning again, made another attempt to obtain his consent to sitting down. With great anger he again pushed me on, and made a stroke at me with his tomahawk, which I avoided by exerting all my strength, and springing forward.

" At this critical moment I recollected that when they took my coat from me, I secured my pocket-handkerchief and half a guinea, which I put in a knot in one corner of it, and tied it around my waist, where it now was. With some difficulty and much agitation I loosened the knot, took the half guinea, and turning round, held it up between my finger and thumb. The savage smiled and beckoned me to seat myself on the ground, on which I fell and immediately fainted.

"When I recovered, I found the great war-chief and my friend both sitting by me. They spoke kindly to me, and gave me to understand by pointing to where the sun would be at two o'clock, that I should then arrive at the village. Immediately on entering the village we were conducted to the council-house, at the door whereof we were obliged to sing and shake the rattles for half-an-hour, and then entered the house (without suffering any ill-treatment), in the centre of which was a fire, and over it hung a kettle with venison and Indian corn boiling.

"On arriving at his hut, my master presented me to his wife. She appeared to be forty years old and rather corpulent. Her looks were extemely savage, and she eyed me with contempt ; the chief, on the contrary, was of the most mild and intelligent countenance. I shall in this place declare that during the whole of the time I was with the Indians, I never once witnessed an indecent or improper action amongst any of the Indians whether young or old.

" At the end of three weeks from my capture, the whole village having collected their horses and peltry, began their journey towards the Wabash and Detroit. I travelled, at my ease, on foot, carrying an unbent bow in my hand. We seldom travelled more than fifteen or twenty miles a day, setting out after breakfast, about an hour after sunrise, and encamping about the same time before sunset, and if we came to good hunting ground, reposed ourselves for the day.

" My dress consisted of a calico shirt, made by an Indian woman, without a collar, which reached below the waist ; a blanket over my shoulders, tied around the waist with the bark of a tree ; a pair of good buckskin leggings, which covered almost the thighs, given me by the great war-chief ; a pair of moccasins, in which I had pieces of blue cloth to make my step easier ; a breech-cloth between my legs ; a girdle around my waist ; and a small round hat, in which the Indian placed a black ostrich feather by way of ornament (the smaller the hat the more fashionable.)

"We at length drew nigh to a village, where I was informed a great council was to be held concerning me, and for the examination of my papers and letters. We encamped within five or six miles of it, and the next day my friend the chief, accompanied by half-a-dozen more Indians and myself, all mounted on horseback, rode to the village where the council was to be held. On our way thither we put up a flock of wild turkeys. Having no fire-arms, we hunted them down, and having caught a very large one, weighing about twenty-five pounds, it was tied, alive, to my back as I rode, and thus we galloped to the village.

"Upon our arrival, several chiefs, to the number of fifty or upwards, opened the council. My papers were read by an interpreter, a white man, who several years before had been taken prisoner. After much sober discussion, in which it was declared that I was an Englishman and not an American, they broke up, after allowing my master to take me to Detroit, and there to receive my ransom.

"We continued to pursue our route by easy journeys. I remarked that our numbers daily diminished, but was told the reason was that provisions began to be scarce, the woods not affording the usual quantities of wild animals. The small party I was with bore a share of this scarcity. We had killed two wild cats, and though not esteemed by the Indians as good food, they were very acceptable at this time. At length our family, consisting of the chief, his wife, myself and negro, travelled alone. In the usual manner we encamped early in the evening, and set forth again in the morning after breakfast.

"One delightful morning, as the sun rose, my friend walked a few paces from his tent (for occasionally he made use of a Russia sheeting one), and seemed to address himself to that glorious orb in a manner, style of words and accent that I had not witnessed before. His manner was dignified and impressive.

"Having arrived within half-a-mile from the village, situated on the White river, which empies itself, six or seven miles down, into the Wabash, he directed us to stop, and went himself to the village to prepare for me, as I afterwards learnt, a good reception. At the place we stopped there were two poles, fifteen or twenty feet high, standing upright, the bark stripped off, the one painted red and the other black. They were called war-poles, and indicated that prisoners had been brought to that village.

"About sunset of the same day we arrived I heard the Indian war-whoop on the other side of the river, at the village through which we had passed. Immediately my friend, his wife, and the negro, left the hut and went to the opposite side of the river, and I was soon left alone in the camp. During that night I did not see anyone moving, but about two hours after sunrise the next morning I perceived several Indians assembled at the door of a house near the water's side, opposite to where I was, and soon after I saw a young man run out of the house naked, his ears having been cut off, and his face painted black; the Indians following with the war whoop and sang, driving him before them, through a valley. They then ascended a hill, a little lower down the stream, distant about four or five hundred yards. As soon as they

gained the summit of the hill, I heard the young man scream, and the Indians give a shout. I perceived a smoke, and judged that the fire was preparing. After a short interval I heard the poor victim utter a dreadful shriek. They were repeated without intermission for a few minutes. The Indians shouted during the interval of tortures. I heard the groans of the poor sufferer, and then his shrieks recommenced under new tortures. These tortures, with remissions, continued about three hours, when his cries ceased. The Indians then returned. To express my feelings during this scene would be impossible, and I began to think that my own fate might be similar.

"After three or four days my friend collected his horses and peltry, and with his wife and negro, set off with me for Detroit, by way of the Miami villages, where I understood was a trading port; several traders, English and French, living there. I was on horseback; we all soon entered the woods. The mosquitoes were so troublesome that we got no rest night or day, notwithstanding the smokes we made to drive them away. After, I think, four days' journey, we arrived at a branch of the Miami river, much swollen with rain. We crossed it with difficulty and encamped on a plain, where I saw several Indian huts scattered. I slept soundly that night, in the pleasing expectation that I was drawing near my deliverance.

