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NO. 29

Annual Report

OF THE

Association of Ontario Land Surveyors

ORGANIZED 1886

INCORPORATED 1892

And Proceedings of the Twenty-second
Annual Meeting Since Incorporation.
Held at Toronto Feb. 17th to 19th, 1914

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NOTICES

The Annual Meeting of the Association is fixed by statutes and is held on the third Tuesday in February.

Copies of Annual Reports for past years can be supplied by applying to the Secretary. Price, 50 cents.

Members will please look up names of chairman of various committees and inform them of any interesting matter pertaining to that branch of the profession which may come to their notice or write to the Secretary.

Our library is now located at the Toronto Engineers' Club, 96 King St. West, and has been consolidated with the libraries of other associations in that building. Members have free and full access to all books in the consolidated library.

Published by Association of Ontario Land Surveyors.
This edition 1,350 copies; price, 50 cents.

PREFACE

To the members of the Association of Ontario Land Surveyors:

The Proceedings of the Association at its Twenty-second Annual Meeting are herewith presented.

Respectfully submitted on behalf of the Council.

L. V. RORKE,

Secretary.

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ASSOCIATION OF ONTARIO LAND SURVEYORS

Organized 23rd February, 1886. Incorporated 1892.

PAST PRESIDENTS

1886. George B. Kirkpatrick	1900. George Ross
1887. George B. Kirkpatrick	1901. James Dickson
1888. Alex. Niven	1902. W. R. Aylsworth
1889. Alex. Niven	1903. W. R. Aylsworth
1890. Villiers Sankey	1904. C. A. Jones
1891. Villiers Sankey	1905. J. W. Tyrell
1892. Elihu Stewart	1906. O. J. Klotz
1892. Elihu Stewart	1907. Thomas Fawcett
1894. M. J. Butler	1908. A. J. van Nostrand
1895. M. Gaviller	1909. Lewis Bolton
1896. Willis Chipman	1910. H. W. Selby
1897. T. Harry Jones	1911. J. F. Whitson
1898. P. S. Gibson	1912. T. B. Speight
1899. H. J. Bowman	1913. J. S. Dobie

OFFICERS FOR 1914-1915

PRESIDENT

J. W. FITZGERALD.....Peterborough

VICE-PRESIDENT

E. T. WILKIE.....Toronto

CHAIRMAN OF COUNCIL

G. B. KIRKPATRICK.....Toronto

SECRETARY-TREASURER

L. V. RORKE.....Toronto

MEMBERS OF COUNCIL

HON. W. H. HEARST, Commissioner of Lands, Forests and
Mines

G. B. KIRKPATRICK, Toronto } For term ending April, 1917

J. J. MACKAY, Hamilton }

A. T. WARD, Toronto }

C. H. FULLERTON, } For term ending April, 1916

New Liskeard }

H. J. BEATTY, Pembroke }

H. T. ROUTLY, Haileybury } For term ending April, 1915

AUDITORS

JOHN VAN NOSTRAND.....Toronto

A. E. JUPP.....Toronto

BANKERS

Imperial Bank of Canada (Yonge St. Branch).....Toronto

BOARD OF EXAMINERS

G. B. KIRKPATRICK (Chairman)	
G. B. KIRKPATRICK, Toronto	} For 3 years
OWEN McKAY, Walkerville	
H. J. BEATTY, Pembroke	} For 2 years
J. F. WHITSON, Toronto	
THOS. FAWCETT, Ottawa	} For 1 year
T. B. SPEIGHT, Toronto	

L. V. RORKE, Secretary of the Board.

Note.—Board meets at Department of Lands, Forests and Mines, Parliament Buildings, first Monday in February, 1915.

COMMITTEES, 1914-1915

STANDING

LAND SURVEYING—C. J. Murphy (Chairman), E. T. Wilkie, H. J. Beatty, C. E. Fitton, J. W. Fitzgerald, H. M. Anderson, T. B. Speight, J. M. Watson.

DRAINAGE—G. A. McCubbin (Chairman), S. B. Code, F. M. Eagleson, E. D. Bolton, John Roger, Geo. Smith, A. S. Code, F. J. Ure.

ENGINEERING—N. D. Wilson (Chairman), Owen McKay, Jas. Hutcheon, F. N. Rutherford, J. W. Tyrrell, A. P. Walker, J. A. Bell, E. W. Neelands.

TOPOGRAPHICAL SURVEY—Thomas Fawcett (Chairman), Otto J. Klotz, Geo. Ross, L. B. Stewart, J. J. Dalton.

PUBLICATION—L. V. Rorke (Chairman), A. G. Ardagh, A. J. van Nostrand, J. F. Whitson.

ENTERTAINMENT—T. D. Le May (Chairman), A. T. Ward, G. S. Abrey, R. M. Anderson, John van Nostrand.

SPECIAL

LEGISLATION—G. B. Kirkpatrick (Chairman), J. W. Fitzgerald, C. H. Fullerton, T. B. Speight, J. M. Watson, J. F. Whitson, C. J. Murphy, T. D. LeMay.

REPOSITORY AND BIOGRAPHY—Willis Chipman (Chairman), H. L. Esten, M. Gaviller, P. S. Gibson, A. E. Jupp, L. V. Rorke, A. L. Russell.

EXPLORATION—L. B. Stewart (Chairman), J. F. Whitson, J. S. Dobie, T. J. Patten, E. R. Bingham.

ROADS AND PAVEMENTS—J. S. Dobie (Chairman), H. T. Routly, J. F. Whitson, W. A. McLean, A. M. Jackson, J. H. Jackson.

Programme of the Association of Ontario Land Surveyors

(INCORPORATED)

At Its Twenty-Second Annual Meeting Held at Toronto,
February 17th, 18th and 19th, 1914.

PROGRAMME

Tuesday, 17th February—Morning, 10 o'clock
In the Engineers' Club

Meeting of Council of Management.
Meeting of Standing and Special Committees.

Afternoon, 2 o'clock

Reading of Minutes of previous meeting.
Correspondence.

President's Address.

J. S. Dobie.

Report of Council of Management.

Report of the Secretary-Treasurer.

Report of the Board of Examiners.

Report of Committee on Legislation.

G. B. Kirkpatrick, Chairman.

Report of Committee on Publication.

L. V. Rorke, Chairman.

Report of Committee on Topographical Survey.

Thos. Fawcett, Chairman.

Report of Committee on Exploration,

J. F. Whitson, Chairman.

Paper.—“Contour Survey on Abitibi River.”

H. T. Routly, O.L.S.

Paper.—“Surveys in British Columbia.”

H. O. Dempster, O.L.S.

Paper.—“Water Power Development and Transmission of Electric
Power in Northern Ontario.”

E. W. Neelands, O.L.S.

Evening, 8 o'clock

Paper.—“The Ontario and Manitoba Boundary. L. B. Stewart, O.L.S.,
D.T.S., Faculty of Applied Science, Toronto University.

Paper (illustrated).—“Colonization in Northern Ontario.” J. F. Whitson,
O.L.S., Road Commissioner, Northern Development Branch
of Lands, Forests and Mines, Ontario.

Wednesday, 18th February—Morning, 10 o'clock

Report of Committee on Land Surveying. C. J. Murphy, Chairman.
Report of Committee on Polar Research. Willis Chipman, Chairman.
Paper.—“Points for Discussion on Subdivision of Lots in the Six Mile
System Into Aliquot Parts.” T. B. Speight, O.L.S.
Paper.—“Questions Arising in Surveys in Double Front Concessions.”
A. G. Ardagh, O. L. S.