"During this time I was informed that another council would be held upon me, in which it was to be determined whether I should be permitted to be taken to Detroit and ransomed. The day accordingly came in which the council was to be held. The Indians having assembled, I was also conducted thither. The council was under the authority of a Captain John, a Shawanese chief, before whom my case was to be decided. One Simon Girty, an Indian interpreter, now living on the Detroit river, was present. I perceived my master and friend was much dejected, and did not speak to me. Several women endeavored to cheer me by saying I should not be hurt. The council was at length opened, and the Indian who had burned the young man contended for me. He insisted that I was a spy and that I knew the whole country. Much was said, and my papers and letters were again brought forward, read, and explained. At length, after a cool and deliberate hearing, the chief pronounced my discharge, and told my friend that he might set out with me as soon as he chose. His eyes sparkled with joy when relating the result of the deliberations of the council. He would have deferred our departure till the morrow, for the Indian traders who lived on the other side of the river, which also formed a junction here with the other two, had long expected me, but dared not intercede for me whilst my life was at issue. After urging with all my power to set off immediately, my friend got a canoe and took me over to the traders' village, called Fort Miami; and both the English and French gentlemen were waiting, with open arms, to receive me, as they had been acquainted with the chief's decision in my favour. The names of the English gentlemen of this place were: Sharpe, Martin, Parkes and Ironside. Mr. Sharpe conducted me to his house, gave me a shirt, and Canadian frock and hat, trousers and shoes. I remained here three days. It was here I found my Bible,

several books, a German flute, and some few other articles; but a tortoise-shell box inlaid with pearl, in which was my mother's wedding ring, and a gold coin of the Emperor Nero (weight about four pennyweights, and in great perfection), given me by a lady of Lisborne, in France, were lost to me forever. The coin had been found with many others at Saint Onge, in France. A French gentleman of the Miami lent my friend, on my account, his large canoe to carry us, with the peltry, to Detroit, distance about 250 miles by water.

"We embarked early on a Sunday morning, took in the peltry, his wife, myself and negro, and descended the Miami river, taking also two Indian women, whom we were to put on shore at an Indian village two miles down the river. We did so, and proceeded. After descending about fifteen miles, we stopped at a white man's house, who was an interpreter among the Indians. I naturally spoke of my deliverance in terms of joy, but I thought he seemed not much to encourage my hopes, for he knew the dangers which yet surrounded me, whilst I was happily ignorant of them. On our way to the mouth of the Miami river, which empties itself into Lake Erie, we passed several parties of Indians returning from Detroit. They were generally drunk, and I was in continual terror until we separated. At length we got to the falls, where there was a house belonging to a Captain McKee, Deputy Superintendent of Indian affairs, and a Mr. Elliott. They were not there, but we received kind treatment and victuals from the Indians of their respective families. Soon after leaving these houses we reached the lake, and after coasting the west end of it for about thirty-eight miles, we entered the Detroit river. A few miles up this river there was another house of Mr. Elliott's. He did not happen to be at home, but we were kindly treated. The next day we descended the River Detroit, and passed the night upon an island, where there were several Indian families.

"Early the next morning, being Sunday, we arrived at Detroit. My friend introduced and presented me to Captain McKee, who received me with civility, and with whom I breakfasted. He then accompanied me to the commanding officer, Captain Wiseman, of the 53rd regiment, and introduced me to him. By this gentleman, and by all the regiment, I was received as a brother.

"N.B.—In the year 1799 my friend Kakinathucca and three more Shawanese chiefs came to pay me a visit at my house in York. They saw me and my family with pleasure, and my wife and children contemplated, with great satisfaction, the great and good qualities of this worthy Indian. He did not return home without bearing a testimony of my gratitude. He died about five years ago, under the hospitable care of Matthew Elliott, Esq., Superintendent of Indian affairs at Amherstburg, at the entrance of the Detroit river."

After a captivity of four months, he was brought to Detroit, then an English garrison. Here the officers of the 53rd regiment received him as a brother, clothed him, filled his purse, and as the regiment was about leaving for Montreal, they invited him to accompany them thither. On the way they stopped at Fort Erie and Niagara, and at the latter place were hospitably entertained by Colonel Hunter, of the

60th, who commanded a battalion there. This officer was afterwards Lieutenant-Governor of Upper Canada and Commander-in-chief of the forces in both Canadas.

They arrived in Montreal about the middle of July, 1788, and Mr. Ridout was kindly received, as his old journal relates, by Sir John Johnson, Captain Grant, and Lord Dorchester, then Governor-General, residing at Quebec. On the 26th May, 1789, he married Mary Campbell, daughter of Alexander Campbell, a U. E. Loyalist, settled at the Bay of Quinte. Soon after he received an appointment in the Commissariat Department and removed to Newark, now Niagara.

He was next employed in the office of D. W. Smith, Surveyor-General in 1793, and from 1799 to 1807 he was employed jointly with others as Acting Surveyor-General. Afterwards, in 1810, he was finally appointed Surveyor-General of Upper Canada. At this time he resided in York, which was then a rising little town, and is now the important City of Toronto. Here he remained until his death in 1829.

He was a kind and exemplary father of a numerous family, who loved and revered him and mourned his departure, the faithful servant of Government for nearly forty years, he endeared himself to the inhabitants of Upper Canada, and so won their affections by his unremitting attentions to their interests and unwearied courtesy to themselves, that they justly considered him an ornament to the colony. To a highly cultivated mind he added the most polished manners, and, what was far better, the meekness and the humility of a Christian looking forward in faith to a blessed immortality.

OBITUARY.

We have this year to record the decease of one who was a prominent member of the Association of Provincial Land Surveyors of Ontario from the date of its inception until physical infirmity demanded his retirement from active life. Mr. Isaac Lucius Bowman died at Berlin on the 3rd of February last, after a prolonged illness.

He was born on the 23rd of May, 1830, near Freeport, at the Grand River, and was the second son of the late John B. Bowman, who came to Canada from Lancaster County, Pennsylvania, in 1816. At the age of 20 he entered upon a course at Rockwood Academy, near Guelph, where he spent two years, at the end of which time he went to Oberlin College, Ohio, and devoted four years to the study of mathematics and classics. Returning to Canada he became interested in school work, and had charge of several schools in the county of Waterloo. In 1861 he was appointed School Inspector of that county, which position he filled until about 1870. From 1867 to 1872 he was principal of the Freeport Academy.