Afternoon, 2 o'clock

Report of Committee on Engineering. Owen McKay, Chairman.
Report of Committee on Drainage. G. A. McCubbin, Chairman.
Paper.—“Permanent Street Grades.” A. M. Jackson, O.L.S.
Paper.—“Ditches and Watercourses Act.” E. D. Bolton, O.L.S.
Report of Committee on Repository and Biography. Willis Chipman,
Chairman.

Evening, 7.30 o'clock

Dinner at Engineers' Club Dining Room.

Thursday, 19th February—Morning, 10 o'clock

Report of Auditors. R. R. Grant, John van Nostrand.
Report of Committee on Entertainment. A. T. Ward, Chairman.
Nomination of Officers:—President, Vice-President, Secretary-Treasurer,
two Members of Council, Auditors.
Unfinished Business.
New Business.
Adjournment.

Minutes of the Twenty-Second Annual Meeting

OF THE

Association of Ontario Land Surveyors

HELD AT THE ENGINEERS' CLUB, 96 KING STREET
WEST, ON THE 17TH, 18TH AND 19TH
FEBRUARY, 1914.

The following members were present:

Name.	Address.		
James S. Dobie.....	Thessalon.	D. D. James.....	Toronto.
John H. Shaw.....	North Bay.	H. O. Dempster.....	Gananoque.
E. Stewart.....	Collingwood.	L. V. Rorke.....	Toronto.
John T. Ransom.....	Toronto.	Geo. Hogarth.....	Toronto.
T. B. Speight.....	Toronto.	W. H. Browne.....	Toronto.
Alan Mair Jackson.....	Brantford.	James Hutcheon.....	Toronto.
F. N. Rutherford.....	St. Catharines.	J. B. Helfferth.....	Toronto.
John L. Lang.....	Sault Ste. Marie.	L. B. Stewart.....	Toronto.
John J. Dalton.....	Weston.	J. F. Whitson.....	Toronto.
Geo. B. Kirkpatrick.....	Toronto.	N. A. Burwash.....	Toronto.
Henry DeQ. Sewell.....	Toronto.	C. F. Aylsworth.....	Madoc.
A. J. van Nostrand.....	Toronto.	A. G. Ardagh.....	Barrie.
Geo. A. McCubbin.....	Chatham.	W. J. Blair.....	Calgary.
E. D. Bolton.....	Listowel.	J. K. Benner.....	Port Arthur.
John D. Evans.....	Trenton.	W. M. Manigault.....	Strathroy.
M. Gaviller.....	Collingwood.	O. R. Blandy.....	Hamilton.
R. S. Code.....	Cobalt.	H. C. Sewell.....	Toronto.
G. S. Abrey.....	Toronto.	D. A. Niven.....	St. Catharines.
L. F. Eadie.....	Toronto.	Willis Chipman.....	Toronto.
H. T. Routly.....	Toronto.	J. J. Newman.....	Windsor.
C. J. Murphy.....	Toronto.	J. W. Fitzgerald.....	Peterborough.
A. E. Jupp.....	Toronto.	John W. Pierce.....	Ottawa.
R. R. Grant.....	Toronto.	W. G. Webster.....	Hamilton.
J. van Nostrand.....	Toronto.	C. H. Attwood.....	Hamilton.
E. T. Wilkie.....	Toronto.	E. W. Neelands.....	New Liskeard.
A. T. Ward.....	Toronto.	P. A. Jackson.....	Toronto.
Herbert J. Beatty.....	Pembroke.	Walter Smith.....	Sudbury.
A. P. Walker.....	Toronto.	J. W. Tyrrell.....	Hamilton.
Colin W. G. Gibson.....	Toronto.	W. A. Sibbett.....	North Bay.
H. L. Esten.....	Toronto.	G. P. Angus.....	North Bay.
Geo. Ross.....	Welland.	Robert M. Gourlay.....	Toronto.
E. G. MacKay.....	Hamilton.	F. J. Anderson.....	Niagara Falls.
W. H. Browne.....	Toronto.	H. S. Holcroft.....	Toronto.
T. D. LeMay.....	Toronto.	Karl Huffman.....	Toronto.
N. C. Lloyd.....	Toronto.	J. J. MacKay.....	Hamilton.

On Tuesday, February 17th, at 2.45 p.m., the President, Mr. J. S. Dobie, called the meeting to order and said:

Gentlemen, the hour is getting along and I think probably it is as well for us to take up the regular order of business. I am very glad to see so many here. We do not usually get a very big turnout for the meeting in the afternoon of the first day, but I think the crowd this afternoon is up to what we generally get, and probably a few more. The first item on the programme for this afternoon is the reading of the minutes of the last annual meeting.

On motion of Mr. A. J. van Nostrand, seconded by Mr. G. S. Abrey, the minutes were taken as read and ordered to be printed in the proceedings.

The President—The next item is correspondence.

The Secretary—There is no correspondence except what will come under new business.

The President—The next item, gentlemen, is the reading of the President's Annual Address.

The President then read the annual address which was greeted with applause.

The President—Now, Gentlemen, the next order of business is the report of the Council of Management. Mr. Kirkpatrick is the Chairman of that Committee and will present the report.

Mr. Kirkpatrick—Mr. Chairman, the Council of Management met this morning and there were several resolutions which were passed at a recent meeting of the Board of Examiners which were sent to the Council for notice and action. As to the discussion of the solicitor's opinion on the Standard Measure we gave a good deal of consideration to that. The Acts provide that the Weights and Measures Act authorities have the power of it and we thought it would be a good thing to try and get an assimilation between the Dominion and the different provinces, and there is to be some correspondence with Dr. Deville, of the Department of the Interior, so that there could be a kind of reciprocity in the stamping of the Standard measures. They are exactly the

same, but our Act provides that it should be done by the Secretary-Treasurer of the Surveyors' Association, whereas the Dominion Act specifies it is to be done by the office of Weights and Measures. We want to try to get it arranged so that that can be done at the Geodetic Observatory of the University of Toronto, where there are facilities for testing measures, and then have the Secretary stamp it. There is really practically no difference between the two, but it is to try to bring the thing within the law of the Dominion which provides for all standards of measures being stamped by the Weights and Measures Department.

W. E. McMullen applied for relief from payment of arrears of fees. The fact was that Mr. McMullen said he had applied verbally to the late Secretary of the Association to have him put on the withdrawn list because, as most of you know, Mr. McMullen was on a railway down in New Brunswick or Nova Scotia for four or five years. He has lately come back to Toronto and is ready to pay his fees for the present year, and also for the past year, and that was agreed to by the Council. I think that is practically all. I would move that the report of the Council of Management be accepted.

The motion was seconded by Mr. Routly.

The President—Gentlemen, you have heard Mr. Kirkpatrick; he has read the report of the Council of Management. If there is any discussion it is in order for any gentleman who wants any further information on those points to speak up. I might say with reference to that standard of measure that that question was brought up here last year and shortly after our last meeting I happened to be in Ottawa, and I went to Captain Deville and had quite a talk with him about the Standard, and I got one of the Standards they used and had it sent down here, and it was examined by members of the Council at the meeting in April, and the Standard that they have adopted in Ottawa is certainly very much superior to anything we have here. I think it is the completest thing that has been gotten out, and the Lufkin Rule Company who manufacture it have kindly agreed to supply it to the different surveyors' associations at \$10 apiece, which is practically the cost of the whole apparatus. To-morrow we will try and have one here so that the members can examine it. I think 25 of them were bought by the Secretary-Treasurer this year, and they have been issued to the candidates who have passed the recent examination and will be used by the Association in the

future. The same standard is being used by the Dominion Land Surveyors, and I think the Provinces of Saskatchewan, Alberta and Manitoba have adopted the same. It makes a great saving for a great many men who want to take more than one commission.

Is there any further discussion on this report, gentlemen? If not I will put the question.

There being no further discussion, the President put the motion, which, on a vote having been taken, was carried and the report adopted and ordered to be printed in the proceedings.

The President—The next order of business is the report of the Secretary-Treasurer, which I understand Mr. Rorke has ready. The Secretary read the report of the Secretary-Treasurer and the financial statement and moved that the report be adopted and that it be referred to the Auditors.

On the motion being seconded by Mr. Ward, the President put the same, which on a vote having been taken was declared carried.

The President—The next order of business is the report of the Board of Examiners.

Mr. Kirkpatrick presented and read the report of the Board of Examiners and moved, seconded by Mr. Sewell, that the report be adopted.

Mr. Speight—Is there a student there articulated with Mr. McLean in the Parliament Buildings?

The Secretary—This list was copied from the articles registered before the meeting of the Board, and Mr. McLean's pupil's name is down on it. These articles came up for approval at the Board, and the Board ruled they could not be accepted, and his name will be taken off this list.

Mr. Speight—I might say here for the benefit of the members that the Board were strongly of the opinion that it was not strictly within the meaning of the Survey Act that members who are Provincial Land Surveyors occupying other positions in the Parliament Buildings and elsewhere, that they cannot truthfully say they are practising as land surveyors, and it is not right for the Board to countenance anything of the kind in the future.

The President put the motion to adopt the report, which, on a vote having been taken, was declared carried.

The President—The next order of business is the report of the Committee on Legislation.

Mr. Kirkpatrick—Mr. Chairman, the Committee on Legislation did not meet this morning, and we have no report, but I understand there are several subjects that are going to be brought up in the course of time so as to get these passed at the present meeting of the Legislature. I cannot explain them very well, but I think there are some members here who can explain what is being done in that matter.

The President—I think Mr. Ward is familiar with one or two phases of these questions Mr. Kirkpatrick speaks of.

(Mr. Ward not being present, the President asked Mr. Speight whether he could give the meeting any information.)

Mr. Speight—One matter that was to be brought up which came before the Toronto Surveyors about a week ago was that at the last session of the Provincial Parliament there was a bill passed amending the Municipal Act which gave municipal engineers authority to go over private lands in carrying on their professional duties. It was intended to give them the rights accorded to surveyors in Section 6 of the Survey Act.

The Secretary read Section 6 of the Survey Act.

Mr. Speight—What they intended to get was something to give them authority to go over private lands in the same capacity as surveyors, but the bill was so brought in that they have been doing surveying, they being civil engineers, so now the Legislation Committee want to have this amended so that there can be no misunderstanding about it to allow them to go over the land but not to exercise the functions of a land surveyor.

The President—Is it the intention to submit a report later?

Mr. Kirkpatrick—I suppose it can be deferred to a later period in the meeting.

The President—I think probably it will be just as well to let this matter stand until this committee can get together and get this thing in concrete shape to make a report.

The report of the Committee on Publication is the next item. Mr. Rorke is Chairman of that committee.

The Secretary—Mr. President, I may say I did not get a meeting of the committee together, but I have drafted a report here. (Reads same). I may say for the benefit of the members that with each one of these Survey Acts that went out there was a postcard in the pocket to be returned, acknowledging receipt of same. I have not had many of these returned. I am afraid the members have not found it. So if any of you do find it you might return it.

I would move the adoption of this report, seconded by Mr. A. J. van Nostrand.

Mr. A. J. van Nostrand—In connection with that report there is a matter that comes up that has been spoken of lately by quite a number of surveyors. They are getting their reports bound and they find unfortunately there is an odd number missing here and there. Some are very anxious to complete their sets, and there may be members who do not keep their sets complete but have extra copies of some numbers, and if there was some means of connecting supply and demand I think we could get a number of sets rounded out. It might be done through the Secretary or by a circular, but I would suggest that any who have reports keep track of them, do not let them be destroyed, and if they wish to get rid of them send them back to the Secretary and he will take care of them.

The President—What is the opinion of the meeting regarding the continuing or discontinuing of the advertisements? I notice in Mr. Rorke's report that the Committee have about come to the conclusion they are not very profitable and they recommend they be discontinued. What is your idea about that?

Mr. Shaw—How are they not profitable? Are they hard to get?

The Secretary—It is a good deal of trouble to get them, and I know of different advertisers, when I have gone to them the second time, who do not appear to think they get value for their money. Last year we only collected \$41. We get \$6 a page, and those pages cost us \$2.50 to print, besides the other trouble in connection with them. After all the trouble

and expense we made probably about \$20 out of the advertising last year.

Mr. Shaw—In my opinion then if any man wishes to have his “ad” in the report, let him send it in and let us print it, but let there be no solicitation. Do not ask any of them for advertisements, but do not refuse any.

The President—When members of the Association are ordering supplies from these people who used to advertise with us, it might be a good idea to tell them that you miss their advertisement from the proceedings of the Ontario Land Surveyors. I think the idea of advertisements not being profitable is because a great many people when ordering goods from different concerns do not state the source of their information, and if every land surveyor who is purchasing supplies would write to the person and tell him he saw his advertisement in the proceedings, it might help to make the demand for these pages a little greater than it is now.

Mr. Kirkpatrick—That is done in a great many cases. You often notice in magazines something to this effect: “Please notify the person from whom you are purchasing where you saw the advertisement.”

Mr. Jupp—I would move that the advertisements be cut out altogether in view of the small amount of money involved.

Mr. Lang—I would second that last motion.

The President—What is your motion again, Mr. Jupp?

Mr. Jupp—My motion is that advertising matter be discontinued altogether from the annual report.

The President—There is a question that comes up; take the Lufkin Rule people, they have an advertisement in there every year, and they are supplying the standard we have adopted practically at cost, and they claim they are doing that largely for the sake of the advertising they get. Wouldn't these people consider it as an affront if we wrote to them and told them we didn't wish to have their advertisement in our proceedings?

Mr. A. J. van Nostrand—I think they have the means of reaching each member by getting a list of our members. I think they would be satisfied with that.

Mr. Lang—I think perhaps it is a small matter, but the plain question is that advertising in a pamphlet is not a commercial proposition. I think it is rather undignified on the part of this Association.

The President put the motion, that the printing of advertisements in the annual report be discontinued, which, on a vote having been taken, was declared carried.

The Secretary—Another matter I would like to bring before the Association and get an expression of opinion on is that last year I had the index, the register and by-laws printed separately because I thought it would probably be more convenient. Now I would like to hear from the members what they think of that, whether that should be continued or whether it should be all bound in one. This year there will be no necessity for printing the by-laws again. The general index and register will have to be printed. Heretofore we only used to get about fifty copies of the register, but they were not sent out to surveyors; the names were in the annual report. The question is if I shall continue adding the index and the register under the one cover? It will cost less. The publication account this year was considerably more, owing to a good deal more work having to be done.

The President—What is the comparative cost? Does it cost more or less to print them separately?

The Secretary—It costs more to print them separately. The register was an extra publication this year, and that cost us \$100 alone.

Mr. Gaviller—I should think if the advertisements were left out it would make our report less bulky and it would be far better to have the register along with the annual report.

The Secretary—Under the Act we have to publish a register, but it is not necessary to publish a register for every member.

Mr. Gaviller—It is just a question of putting it in the report for convenience.

The Secretary—But that is only a matter of \$10 or \$12 to publish the register separately for official use.

The President—Suppose you publish the register separately, how many copies would you have printed?

The Secretary—Fifty copies.

The President—Would it be more expensive to publish fifty copies separately than to include a copy in every report of the publication?

The Secretary—It would be necessary I think to include a copy in the publication as well. These fifty copies were extra.

Mr. van Nostrand reads Section 44, Sub-Section 1, of the Act.