In 1873 Mr. Bowman began the study of Land Surveying, receiving his commission as Provincial Land Surveyor in 1876, and the remainder of his career was devoted to this profession, he having been frequently in the employ of the Ontario Government. He also enjoyed other trusts of a public nature, his being a familiar face during 26 years at the sessions of the Waterloo Township Council.

A member of the United Brethern Church, he also held the position of local minister in the conference in which he resided.

Mr. Bowman left a widow and four sons. Of the latter, three, like himself, are Surveyors and Civil Engineers, and are engaged as follows: L. M. Bowman, Sanitary Engineer in the Health Department, Toronto; A. M. Bowman, Assistant Engineer at the Government improvements on the Ohio River, at Pittsburgh, and F. M. Bowman, chief Draughtsman for Messrs. Riter and Conley, at Pittsburgh, Pa. His fourth son, H. M. Bowman, is an under-graduate in Arts, in attendance at Toronto University.

OBITUARY.

Since the date of our meeting this year, one of the patriarchs of our profession has passed away. Mr. Thomas Fraser Gibbs, of Adolphustown, died on the 15th of April, in his 82nd year.

He was born in Edinburgh, Scotland, on the 6th Dec., 1811, and came with his parents to New York when about 11 years of age. Here he received a liberal education, and having special talents for mathematics and mechanical drawing, particular attention was paid to these branches, leading to his adoption of Land Surveying as his profession. Before, however, he was legally qualified to practise, Mr. Gibbs removed in 1840 to Kingston, U.C, and having in the following year passed his examination before the Surveyor General, he received his commission as a Provincial Land Surveyor from the then Governor-General, Baron Sydenham, bearing date 31st May, 1841. Since that date Mr. Gibbs has been known as one of the foremost Land Surveyors in the Province, and in 1864 he was honored with an appointment as member of the Board of Examiners for Provincial Land Surveyors, at the hands of Rt. Hon. Viscount Monk, which position he continued to hold during his lifetime. A year or two previously he had purchased and removed to the property bordering on the Bay of Quinte, which has been his home ever since.

Mr. Gibbs was a registered member of the Association of Ontario Land Surveyors, and about two months before his death addressed a letter to the Association, expressing his hearty approval of the aims and objects of that body, and regretting the fact that he was unable through physical disability to take part in the annual meeting. Arrangements were being made whereby his name would have appeared in the honorary list of those who were granted exemption under the Ontario Land Surveyors' Act, but these were terminated by the news of his death.

He was of a retiring disposition, yet genial and warm-hearted with those who had the pleasure of his intimate acquaintance. Among his earliest friends and patrons were the late Hon. John Macauley, the Venerable Archdeacon Stewart, Thomas Kirkpatrick, Sir John Macdonald, Sir Alex. Campbell and Sir Henry Smith, all of whom remained his friends through life.

In his religious views he was brought up a Presbyterian, but there being no church of that denomination convenient to his home, he gave of his means to the support of the Church of England, of which Church his family were members.

A widow, one son and two daughters are left to mourn his loss.

APPENDIX.

BY-LAWS.

Definitions in the following By-laws as defined by the "Ontario Land Surveyors' Act."

Definitions

The word	"Association"	means	The Association of Ontario Land Surveyors.
"	"Council"	"	The Council of Management.
"	"Board"	"	The Board of Examiners.
"	"Chairman"	"	The Chairman of Council.
"	"Secretary"	"	Secretary-Treasurer.

PREAMBLE.

Authority for By-laws.

The following By-laws are enacted under the powers granted by the "Ontario Land Surveyors' Act"—(Cap. 34, Ont. Stat. 1892.)

THE ASSOCIATION.

Annual Meeting of Association.

1. The Annual General Meeting of the Association shall be held (as provided by said Act) in the City of Toronto, on the fourth Tuesday in February in each year, at such place as may be selected by the Council.

Special Meetings.

2. Special meetings of the Association may be called by the President, or shall be called by him at the written request of ten or more members.

Notice to be given by Secretary.

3. Due notice of such meetings shall be given by the Secretary to each member of the Association by circular letter posted to his registered address at least 10 days before any such meeting.

Constitution of quorum.

4. Fifteen members shall form a quorum at any meeting of the Association for the transaction of business.

THE COUNCIL.

Duties of Council.

5. In addition to the duties assigned to the Council by said Act, it shall have the direction and management of all the affairs of the Association, and shall appoint the several Standing Committees and name the Chairman of each.

Regular meetings of Council.

6. There shall be three regular meetings of the Council in each year, one to be held on the first day of the annual meeting of the Association, and one during each of the meetings of the Board as prescribed by said Act.

Special meetings of Council.

7. Special meetings may be called by the President or Chairman.

Notice to be given by Secretary.

8. Due notice of every such meeting shall be given by the Secretary (as above provided) to each member of the Council.

Constitution of quorum.

9. At any meeting of the Council when business relating to the property or to the financial affairs of the Association is transacted, five members shall form a quorum; for the transaction of any other business three shall form a quorum.

Annual Report of Council.

10. The Council shall make a report of the affairs of the Association at the Annual Meeting, which report shall include the report of the Secretary and also of the Board of Examiners.

Board of Examiners to report to Council.

11. The Board of Examiners shall make a report to the Council at the meeting held in November in each year.

STANDING COMMITTEES.

Standing Committees.

12. The Standing Committees shall be as follows: each shall be composed of not less than 5 and not more than 9 members.

Committee on Land Surveying.
" Drainage.
" Engineering.
" Topographical Surveying.
" Entertainment.
" Publication.

Duty of Standing Committees.

13. Each Standing Committee appointed by the Council shall endeavour to advance the interests of the Association in that branch allotted to it.

Provision for meetings.

Meetings of any Standing Committee shall be held at the call of the Chairman, three members to form a quorum.

Standing Committees to report to Association.

Each Standing Committee shall present to the Association or to the Council an Annual Report on the work done by said Committee.

ORDER OF BUSINESS AT MEETINGS OF ASSOCIATION.

Order of business.