Mr. van Nostrand—Under that it appears to be necessary for the Registrar to publish this register, and that has been more or less lived up to ever since we had the Statute; but it has been practically a dead letter for the object for which it was intended. Occasionally I think there is an application from outside for a copy of that register, and then we must have it. The list of members that was usually published as an appendix to the report pretty well served the purpose, except it is brought up to date at the time of publication; it does not cease at the first January, so that there is a slight overlapping there. I don't see how we could get one list so that it would serve the double purpose. If we could do that, then the ordinary list in the back of the report would do, and a few extra copies could be published for the people who may apply for them in an official way.

The President—Just simply that list?

Mr. van Nostrand—Yes. The first of January puts us out.

The President—That list that would be published to comply with the Statute would not require to have the names of the men who have recently passed this examination.

Mr. van Nostrand—No, they would not be eligible, and they on the other hand would miss one year appearing in the list of active members.

The President—So that the list published annually in our report not only complies with the Statute, but goes a little further; as a matter of fact it is up-to-date.

Mr. van Nostrand—Yes; with a special mark and a footnote to denote those who do not belong to the official register that could perhaps be made to serve the double purpose.

The President—I should think so.

Mr. van Nostrand—That would be a great saving of trouble and some expense, and the Statute would be complied with.

The President—I don't think that requires a motion. Is there any further discussion on the report of this committee?

(There being no further discussion, the President put the motion to adopt the report which, on a vote having been taken, was declared carried.)

The President—The next is the report of the Committee on Topographical Survey.

Mr. Speight—I understand the Chairman of that Committee transferred his data over to Mr. Dalton and he had kindly consented to read it.

Mr. Dalton—What I heard from Mr. Fawcett was he had send the report either to the Secretary or myself to read before the meeting, but I have not received his report yet.

The Secretary—It did not come to my hand.

The President—Under the circumstances we will have to defer that.

The next item is the report of the Committee on Exploration. Mr. Whitson is the Chairman of that Committee. I don't think he is here. I think probably that had better be deferred until Mr. Whitson comes in. That completes the list of reports of committees that we have on the programme for this afternoon, and the next item is a paper by Mr. Routly on "Contour Survey on Abitibi River."

Mr. Routly—Mr. President and fellow members of the Association. This paper is a sort of write-up or description of a contract which our firm carried out on the Abitibi River last winter, beginning the latter part of November and ending in March.

(Mr. Routly then read his paper, and in connection with same showed a blue print of part of the plan.)

The paper was received with applause.

The President—The next item is the paper by Mr. Dempster on "Survey in British Columbia."

Mr. Dempster—Mr. Chairman and gentlemen, I am afraid I can't give you much of a paper. I had a few points I thought I might bring up here to open up discussion. If I tried to get up after Mr. Routly and give a paper I would be ashamed. Opening up a new line of work such as Mr. Routly has given you a chance to do, he has placed the cost before you and you can get the cost data and you know where you are going to be. Did you have anything like that before you or did you have to more or less take a gambling shot at the motion.

The President put the motion that a vote of thanks be tendered to Mr. Dempster, and that the paper be printed in the proceedings, which, on a vote having been taken, was declared carried.

The President—The next item on the program is a paper by Mr. Neelands, but the time is getting rather late, and I think with Mr. Neeland's consent it might be just as well probably to have this paper left over till to-morrow when there may be a little gap.

The meeting adjourned at 5.30 p.m.

EVENING SESSION.

At 8.30 p.m. the President called the meeting to order and said: The first item we have on our programme to-night is a paper on "The Ontario and Manitoba Boundary," by Professor L. B. Stewart. I am sure Professor Stewart requires no introduction to any of the members here; I think you have heard him before. He has presented a number of papers to this association, all of which have been interesting and instructive, and to-night will be no exception to the rule and I will call upon Professor Stewart to come forward without any further remarks.

Professor Stewart: Mr. President and Gentlemen,—About two years ago I saw in one of our local papers a description of the new boundary between Ontario and Manitoba as the Province was extended, and it struck me in reading it that a certain part of the boundary involved some very nice surveying problems, so that I felt very much interested, and lately I have been making some calculations with respect to long lines drawn on the surface of the earth, and it occurred to me when I was asked to contribute a paper for one of these meetings that possibly this might be an interesting subject, so

I took as the subject of my paper the Ontario and Manitoba boundary.

(Professor Stewart then read his paper, which was received with applause.)

The President—The next item is the report of the Committee on Drainage of which Mr. McCubbin is Chairman.

MORNING SESSION.

Wednesday, February 18th, 1914.

At 10.30 a.m. the President called the meeting to order and stated that the first item upon the programme was the report of the Committee on Land Surveying of which Mr. Murphy was chairman.

Mr. Murphy presented the report of the Committee on Land Surveying.

12.30 p.m., the meeting then adjourned to 2 o'clock p.m.

AFTERNOON SESSION.

The President called the meeting to order and said, We will continue on from where we left off this morning. The first item is the report of the Committee on Polar Research, by Mr. Willis Chipman.

(Mr. Chipman was not present and the report of this Committee was deferred.)

The President—We will now have Mr. Ardagh's paper on "Questions arising in Surveys in Double Front Concessions."

Mr. Ardagh then read his paper.

The President—We will now call upon Mr. Speight for his

paper entitled "Points for Discussion on Subdivision of lots in the Six Mile System into Aliquot parts."

The President—The next item is the report of the Committee on Engineering. Mr. Owen McKay is the Chairman of that Committee.

The Secretary—No report has come to hand.

Mr. Routly—I know nothing about it; I have had no notice from the Chairman at all.

Mr. Tyrrell—I have received no notification from the Chairman, Mr. President.

The President—The next item is a paper on "Permanent Street Grades" by Mr. A. H. Jackson.

Mr. Jackson then read his paper which was received with applause.

The President—Our next item is a paper on "Ditches and Watercourses Act" by Mr. E. D. Bolton.

Mr. Bolton then read his paper which was received with applause.

The President—The next is the report of the Committee on Repository and Biography. I understand Mr. Chipman is not with us but Mr. Rorke is also on that committee, and Mr. Rorke tells me that he and Mr. Chipman have conferred on this matter and they are preparing a report which will be printed and incorporated in the annual report. I would therefore suggest that this report be taken as read and that someone move to that effect.

Mr. Sewell moved, seconded by Mr. Gaviller, that the report be taken as read, and that it be prepared and printed in the proceedings. (Carried.)

The President—There is one item which was left over from yesterday, and that is a paper by Mr. Neelands. I see he is in the hall. Possibly he can come forward and give that paper before we adjourn.

Mr. Neelands—I think it is too late in the afternoon now, and I think you had better let it go as read. I prepared data on

the Charlton water power development, and then thinking possibly it would not be of interest to the association I decided to write up another subject, but it has been so well threshed out to-day, and on former occasions, that I would much rather send in the article on the Charlton water power development, if it is satisfactory to the association. I could, if necessary, bring up a few points in general on water power development in the north country, which might provoke a certain amount of discussion to those interested in water power development. But, I think we have had a pretty full day and with the dinner coming on to-night we had better let it go that way.

The President—As I understand, your paper is not quite prepared for reading, and you would prefer to have it left over, and you will send it in to the secretary.

Mr. van Nostrand—I have much pleasure in moving, seconded by Mr. Newman, that Mr. Neeland's paper be taken as read and published in the proceedings.

The President put the motion, which, on a vote having been taken, was declared carried.

The President—That concludes our programme for this afternoon. I hope everyone will turn out for the banquet to-night. There is just one item before we disperse this afternoon. It appears from what I have heard, there has been some misunderstanding regarding the date of the calling of this meeting. Some of the members did not know the meeting was to be called for yesterday, and were under the impression it was to be for the fourth Tuesday instead of the third. I would like to state that the date of the calling of the annual meeting is fixed by statute for the third Tuesday in February. On one or two occasions in the past, for reasons that were ample at the time, that meeting has just simply been held by a few who happened to be in the city and then adjourned to a more convenient day, but it has been decided it is more convenient in every way to hold the meeting on the date set forth in the statute, and I think on that account this misapprehension has arisen.