14. The following shall be the order of business at the meetings of the Association:—

1. Reading of minutes of previous meeting.
2. Reading of correspondence and accounts.

3. Reports and papers.
4. Unfinished business.
5. New business.
6. Nomination of officers (if at the General Annual Meeting).
7. Adjournment.

RULES.

Procedure.

15. All motions must be in writing, and shall contain the names of the mover and seconder, and must be read from the Chair before being discussed.

Reports of Committees.

16. Reports of Committees must be in writing and signed by the Chairman thereof.

Rules of speech.

17. No member shall speak on any subject more than once, except the introducer of the subject, who shall be entitled to reply; every member, however, shall have the right to explain himself subject to the discretion of the Chair.

Discussion closed.

18. When a motion has been finally put to the meeting by the Chairman, all discussion thereon shall be closed.

Majority vote may re-open any motion.

19. Any motion may be re-opened by a majority vote of those present.

Appointment of Scrutineers.

20. The Chairman of the meeting shall appoint two scrutineers when a ballot is taken, as defined in sec. 22 hereof.

Speakers to address the Chair.

21. Every member while speaking shall address the Chair.

Voting at General or Annual Meetings.

22. All voting at any General or Annual Meeting shall be by standing vote, unless a ballot be demanded by at least two members.

Parliamentary rules to govern.

23. Parliamentary rules to govern in all cases not provided for in preceding sections.

DUTIES OF OFFICERS.

Presiding officer at Association meetings.

24. The President, or in his absence the Vice-President, shall preside at all meetings of the Association; in the absence of both, the meeting shall appoint a Chairman.

Presiding officer at Council meetings.

25. The Chairman shall preside at all meetings of the Council; in his absence the meeting shall appoint a presiding officer.

Duties of Secretary-Treasurer.

26. In addition to the duties assigned to him by said Act, the Secretary-Treasurer shall keep an accurate record of the proceedings at all meetings of both the Association and the Council in separate books, conduct all correspondence, announce all meetings, receive all fees and subscriptions and other moneys.

He shall, under the direction of the Council, deposit all moneys in such bank or other financial institution as it may select. He shall pay no bills unless sanctioned by the Council and signed by the Chairman. All payments of $10.00 and upwards to be made by cheque, signed by the Secretary and countersigned by the President, or in his absence by the Chairman of the Council. He shall submit an account of all moneys received and paid by him under the said Act and these By-laws to the Council at the Annual General Meeting of the Association, and shall perform such other duties as may from time to time be assigned by the Council.

27. The Secretary-Treasurer shall give bonds in the usual form to the amount of $1,000, such bond to be in the custody of the President, and deposited in the bank where the funds of the Association are kept.

The Sec.-Treas. to give bonds. Where they shall be deposited.

EXAMINATIONS.

28. Candidates for admission to apprenticeship are to be examined as follows, in the subjects prescribed in Rev. Stat. Ont., C. 152, S. 7.; and no candidate will be admitted unless he obtains at least the minimum marks set opposite each subject, and at least a total of 350.

Examination of candidates for apprenticeship

SUBJECT.	Max. Marks.	Min. Marks.
1. Penmanship	50	30
2. Orthography	50	40
3. Arithmetic (Fractions, Decimals, Square Root)	100	40
4. Logarithms, Algebra (including Equations 1st degree)	100	30
5. Euclid, (Books 1, 2, 3 and 4.)	100	40
6. Plane Trigonometry and Rules for Spherical	100	30
7. Mensuration of Superficies	50	25
8. Linear Drawing (use of ruling pen and construction of scales)	50	25

29. Candidates for admission to practice are to be examined as follows, in the subjects prescribed in Rev. Stat. Ont., C. 152, S. 10.; and no candidate will be admitted unless he obtains at least the minimum marks set opposite each subject, and at least a total of 900.

Examination of candidates for admission to practice.

SUBJECT.	Max. Marks.	Min. Marks.
1. Geometry, including the first 6 Books of Euclid, excepting the last thirteen propositions of the 5th Book	100	50
2. Algebra (Simple and Quadratic Equations, Progressions and Exponents)	100	40
3. Trigonometry (Plane and Spherical)	100	50
4. Mensuration of Superficies and laying out and dividing land	150	75
5. Descriptions by metes and bounds	100	75

Subject.	Max. Marks.	Min. Marks.
6. Use and adjustment by instruments for surveying and levelling	100	70
7. Laying out of Curves	50	20
8. Practical Astronomy, including finding of Time, Latitude, Longitude, Azimuth Var : of compass and drawing meridian lines	150	
9. Survey Act	150	
10. Mining Act, Registry Act, Municipal Act, Ditches and Water-courses Act (so far as they relate to surveys and drainage)	100	35
11. Levelling	50	40
12. Principles of Evidence and drawing up affidavits.	80	30
13. Taking of field notes and preparing of plans	100	60
14. Geology and Mineralogy, Rudiments of	75	25

30. If a candidate for admission to practice obtains at least the total of 900 marks, but fails to obtain the minimum marks in at most two of the subjects, such candidate may at a subsequent examination be examined only in the two subjects in which he has failed.

The Council to regulate examinations.

31. The Council may make from time to time such regulations as it considers necessary for the proper carrying out of these examinations.

Complaints against members or any unlicensed practitioner to be filed with Secretary.

32. Any complaint against a member of the Association or against any unlicensed practitioner shall be filed with the Secretary, who shall immediately forward the same to the Chairman.

The Chairman may call a special meeting.

If the matter complained is of a serious and pressing nature, the Chairman may at his discretion call a special meeting of the Council for the purpose of hearing said complaint ; if not so acted on, the complaint shall be heard at the next regular meeting of the Council.

Procedure where the delinquent is a member.

In the case of a member of the Association, the Council shall take action as defined in the said Act.

Procedure where the delinquent is an unlicensed practitioner.

In the case of any unlicensed practitioner, the Council, if satisfied as to the justice of the charge, shall name a prosecutor and direct him as to his action in the conduct of the case, and shall allot such portion of the penalties, or authorize the payment of such fees as it may deem expedient.