At 5 o'clock p.m. the meeting adjourned to meet Thursday, February 19th, 1914, at 10 o'clock.

In the evening at 7.30 the annual dinner was held.

Thursday, February 19th, 1914. 10 o'clock a.m.

The President, Mr. J. S. Dobie, in the Chair.

The President—The first thing we have to consider this morning is the report of the auditors.

Mr. R. R. Grant—We have not completed our audit of the books, and we would move that the audit be adjourned until completed, and that the President be asked to O.K. it. Things are rather involved at present, and, of course, we will spend the afternoon on it. Furthermore, in view of the time it has taken us, I would like to suggest that this thing should be moved on ahead of the annual meeting, so that it will not break into the extent it does in the proceedings. The auditors are never present during the proceedings, particularly in the afternoon. If it was possible to have the thing so arranged that the audit would be completed before the annual meeting it would be a good thing. At the present time we have not our audit completed, and it will take some little time to do so.

Mr. Rorke—Mr. President, it has been the custom heretofore, that the end of the financial year has been the day before the meeting, and it is almost impossible, where \$1,500 is involved in small items in the transactions of the year, to have everything in proper shape so that an audit can be made. I do not know why it has always been that way. I do not find anything in the by-laws that requires the financial year to end the day before the annual meeting. My idea is that this meeting might suggest to the council the advisability of passing a by-law fixing the end of the financial year, say, about the 1st February. That would give the Secretary ample time to get everything in shape. As it is now it is hardly fair, for two reasons: The auditors are required to be absent from the proceedings of the meetings probably a whole day. Another reason is that the Secretary should be with them at the time to explain different little items. I am not a book-keeper, and as long as you have a Secretary who is not a good book-keeper he would possibly need to explain the different items. I would suggest that the course we should pursue is to fix end of audit year on February 1st.

The President—You have heard the remark Mr. Grant has made on behalf of the auditors, and also Mr. Rorke's explanation. I think we had better deal with the report of the

auditors before taking up Mr. Rorke's suggestion. That had better come in under new business. The whole thing involves a lot of work.

Moved by Mr. Sewell, seconded by Mr. Bolton, that the auditors prepare their report and it be submitted to the council in April. (Carried.)

The President—Next comes the Report of the Committee on Entertainment.

Mr. A. T. Ward—We have hardly had time to prepare a report. I move that the Report of the Entertainment Committee be received at a later date.

Seconded by Mr. Grant. (Carried.)

Moved by Mr. Bolton, seconded by Mr. Niven, that the Association instruct the Secretary to express to the President and directors of the Engineers' Club of Toronto our appreciation of their kindness in extending to our members the privileges of the Club. (Carried.)

Mr. Routly—In connection with this arrangement between the Engineers' Club and the Ontario Land Surveyors' Association, it struck me that as the Engineers' Club is now re-organizing and undertaking the construction of a Club House in which there will be a great deal more room and accommodation for things of this kind, for our libraries and so on, and in view of the close relationship that has always existed between the Ontario Land Surveyors and the Engineers, I have thought that it would be wise to make a suggestion at this Annual Meeting that the Council of the Association be authorized, if it is within their power, to subscribe for a limited number of the bonds of the company which will construct that new Club House. These bonds are being subscribed for by the members of the club, and to some extent by others. While I have no retainer, or even permission, from the club, or any of its officers, to make the suggestion, I feel it is quite in order. The Association have funds in hand and they may see fit to invest. It is not a gift in any sense of the word. The members of the club do not consider that in purchasing the bonds we are making a gift to the club. It is an investment which bears interest at 5 per cent. I would like to hear a discussion as to whether the annual meeting would authorize the council, if they see fit after investigation, to purchase a limited number of bonds. I would move that this annual meeting do authorize

the council to make that investment to the limit of, say, \$500, if on investigation they find they are legally qualified to do so and if they think it is advisable.

Seconded by Mr. A. M. Jackson.

The President—You have heard the motion. Is there any desire on the part of the members to discuss the motion before it is voted upon.

I might say myself that this question of investing the funds of the society in the bonds of the Engineering Club is a new one to me, and there might be a good deal for it and a good deal against it. I would not be prepared to discuss that question just at the present time, but I might say while on my feet that the Engineers' Club are contemplating a very large increase in its functions in this city. As I understand it they contemplate having a club house over in University Avenue, where they will be able to accommodate very much larger numbers than at the present date, and all members of the Engineers' Society and allied professions are eligible to that club. It is their intention to have dormitories and rooms, so that different out-of-town members can come and make it their headquarters when in the city. In fact, it will be a home for out-of-town engineers and surveyors, and in that way it would be a very desirable thing for this association to help along a movement of that kind. Whether that could be done by investing the funds of the association in the bonds, or by individual members investing, is a question.

Mr. Ross—Mr. President, does the association pay anything to the Engineers' Club for the use of this room?

Mr. Rorke—Twenty dollars.

Mr. Ross—It would be probably better to pay a liberal amount for the use of the rooms than to invest in the bonds of the club. However, I think that this association, as a body or individually, should take an interest in this movement in connection with the erection of a new club, and express their appreciation of the proposed work.

The President—You have all heard Mr. Routly's motion that the council be authorized to investigate the desirability of investing some of the funds of the association in the bonds of the Engineers' Club. (Carried.)

Mr. Fitzgerald—I have much pleasure in moving that the sum of \$400 be granted to the Secretary-Treasurer for his services during the past year. I think this is a very small sum.

Seconded by Mr. John van Nostrand. (Carried.)

The President—I may say that this is in accord with the usual custom. We have always done this. Mr. Rorke's efforts for the good of this society have been untiring. The amount of work he does during the year is certainly far more than anybody has any idea. The laborer is worthy of his hire. (Applause.)

Mr. Routly—I have a motion, and under the circumstances I hardly know how to put it. It is moved that the sum of \$5 be paid to each of the auditors for their services. Unfortunately the auditors seem to have done a great deal of work, and this would not attempt to pay them for their services.

Seconded by Mr. Blair. (Carried.)

Mr. Dalton—I wish to bring forward a resolution that this association feels it should not conclude its meeting without expressing its deep regret on account of the death of the following members: J. K. McLean, Ottawa; Joseph Cozens, Sault Ste. Marie; A. O. Graydon, London; George McPhillips, Winnipeg; P. A. Peterson, Montreal.

Seconded by Mr. Sewell. (Carried.)

The President—The next item on the programme is the nomination of officers. The meeting is now open to receive nominations for the coming year.

Mr. Speight—I have great pleasure in nominating Mr. Fitzgerald as President of the association for the coming year.

Seconded by Mr. Kirkpatrick. (Loud applause.)

The President—I take it by the hearty manner in which Mr. Fitzgerald has been received that there are no further nominations. (Applause.) I have very great pleasure in declaring Mr. Fitzgerald elected by acclamation.

Mr. Fitzgerald—Mr. President and gentlemen, I thank you very much for the honour of nominating me for President. I assure you I appreciate it very much, and will endeavour to do all I can to take care of the interests of the association.

Mr. H. J. Beatty—I have much pleasure in nominating Mr. E. T. Wilkie as Vice-President of this association.

Seconded by Mr. Ross. (Applause.)

The President—Are there any further nominations? If not, I take great pleasure in declaring Mr. Wilkie elected by acclamation as Vice-President of this association for the coming year.

Mr. Ward—I have great pleasure in nominating Mr. L. V. Rorke as Secretary-Treasurer. I think he has given us good services in the past, and I am sure he will in the future.

Seconded by Mr. Sewell. (Carried unanimously.)

The President—And if the coming year will be conducted as it has been in the past, I am sure I can congratulate the society on the choice.

The next nomination is for two members of the council. Every year two members retire. It is the usual custom to have the members of the council distributed from around the different outlying parts of the country, and I might also say that it is usually customary to submit a number of names.

Mr. Rorke—Mr. G. B. Kirkpatrick and Mr. J. McC. Watson are the retiring members.

Moved by Mr. Speight, seconded by Mr. Gaviller, that Mr. G. B. Kirkpatrick be a member of the council.

Moved by Mr. Ward, seconded by Mr. Abrey, that Mr. J. McC. Watson be a member of the council.

Moved by Mr. Grant, seconded by Mr. A. J. van Nostrand, that Mr. E. D. Bolton be a member of the council.

Moved by Mr. Ross that Mr. J. J. MacKay be a member of the council.

Moved by Mr. Le May, that Mr. John Shaw be a member of the council.

The Chairman—I might say, gentlemen, it is one advantage in having a number of names submitted for the office of council, the ballot is not taken now. It is taken a little later in the season, and before any member can vote he has to pay

his fees, and it gives our Secretary-Treasurer a chance to get in touch with some delinquents.

The next is the nomination for auditors.

Mr. Ross—I would move that Mr. John van Nostrand and Mr. Grant be auditors for the coming year.

Mr. Grant—I have had two years' session of the work, and it is more or less honorary.

Mr. Ross—I withdraw my motion.

Mr. Grant—I would move that Mr. A. E. Jupp and Mr. John van Nostrand be the auditors for the ensuing year.

Seconded by Mr. Ross. (Carried.)

The President appointed Messrs. H. L. Esten and T. D. Le May scrutineers of ballots for the election of members of council for 1914.

The Chairman—The next in order is unfinished business, but as there is no unfinished business to bring before the meeting I will proceed at once to the next in order, which is new business.

I have a letter from Mr. A. S. Code, Alvinston, suggesting that the association recommend to the Government that a supply of draughting instruments be provided for each registry and Land Titles Office.

The Chairman—This matter, gentlemen, is something of importance to the surveyors, and should be dealt with. In order to keep the business of the association going, I would ask that some member would make a motion that this matter be referred to the Council of Management, and whatever you may consider to be a proper way of dealing with it should be discussed.

Mr. Kirkpatrick—I think it would be a good thing to refer that to the Council of Management. There is money involved, and if the Government would have to grant it of course it would have to be applied for to the Government as soon as possible. I think it would be well to have the Inspector of Registry Offices recommend it. I will make a motion to that effect.

Seconded by Mr. Sewell.

The Chairman—That is, that the question of asking the Government to supply draughting instruments in the various Registry Offices be referred to the council, and that the council be asked to take such steps as are necessary to deal with the matter.

Mr. Shaw—I have found some cases in which they objected to having a pen or ink around, if you want to take a copy in the Registry Office. Some registrars seem to have fear of Land Surveyors altering their plans. That, however, has occurred in a very few cases, as far as I have seen. I know myself this would be a wonderfully handy thing.

The Chairman—I don't know whether that was the purpose of this letter. Unless the Registry Office would have some draughting instruments among its supplies, I don't see how they can check up a plan before they file it.

Mr. Ardagh—The Registry Office at Barrie does not allow a pen and ink to be used with the abstract book, but they have always furnished me with the advantage of India ink.

The Chairman—Would they allow you that pen and ink for copying plans.

Mr. Ardagh—No, I never have taken it. They are bound in books, and their idea is that no ink should be dropped, or the abstract books should not be defaced. I never heard that suggestion before.

The Chairman—I have a motion to bring in myself. I will ask Mr. Fitzgerald to take the chair.

Mr. Dobie—I made a reference to this matter in my address. In view of the great interest that is being taken in the good roads movement all over the country by everybody, and that it is a class of work that our men might very profitably work into, not only with profit to themselves but to the community at large, I beg to make the following motion:

To our list of standing committees we add a Committee on Roads and Pavements. Such committee should report regularly to our meetings, and would bring up such matters as the construction of roads, etc., that would be of great assistance. A number of our men are specialists in those lines. There are a number in Toronto who devote their time altogether to road work. So I think a very valuable committee could be

gotten up, and a lot of information gathered and placed on file in our proceedings, which would be of great benefit to all.

Mr. Newman—I second that. I think the more we get of that class of thing the better it will be. (Carried.)

Mr. Fitzgerald occupied the Chair.

The Chairman—It is in order for us to pass a resolution, a vote of thanks, to our worthy retiring President. I am sure you will all agree with me when I say that he has filled the chair very ably, much more ably than I can ever hope to do. I think Mr. Dobie is one of the best Presidents we have had for the past ten years. (Loud applause.)

Mr. Dobie—Mr. Chairman, I can only express my thanks for the manner in which you put that motion. I may say that, while this meeting has, I think, been one of the most successful we have ever held, I don't take any of the credit of the results to myself. The work of getting everything in shape for these meetings falls very largely on the committees, and on the Secretary-Treasurer, and, while the heart of the President may be in the right place, there is little he can do, and unless he has the hearty co-operation of the members in the various committees he can do very little. While you express thanks to me for the little I have done, for which I am very grateful, I may say that thanks are due to the committees and members themselves of the association. I thank you most heartily. (Loud applause.)

Mr. Ransom—With regard to a matter that you referred to be brought up under new business, after talking it over with several gentlemen here I came to the conclusion to make a motion, but first I might read over what points were brought up for discussion in the report of the Land Surveying Committee.

Reads points.

Those were points that were brought up, and it was deemed that it would be better to leave that over to new business, and deal with it as advisable.

It seems our machinery for putting anything like that into operation takes considerable time, and the least time it would be got over would be to have it brought up next year.

I would move that a committee be appointed by this association to consider the points brought up in this discussion, and to bring in a recommendation to the council at its next annual meeting, and the council could deal with such decision of the committee, or report of the committee as thought advisable. That this decision of the council with respect to that discussion be placed in the annual proceedings, so that all surveyors would have time to consider the matter, and at our next annual meeting we would be thoroughly familiar with the points, and it could be easily adopted or rejected by the association.

Mr. Beatty—I think the idea is a good one, but it seems to me it would be better to refer that to the council and have them report to the next annual meeting. I doubt very much if it would be of much account by referring to a special committee, and then report to the council.

Mr. Ransom—That point was brought up, and in the short time the Council would have to dispose of it if the thing was put in a concrete form for the Council they would be in a better position to discuss it.

Mr. Member—A matter was brought up with regard to a discussion which was brought before the last meeting. It was in connection with persons owning pieces of land which they required to be sub-divided, and they wanted to have it sub-divided in the winter. Well, of course, when the frost is in the ground you would stake it. The practice, therefore, has come around here in Toronto too, and I suppose in most cities, that we went out and staked with iron stakes, and staked the blocks of the property, and then it was registered just simply showing those blocks. The owners would then in most cases ask the surveyor afterwards to stake it out. The stakes which were planted on the corners of the blocks, of course, were the only ones that could be marked on the registered plan, and consequently they were the only original ones. The surveyor's staking after the registration had been accomplished would necessarily not be original posts, and therefore, would be of no practical use unless they were absolutely correct. Take, for instance, if there was half an inch short on one lot, then that would throw out the whole of the work on that block. The idea was when it was brought up that we might possibly get some alteration or amendment made to the Registry Act, whereby a surveyor, under those circumstances, might apply

to the Registrar for permission to mark on those posts within six months after the registration had taken place, so that they might become original posts, the same as if they had been planted in the first instance.