The Council has power to pass By-laws.

33. The Council shall have power to pass any By-law which it deems expedient for the good of the Association, and such By-law shall have the same force until the next Annual Meeting, as if it had been passed by the Association. Such By-law must be reported to the Association at the next Annual Meeting, and action taken thereon. All members of the Association shall be notified by the Secretary of the passing of such By-law by the Council.

RULES AND REGULATIONS

Adopted by the Board of Examiners and ratified by the Council under the authority of By-law 31.

1. The examination sittings shall commence each day at 9.30 a.m., continue until 12.30 p.m., recommence at 1.30 p.m., and continue until 4.30 p.m., day by day until completed.

2. All the papers will be collected at the close of each sitting, and candidates will not be permitted to write on any question on such papers at any future sitting.

3. Any candidate obtaining assistance, during the hours of examination, by copying the papers of another candidate, or otherwise, will at once be dismissed, and any candidate who shall permit such copying or give such assistance, will be considered equally guilty and treated similarly.

4. Each sheet of paper shall have at the top the subject and number of question and shall be signed and folded by the candidate, and endorsed with his name and the subject and number, and not more than one answer shall be written on the same sheet of paper.

5. The candidate shall not write on one line more than one step in Geometrical or Algebraic work. A single step may cover several lines, but two or more should in no instance be put on the same line. They should be written thus:

Because A = B
And B = C
Therefore A = C

6. No other person than the examiners, Secretary and the candidates shall be admitted into the examination room.

7. No books or diagrams of any kind, except those allowed by the Board, shall be brought into the examination room.

8. Candidates are to present themselves punctually at the hours appointed for the commencement of the examinations, and no candidates will be allowed to enter the examination room later than fifteen

minutes after that time, nor will any candidate be permitted to leave the room during a sitting, but so soon as he has finished his papers he may hand them to the examiner, after which he will not be allowed to re-enter until the next sitting.

9. A candidate rejected by the Board shall not be entitled to a new examination before the next regular meeting of the Board.

10. Each candidate for "Admission to Practice" shall bring with him an instrument suitable for taking the necessary observations required in sec. (8), By-law 29, which he shall submit to the Board for their examination and approval, and he shall also submit a plan and field notes of a survey, all made by himself, which will be filed with his papers.

11. Each candidate for admission to apprenticeship shall bring with him a ruling pen and scale.

LIST OF CANDIDATES who have passed the Preliminary Examinations for Land Surveyors in Ontario, since 1885.

NAME OF CANDIDATE.	ADDRESS.	Date of Preliminary Certificate.	TO WHOM ARTICLED.	DATE.	Term of Service	Date of Final Exam.	GENERAL REMARKS
Ludgate, Bruce Allin	Peterboro'	6th Jan., 1885	T. R. Hewson, Peterboro'	5th May, 1885	1 year	8th July, 1886	Grad. S.P.S., 1885
Ross, David Andrew	Mount Forest	9th April, 1885	Hugh Wilson, Mt. Forest	10th April, 1885	3 years	11th Apr., 1890	
Stephens, Lewis Frederick	London South	9th April, 1885	J. M. Moore, London	12th Aug., 1885	3 years	11th Apr., 1890	
Farncomb, Frederick Wm.	T'p of London	9th April, 1885	C. A. Jones, London	12th Aug., 1885	3 years	6th Nov., 1889	
Booth, George Algernon	Sydenham	9th April, 1885	C. E. S. Booth, Kingston	9th April, 1885	3 years		
Decker, Edwin Stanton	St. Thomas	7th July, 1885	A. W. Campbell, St. Thomas	8th July, 1885	3 years	12th Nov., 1888	
Stewart, Walter Edgar	Aylmer, Ont.	7th July, 1885	J. A. Bell, St. Thomas	7th July, 1885	3 years	12th Apr., 1892	
Gurd, John Abrom	London West	7th July, 1885	C. F. Cox, London	30th Sept., 1885	3 years		
McKay, Owen	Forester's Falls	7th July, 1885	Speight & VanNostrand, Tor.	19th Dec., 1885	1 year	7th Jan., 1887	Grad. S.P.S., 1885
Robertson, Alex. Morton	Goderich	7th July, 1885	Not articled				
Bowman, Herbert Joseph	Berlin	6th Oct., 1885	P. S. Gibson, Willowdale	30th Dec., 1885	1 year	7th Jan., 1887	Grad. S.P.S., 1885
Matthews, Herbert Edward	London	6th Oct., 1885	J. M. Moore, London	6th Oct., 1885	3 years		
Fitzgerald, James	Peterboro'	4th Jan., 1886	J. W. Fitzgerald, Peterboro'	7th Jan., 1886	3 years		
DeMorest, Richard Watson	Toronto	5th April, 1886	Speight & VanNostrand	5th April, 1886	3 years	9th Apr., 1889	
Bowman, Arthur Meyer	Berlin	6th April, 1886	I. L. Bowman, Berlin	1st June, 1886	1 year	11th Nov., 1887	Grad. S.P.S., 1886
Cameron, Alfred John	Peterboro'	7th April, 1886	T. R. Hewson, Peterboro'	15th April, 1886	3 years	9th Apr., 1889	
Laird, Robert	Toronto	6th July, 1886	P. S. Gibson, Willowdale	15th Sept., 1886	1 year	11th Nov., 1887	Grad. S.P.S., 1886
Sherman, Ruyter Stinson	Brantford	6th July, 1886	T. H. Jones, Brantford	6th July, 1886	3 years	12th Apr., 1890	
Nie, Josiah Andrew	Toronto	6th Oct., 1886	G. B. Abrey, Toronto	6th Oct., 1886	3 years		
McCulloch, Andrew Lake	Hawksville	6th Oct., 1886	H. J. Bowman, Berlin	30th June, 1887	1 year	10th Nov., 1888	Grad. S.P.S., 1887
Rorke, Louis Valentine	Heathcote	5th Jan., 1887	Stewart & Whitson, Collingwo'd	5th Jan., 1887	3 years	14th Apr., 1890	
Taylor, Thomas Herbert	St. Jas. Pr'k, Lon.	5th April, 1887	C. A. Jones, London	16th June, 1887	3 years		
Weekes, Abel Seneca	Glencoe	5th April, 1887	Coad & Robertson, Glencoe	15th April, 1887	3 years	12th Apr., 1890	
Griffin, Albert Dyke	Woodstock	7th Nov., 1887	W. M. Davis, Woodstock	7th Nov., 1887	3 years	11th Nov., 1890	
Kirkpatrick, Robert	London	9th Nov. 1887					
Gibson, Harold Holmes	Willowdale	4th April, 1888	P. S. Gibson, Willowdale.	4th April, 1888	3 years	8th Sept., 1891	
Knight, Merle Shafto	Woodstock	4th April, 1888					
Moore, Thomas Alexander	London	4th April, 1888	J. M. Moore, London	9th April, 1888	3 years	12th Nov., 1892	
Ollerhead, George Elliott	Brampton	5th April, 1888	C.J&C.R Wheelock, Orangev'le	12th April, 1888	3 years		
Robinson, John Kimpton	Essex Centre	5th April, 1888	J. S. Laird, Essex Centre	7th April, 1888	3 years	11th Apr., 1891	Dead.