Then there were some of the members from outside who stated that their practice was, if a surveyor did not put all the stakes in before it was registered, the owners would not desire to have any stakes planted afterwards, and consequently it was a financial loss to the surveyor that he would not get any fees for doing so, and that he would only just simply get his fees for making the plan. The planting of the posts was absolutely necessary.

Then they raised the question as to whether it was legal for a surveyor to register a plan without having planted a post at every corner, and it was that question which was referred to Mr. E. D. Armour. That is what it really amounted to. The whole opinion was on that point, as far as we could have it, that the practice of planting of the posts was legal.

If we could get that point raised and possibly get more legislation on the subject, I suppose it would be a great deal of use. Otherwise, I don't see how this motion would do us any good whatever.

The Chairman—There are one or two other questions, I think, involved besides that. That matter you speak of was pretty well threshed out last year, and we got Mr. Armour's opinion which was explicit, except for two or three points. To prevent consuming a lot of time in discussion, I think Mr. Ransom's motion is a good one, to appoint a committee to go into the matter, and make certain recommendations and report to the Council, and then the matter be brought up in concrete form when we have something to decide upon.

Seconded by Mr. Ward.

A Member—Permit me to suggest some names for the Committee. I think probably Mr. Speight from Toronto, Mr. Routly from the north, and Mr. Dobie from the west are three good men.

Mr. Dobie—I don't think I could act on that. I think a committee should be one within easy reach of each other.

Member—I think it would be a wise thing to appoint one from each district connected with different kinds of survey work.

Mr. Ransom—I should think there should be at least four or five on it. The result of anything being actually done on that matter would have a different effect on Northern Ontario, or different parts of Ontario, than it would have, say, round the suburbs of Toronto. Generally, however, it would affect the Province in the same manner throughout. I should think that on the Committee we should have representatives from different points of the Province.

Mr. Rorke—We had better make this matter clear. This meeting appoint a Committee to bring in a report to Council at its next regular meeting on the 1st April, regarding the annexed motion, and that Council make a report to be published in the annual proceedings. This is not to be printed in this year's proceedings.

Mr. Ransom—The intention is that the result of this be printed this year, so that the surveyors will have plenty of time and leisure to inform themselves on all points, or the decision of the Council in the matter, and at the next annual meeting it will take very little time to either accept or reject anything that would be decided in the matter.

Mr. Rorke—It will be a report of the Council, then, as to what action they would take on the matter.

Moved by Mr. Lang, seconded by Mr. Webster, that Messrs. Speight, Routly, Le May, MacKay, Murphy and Ransom be appointed as such Committee. (Carried.)

Moved by Mr. A. J. van Nostrand that the reports of the Committees on Legislation, on Exploration, on Polar Research, on Engineering and on Repository and Biography be taken as read and printed in the annual proceedings.

Seconded by Mr. MacKay. (Carried.)

Mr. Routly—It strikes me something should be done to facilitate the work, or to get the work done sooner. I don't know what procedure will be necessary, but it struck me the other morning, when we had the discussion, for instance, on the report of Land Surveying Committee, that we should get these questions before us some time previous to our com-

ing here. If a committee could have these questions a considerable time ahead of the meeting of the Association, they could get into them and come here with a more mature opinion. People bring these questions in, not with the thought of arousing discussion, but to get a more or less authoritative answer. When questions come in so late in the day, the Committee really have no chance to go into things thoroughly. The questions are usually brought forward in the report, the members are not familiar with them, the different members speaking on the question often don't grasp what it means and finally, after they have talked for five or ten minutes, find they are not talking to the mark. We live in an age of progress, and I think we could improve on the work of our Committee in that regard. The other Committees have the same things to meet with. Very often several reports are brought in in a last motion to be received and printed as read, when they have not been read and possibly have not been prepared yet. What I want to bring out is that the work of the Committee is left to the very last thing, as a rule, and is done during the progress of the Association meetings. Quite a number of the members are, therefore, withdrawn from the meetings. A number of the older members are quite familiar with this Committee work; I would like to hear suggestions from them.

I have one suggestion to make: The appointment of Standing Committees is done by the Council in the regular meeting in April, which means that between now and April there is no Committee except the Committee which has been appointed for last year, which, I presume, still lives until their successors are appointed. They must, to a certain extent, consider their labor is over. In connection with the Committee on Legislation there is work that should be very closely looked after, and the Committee which has until now been the Committee must feel that to large extent their work is finished, they made their report. I think the Standing Committees should be appointed possibly after the annual meeting. I think there should be more interest taken in the Committees. When the Council meets the members are not there. The members of the Council do the best they can to appoint men to take charge of the different Committees. It may be they appoint men that are unable to give it the attention needful. If Committees could be appointed by the annual meeting, or during the time of the annual meeting, and get right down to work, I think their reports would be more valuable to us, and their work would be more easily carried out. I am making

this is not a motion, but in order to bring out an expression of opinion from those present.

Mr. Rorke—I am quite in accord with anything that can be done to bring out a greater interest in the members of the different Standing Committees. There does seem to be a lapse of time. For instance, if the Committee on Engineering has made its report, there is nothing further to interest that Committee, and the new Committee is not appointed until 1st April. However, if there is a Committee that has not completed its report, such as the Legislation Committee, and which they cannot complete, to report to the Annual Meeting, it seems to me it is in order for them to go on, as they are the Committee until a new Committee is appointed.

Now, the Council of Management appoints these Standing Committees, and after they are appointed in April a notice is sent to every Chairman notifying him of the members on that Committee and asking him to look after it. Then, on or about the end of the year, another letter was sent to each Chairman, informing him again that he was Chairman and asking him to give the matter serious consideration and get in touch with the other members of the Committee. Then again about the first of the year, a circular is sent to every member of the Association, asking members to bring up any matter they might have for discussion, forward it either to the Secretary or the Chairman of the Committee, and calling attention to the fact that they would find the name of the Chairman of the Committee in the report.

As far as my end of the work goes, I think I have done all I can towards getting the members to take an interest in the matter. I am quite in accord with what Mr. Routly said. A great many of the members say they do not know they are on the Committee. I think that is entirely their own fault.

Mr. Routly—That is about what I expected from the Secretary. It means that the Secretary is practically boosting all the Committees and that should not be. If our Committees were thoroughly in earnest about their work, they should not require that. Even with all the boosting they have had, a number do not know they are on the Committees. I for one, even though I don't get my notice, had forgotten what Committee I was on until I saw it in the report. I really have not much suggestion to offer, but I feel that is not the right condition for our work to be in. Our Committees ought to be more

in earnest than that. It may be partly caused by the way they are appointed. I receive the announcement that I am on a certain Committee. Maybe I am not interested in that kind of work. Another man receives the notice he is Chairman. Of course, the Council will use their best judgment and will know which members are most capable of handling different things, but some man may be appointed who is on a dozen other Committees, and is really too busy, while there are other men—maybe some of the younger members of the profession—who may be very much interested and quite anxious and willing to give real good hard work, and if there was some way by which we could find out these men and bring them out I think we would get better work. (Applause.)

As a member of a Committee it seems to me that a great deal of trouble is due to the indifference of the members themselves, and they are to blame a great deal. In the Land Surveying Committee they don't get the questions until a week or two before the Committee meets, and in many cases not until three or four days before the annual meeting. I think that in the future, any question submitted to the Land Surveying Committee should be sent in sufficient time to give each member of the Committee a copy, so that they might be able to deal with it more intelligently. It would be very expensive matter to have the Committee meet perhaps two or three weeks before the annual meeting, if a great many of the members were a long distance from the City.