LIST OF CANDIDATES who have passed the Preliminary Examinations for Land Surveyors in Ontario—*Continued.*

NAME OF CANDIDATE.	ADDRESS.	Date of Preliminary Certificate.	TO WHOM ARTICLED.	DATE.	Term of Service	Date of Final Exam.	GENERAL REMARKS
McMullen, William Ernest.	Toronto	6th Nov., 1888	Speight & VanNostrand, Tor...	6th Nov., 1888	3 years	11th Nov., 1892	
Naismith, Peter Lawrence..	Pembroke	6th Nov., 1888					
Wallace, Charles Hugh	Port Arthur	6th Nov., 1888	H. DeQ. Sewell, Port Arthur..	6th Nov., 1888	1 year	9th Nov., 1889	B.E. Trin. Col. Dub
Anderson, John Drummond	Delaware	1st April, 1889	J. A. Bell, St. Thomas	3rd April, 1889	3 years	13th Apr., 1892	
O'Hara, Walter Francis	Chatham	1st April, 1889	A. McDonell, Chatham.	3rd April, 1889	3 years	14th Apr., 1892	
Bowman, Leander Meyer...	Lindsay	2nd April, 1889	A. M. Bowman, Lindsay	2nd April, 1889	2 y. 5m	14th Apr., 1892	
Harvey, Thomas Alexander	London	2nd April, 1889	J. M. Moore, London	9th April, 1889	4 years		
Heathcote, Wm. C. Percival	Peterboro'	2nd April, 1889					
Sharpe, Geo. Alexander	Cannington	2nd April, 1889	John Vicars, Cannington	7th April, 1889	3 years		
Watson, John	Orillia	3rd April, 1889	C. E. Fitton, Orillia	10th April, 1889	3 years	13th Apr., 1892	
McLennan, Murdoch John..	Williamstown	9th Nov., 1889	D. R. Brown, Cornwall	5th Oct., 1891	1 year		B.A. Sc., (McGill)
Grenfell, Joseph Henry	London	9th April, 1890	J. M. Moore, London	19th April, 1890	4 years		
Hill, Victor	Toronto	9th April, 1890	V. M. Roberts, Toronto Junc.	9th April, 1890	3 years		
McFarlane, Malcolm Cameron	Brockville	9th April, 1890	B. J. Saunders, Brockville	6th Aug., 1890	1 year		B.A. Sc., (McGill)
Mackenzie, Wm. Innes, jun.	Toronto	5th Nov., 1890	Speight & VanNostrand, Tor..	5th Nov., 1890	3 years		
Munro, John Vicar	London	5th Nov., 1890	F. Henry, London	10th Mar., 1890	3 years		
Farncomb, Ernest Alfred...	London	7th April, 1891	F. W. Farncomb, Exeter	2nd May, 1891	3 years		
Hall, Walter	London	7th April, 1891					
McCubbin, George Albert...	St. Thomas	5th April, 1892	A. W. Campbell, St. Thomas	6th April, 1892	3 years		
Abrey, George Spencer	Toronto Junct'n	9th Nov., 1892	G. B. Abrey, Toronto Junction	9th Nov., 1892	3 years		
Code, Abram Silas	Glencoe	9th Nov., 1892	Coad & Robertson, Glencoe...	9th Nov., 1892	3 years		
Hopkins, Marshall Willard.	Stony Creek	9th Nov., 1892	Cyrus Carroll, Hamilton	9th Nov., 1892	1 year		B.A. Sc., (McGill)
Bolton, Ellsworth Doan	Listowel	5th April, 1893	L. Bolton, Listowel	6th April, 1893	1 year		B.A. Sc., (McGill)
Richardson, Jocelyn Johnston	St. Catharines..	8th April, 1893	E. Gardiner, St. Catharines...	20th May, 1893	3 years		

LIST OF MEMBERS.

Names marked thus * were granted exemption under authority of Sub-sec. 4 of Sec. 10 of the Ontario Land Surveyors' Act; and those marked † registered, but withdrew from practice.

Abrey, George Brockitt ..... Toronto Junction.
Aylsworth, Wm Robert ..... Box 2, Belleville.
Aylsworth, John S ..... Selby.
Aylsworth, Charles Fraser, Sr. ..... Madoc.
Aylsworth, Charles Fraser, Jr ..... Box 60, Madoc.

Beatty, David ..... Parry Sound.
Beatty, Walter ..... Delta.
Bell, James Anthony ..... St. Thomas.
Bowman, Clemens Dersteine ..... West Montrose.
Browne, Harry John ..... 17 Toronto Street, Toronto.
Burke, Wm. Robert ..... Ingersoll.
Butler, Matthew Joseph, ... Box 359, Napanee.
Bray, Edgar ..... Oakville.
Barrow, Ernest George ..... Hamilton.
Bolger, Francis ..... Penetanguishene.
†Bowman, Leander Meyer ..... Medical Health Dept., Toronto.
†Bowman, Franklin Meyer ..... Berlin.
†Bowman, Arthur Meyer ..... Berlin.
Baird, Alexander ..... Leamington.
Bazett, Edward ..... Burks Falls.
Browne, Wm. Albert ..... 17 Toronto Street, Toronto.
Biggar, C. A. ..... 68 Daly Ave., Ottawa.
Bray, Samuel ..... Department of Indian Affairs, Ottawa.
Bolton, Lewis ..... Listowel.
Brown, David R ..... Cornwall.
Bowman, Herbert Joseph, ... Berlin.
Brown, John Smith ..... Kemptville.
Bolton, Jesse Nunn ..... 264 Major St., Toronto.
Bolger, Thomas Oliver ..... City Eng. Office, Kingston.
Bell, Andrew ..... Almonte.

Campbell, Archibald Wm. ..... St. Thomas.
Cavana, Allan George ..... Orillia.

†Cambie, H. J. ..... Vancouver, B.C.
Chipman, Willis ..... 103 Bay St., Toronto.
Coad, Richard ..... Glencoe.
Cheesman, Thos ..... Mitchell.
Caddy, Cyprian Francis ..... Campbellford.
Carre, Henry ..... Belleville.
Cameron, Alfred John ..... Peterborough.
Caddy, John St. Vincent ..... 559 King St., Ottawa.
Casgrain, Joseph Philip Bâby ..... Morrisburg.
Carroll, Cyrus ..... 6½ James Street S., Hamilton.
Creswicke, Henry ..... Barrie.
*Cromwell, Jos. M. Oliver ..... Perth.
†Coleman, R. H ..... 204 King St. E., Toronto.
Cozens, Joseph ..... Sault Ste. Marie.

Doupe, Joseph ..... 411 Main Street, Winnipeg.
Dickson, James ..... Fenelon Falls.
DeGursé, Joseph ..... Windsor.
DeMorest, Richard Watson ..... Sudbury.
Davidson, Walter Stanley ..... Arkona.
Dobbie, Thomas William ..... Tilsonburg.
†Drewry, W. S. ..... Ottawa.
Deacon, Thomas Russ ..... Rat Portage.
Deane, Michael ..... Lindsay.
Davis, William Mahlon ..... Woodstock.
Ducker, W. A. ..... 314 McWilliam St., Winnipeg, Man.
Davis, John ..... Alton.
Deans, William J. ..... Oshawa.

Evans, John Dunlop ..... Copper Cliff, near Sudbury.
Esten, Henry Lionel ..... 157 Bay Street, Toronto.
Ellis, Henry Disney ..... City Hall, Toronto.

Fawcett, Thomas ..... Dept. of Interior, Ottawa
Foster, Frederick Lucas ..... 157 Bay Street, Toronto
Fitton, Charles Edward ..... Orillia.
Flater, Frederick William ..... Chatham.
Fairbairn, Richard Purdom ..... 127 Major St., Toronto.
Francis, John James ..... Sarnia.
*Fraser, Charles ..... Wallaceburg.
Farncomb, Frederick William ..... 213 Dundas St., London.
Fitzgerald, James William ..... Box 333, Peterborough.

Gaviller, Maurice ..... Box 773, Collingwood.
Gardiner, Edward ..... St. Catharines.
Gibson, Peter Silas ..... Willowdale.
Gibbons, James ..... Renfrew.
Gamble, Killaly ..... 193 Bloor St. E., Toronto.
Gibson, Harold Holmes ..... Willowdale.
Galbraith, William ..... Bracebridge.
Griffin, Albert Dyke ..... Woodstock.
†Green, T. D ..... Dep. Ind. Affairs, Ottawa.

†Harris, John Walter ..... Winnipeg.
Henderson, Eder Eli ..... Henderson P.O., Maine, U.S.A.
Hart, Milner ..... 103 Bay St., Toronto.
Hutcheon, James ..... Guelph.
Howitt, Alfred ..... Gourock.
Haskins, William ..... 45 Wellington St. S., Hamilton.
Hanning, Clement George ..... Preston.
Hobson, Joseph ..... Engineer's Office, G. T. Ry., Hamilton.
Hewson, Thomas Ringwood ..... Peterborough.

Innes, William Livingstone ..... London.

Jones, Thomas Harry ..... Brantford.
Johnson, Robert Thornton ..... Sudbury.
James, Silas ..... 19 Richmond St. E., Toronto.
James, Darrell Denman ..... 19 Richmond St. E, Toronto.
Jones, John Henry ..... Sarnia.
Jones, Charles Albert ..... 213 Dundas St., London

Kirkpatrick, George Brownly ..... Crown Lands Dept., Toronto.
Klotz, Otto Julius ..... Dept. of Interior, Ottawa.
Kennedy, James H ..... Box 434, St. Thomas.
Kippax, Hargreaves ..... South Dakota, Huron.
*Kirk, Joseph ..... Stratford.

Lumsden, Hugh David ..... 7 Homewood Ave., Toronto.
Lewis, J. B ..... Brunswick House, Ottawa.
Lendrum, Robert Watt ..... Vankleek Hill.
Laird, Robert ..... City Hall, Toronto.
Laird, James Steward ..... Essex Centre.
*Lynch-Staunton, F. H ..... Hamilton.
†Livingstone, T. Chisholm ..... Winnipeg.

Lougheed, A. ..... Port Arthur.
Low, Nathaniel E ..... Wiarton.

McGeorge, William Graham ..... Chatham.
McPhillips, George ..... Box 556, Windsor.
McAree, John ..... Toronto.
McKay, Owen ..... Windsor.
McCulloch, Andrew Lake ..... Toronto Junction.
McFarlen, George Walter ..... Court House, Toronto.
McDowall, Robert ..... Owen Sound.
McMullen, Wm. Ernest ..... 7 Murray Street, Toronto.
McEvoy, Henry Robinson ..... St. Mary's.
McLatchie, John ..... 28 Stanley Ave., Ottawa.
McFadden, Moses ..... Neepawa Manitoba.
McKenna, John Joseph ..... Dublin.
McDonell, Augustine ..... 4 and 5 Ebert's Block, Chatham.
McGrandle, Hugh ..... Huntsville.
McLean, James Keachie ..... Elora.
McCallum, James ..... Rat Portage.

MacKenzie, William Lyon ..... Mattawa.
†MacLeod, Henry A. F. ..... 340 Cooper St., Ottawa.
†MacPherson, Duncan ..... C. P. Ry., Montreal.
Macdougall, A. H ..... Port Arthur.
Macnabb, John Chisholm ..... Chatham.

Moore, J. Harry ..... Smith's Falls.
Manigault, William Mazyck ..... Box 300, Strathroy.
Murphy, Charles Joseph ..... 157 Bay St., Toronto.
Mountain, George Alphonse ..... Ottawa.
Malcolm, Sherman ..... Blenheim.
Moore, Thomas Alexander ..... London South.
Morris, James Lewis ..... Pembroke.
Miles, Charles Falconer ..... 8 Lombard St., Toronto.
Marshall, James ..... Holyrood.

Niven, Alexander ..... Haliburton.
Newman, William ..... Windsor.

Ogilvie, William ..... Ottawa.
O'Hara, Walter Francis ..... Chatham.

Patten, Thaddeus James.....Little Current.
Paterson, Jas. Allison.....9 Masonic Chambers, Toronto.
†Pearce, William.....Calgary Alta.
†Pedder, James Robert.....Doon.
Pinhey, C. H.....Coteau Landing, Que.
Proudfoot, Hume Blake .....33 Tranby Ave., Toronto.
Purvis, Frank .....Eganville.

Robertson, James.....Glencoe.
Ross, George .....Welland.
Roberts, Vaughan Maurice .....11 Peter St., Toronto.
Rorke, Louis Valentine.....Sudbury.
*Robinson, William .....London.
†Rogers, Richard Birdsall.....Peterborough.
Russell, Alexander Lord .....Port Arthur.
Reid, James Hales.....Bowmanville.
Roger, John.....Mitchell.
Reilly, William R.....Regina, Assa.
Ritchie, Nelson T.....Kincardine.

*Schofield, Milton C .....Guelph.
Speight, Thomas Bailey .....Yonge Street Arcade, Toronto.
†Spry, William.....15 York St., Toronto.
Stewart, Elihu .....Collingwood.
*Strange, Henry .....Rockwood.
†Stewart, Louis Beaufort.....S. P. S., Toronto.
Smith, Henry.....Crown Lands Dept., Toronto.
Scane, Thomas .....Ridgetown.
Saunders, Bryce Johnston.....Box 114, Brockville.
Steele, Edward Charles.....Toronto.
Seager, Edmund .....Rat Portage.
Stewart, Walter Edgar.....Aylmer, Ont.
Sankey, Villiers.....City Hall, Toronto.
Sewell, Henry DeQuincey.....Port Arthur.
Sanderson, Daniel Leavens.....Wilton.
Silvester, George Ernest .....Ringwood.
Smith, George, Jr .....Beaverton.
†Sherman, Ruyter S.....Vancouver, B.C.
Sing, Josiah Gershom.....Box 3, Meaford.
†Strathern, John .....Vancouver, B. C.

Tyrrell, James Williams.....42 James St. N., Hamilton.
Tiernan, Joseph M.....Tilbury Centre.
†Tracy, Thos. H.....Vancouver, B.C.
Traynor, Isaac.....Dundalk.
Turnbull, Thomas ..... C. P. R. Office, Winnipeg.

Unwin, Charles .....157 Bay Street, Toronto.
Ure, Frederick J.....Woodstock.

VanNostrand, Arthur J..... Yonge Street Arcade, Toronto.
VanBuskirk, W. F.....Stratford
†Vicars, John.....Kamloops, B.C.

Wicksteed, Henry King.....Cobourg.
Weatherald, Thomas.....Box 273, Goderich.
Wheelock, Chas. Richard .....Orangeville.
Warren, James.....Walkerton.
Wilkie, Edward Thomson.....Carleton Place.
Walker, Alfred P.....C. P. R. Eng. Dept., Toronto.
Wadsworth, Vernon B.....103 Bay St., Toronto.
Williams, David.....Kingston.
Wallace, Charles Hugh.....Hamilton.
Watson, John McCormack.....Box 224, Orillia.
Wiggins, Thomas H. .....Napanee.
Weekes, Abel Seneca.....Clinton.
Whitson, James Francis..... Crown Lands Dept., Toronto.
†Wheeler, Arthur O.....New Westminster, B.C.
Wilkins, Frederick W.....372½ Water St., Peterborough.
Winter, Henry.....Thornyhurst.
†Willson, Alfred.....204 King St. East, Toronto.
*Wood, H. O. .....Billing's Bridge.

Yarnold, William Edward.....Port Perry.

LIST OF THOSE WHO HAVE PAID $1.00, WITH REQUEST TO REGISTER, BUT HAVE NOT REQUESTED TO HAVE THEIR NAMES WITHDRAWN.

Bray, Harry F ..... Oakville.

Caddy, E. C. ..... Cobourg.

Davidson, Alexander ..... Arkona.
Davis, A. R ..... Napanee.

Fowlie, Albert ..... Orillia.

Gibson, George ..... St. Catharines.
Graydon, Aquila Ormsby ..... London.

Hermon, R. W ..... Rednersville.

McNab, J. D. ..... Owen Sound.

Murdock, William ..... Port Arthur.

Pope, Robert T ..... Magnetawan.

Rubidge, Tom S ..... Cornwall.
Ross, J. E ..... Box 207, New Westminster, B.C.

Stewart, John ..... Ottawa.

Thomson, A. Clifford ..... Kansas City, Mo.

Walsh, T. W ..... Simcoe.

ACKNOWLEDGMENT.

THE Association cheerfully acknowledges the receipt of advertisements from the persons and firms whose names appear below, and bespeaks for these advertisements the careful consideration of all who read these Proceedings.

The firms are reliable and deserving of patronage.

LIST OF ADVERTISEMENTS.