The President—Supposing a rule were made that all matters were in the hands of the Secretary before the end of the year, and every question should be accompanied by a diagram. Could it not be arranged that copies of each one of these questions could be printed and distributed to the different members, accompanied by this diagram, so that the members coming here could have an idea as to what questions were to be discussed, and something of the general nature of the questions that were to come up. It would not be necessary for the Land Surveying Committee to meet to pass those questions until the day of the meeting, so long as they had the information in time. I think the evil of the whole thing lies in the fact that the Land Surveying Committee do not get their information in time, and the members themselves do not know anything about the questions until they are put on the board.

As regards the appointment of the Committees, that

might possibly be gotten around in another way. The Committees are usually appointed at the meeting of the Council. It is held under the special meeting of the Council, I think it is necessary to give a certain notice. Would it not be possible, when the programs are being sent out in connection with the annual meeting, to have a notice also sent that a meeting would be held after the annual meeting for the purpose of appointing Committees, and the members could be appointed at that meeting. The Council would know they had this to do, and they could get around and discuss matters, select their chairman and arrange everything while the members are here. It seems it could be done in that way.

Mr. A. J. van Nostrand—There seems to me one objection in that the dying Council appoints the Committees for the new year. The ballots are not opened until the annual meeting of the Council.

The Chairman—Are those retiring members not members of the Council until their successors are elected?

Mr. A. J. van Nostrand—What has been the practice in the Council, when I was familiar with it, was that the list of members was very carefully gone over, and the different Committees were constructed after each member had been first carefully considered as to his knowledge of the particular matter pertaining to the Committee. From those the Chairman was selected. By-law 5 gives to the Council the appointment of the several Standing Committees, and the naming of the Chairman of each. That is all done by the Council. As a rule it is done, I think, with a great deal of thought and care I don't think we could supply any better machinery than we have. The only thing is there is that little frailty in human nature—every man has his own affairs to attend to, and when it comes to anything of a public nature it is set aside, and even when attended to it is too late for the best interests of all. I do not see what we can do further than to ask each person to take an interest in the work of his Committee, and try to stir up everybody else to do so and have a general interest in the work of those Committees, especially the Land Surveying Committee—that and the Legislation Committee should have the very best material we can find in the membership. They should be men who would give it their very best care. One of the advantages we hold out to the surveyors as given by the Association lies in the fact that they have an Advisory Board to

whom they can apply for counsel and advice in the knotty subjects that come up in connection with a surveyor's practice throughout the year. With a good live Chairman on the Land Surveying Committee, I do not think he would mind having questions of that kind submitted to him all through the year. He could have a few members together and deal with it and give his opinion. That would come out in the Annual Report. That is one of the advantages we have held out. I hope it will not be lost sight of.

Mr. Speight—One thing, Mr. President. There has been legislation passed during the present Parliament. I think it would be advisable for the Council to find out if it is anything affecting surveyors. If so, it should be sent to them by circular rather than wait until it is published in the report. What I mean is, any new legislation that may be passed by the present Parliament, affecting the surveyors, it would be advisable that it be sent out to the different surveyors by circulars, rather than wait.

The Chairman—You mean any legislation that surveyors might be interested in. Not any legislation that surveyors would bring in themselves.

Mr. Beatty—I know cases this year where a plan was registered a less width than 66 feet. It was consented to by the municipality, but was contrary to the Act. The Registrar accepted it; the plan was registered; there was nothing in the Registry Act to prohibit him registering that plan, although the Municipal Act forbids anybody opening a street less than 66 feet. I do not think there is enough care exercised with reference to the legislation.

The Chairman—Was that plan filed as a result of special legislation that they obtained, or was it simply a slip of the Registrar allowing it to go through?

Mr. Beatty—The Registrar accepted the plan, and there is nothing in the Registry Act to-day that prohibits anybody registering such plan. The municipality consented to the plan, and when the Registrar saw that they had consented to it he registered the plan. Now they have got to go to work and change the thing. The question will arise later on, "Who owns that street?"

The Chairman—Did the municipality authorize the registering of the plan.

Mr. Beatty—Not by by-law; they simply accepted the plans. That street is in a nice muddle.

Mr. Lang—The same case exactly came up in our practice last year, and nobody in the town knew anything about the amendment in the Municipal Act until a few months after.

Moved by Mr. Speight, seconded by Mr. Lang, that the Secretary-Treasurer circularizes the members as to any legislation that is passed by the Legislature affecting the surveyors in any way. (Carried.)

Mr. Webster—I do not think that Mr. Routly's point should be lost sight of. I would like to tell you the objections of one of the very youngest of the members on that particular point. I think that when young surveyors come to Toronto to attend the Association meeting, for the first two or three times they have the feeling that the affairs of the Association are run from the top down, instead of from the bottom up. I want to be perfectly clear about the fact that I am not getting up in a spirit of criticism. I know if I were informed in April or May that I was a member of a certain Committee, I would not have nearly as much interest in it as I would have if I were informed here at the meetings, and had an opportunity of talking with the other members of that particular Committee before going home, and personally laying some plans for work prior to the next meeting. I think Mr. Routly's point is well taken.

The Chairman—With regard to this information for the Land Surveying Committee, Mr. Rorke suggests that gentlemen having questions of any kind to come before that Committee should send them in early, and he will see, as far as in his power, that members of the Association will be acquainted with all the questions that are liable to be brought up, at the time he sends out the circular letters notifying the members of the Committee of the meeting.

Mr. Ardagh—With regard to the Land Surveyor's Committee, would it be well to make it a rule that every person furnishing questions should also furnish a certain number of duplicates of questions? That would enable the matter to be arranged by correspondence between them.

Mr. Rorke—I hardly think that would be advisable.

Mr. Ardagh—I mean to send five copies for the members.

Mr. Rorke—I understand that was the suggestion of a previous speaker.

The Chairman—Not copies for each member of the Association.

Mr. A. J. van Nostrand—It seems to me that in undertaking to send out information to the members as to these questions, it will be found there are so many references to diagrams that the questions simply as printed matter will not be very much used. I would like to suggest that the Secretary look into the matter, and see if he finds it possible to deal with the publishers in advance of the bringing out of the report, and have the cuts, that will appear later in the report as a part of the question, made to send to the membership. That would not involve much more expense and would serve a very good purpose.

Mr. Ardagh—That was my idea some time previously, I did not say anything about it.

The Chairman—I think that matter, gentlemen, can be very largely left in the hands of the Secretary. He is in a better position than anybody else to realize the amount of labor it will require and to look into the best way of bringing that about.

Mr. A. J. van Nostrand—If there is nothing further to come before the meeting, I move an adjournment.

Seconded by Mr. Ardagh. (Carried.)

Meeting adjourned at 12.30 p.m.

PRESIDENT'S ADDRESS.

J. S. Dobie.

Fellow Members of the Ontario Land Surveyors' Association.

The pleasant duty devolves upon me of welcoming you to this the 22nd annual meeting of our Association. We come here year after year for mutual pleasure and profit, and I think I may safely say that those of us who take an active interest in the welfare of our Association have come to regard the annual pilgrimage to Toronto as an event to look forward to with pleasure. It is here that we come to renew acquaintances with our fellow-members; here we bring the technical problems that have confronted us in our work during the past year; and here that we set into concrete form our plans for the advancement of the profession as a whole. It is to be hoped that this year's gathering will be as productive of good results as have those of the past. The programme that we have to offer for your consideration represents a great deal of painstaking work on the part of our Secretary, and I hope that his efforts will not be unappreciated.

The past year has been an eventful one, not only to the members of the surveying and allied professions, but to the Dominion of Canada as a whole. A series of events have combined to bring about a slowing down in the era of expansion that a year ago looked as though it could not come to an end. Everywhere has been heard the cry that money was tight, and the fact that our leading financial institutions saw fit to prepare for heavy weather, and to put the brakes on the fever for speculation which had become epidemic amongst all classes, has been used by persons of a pessimistic turn of mind, as a basis for predicting blue ruin, and a final consigning of the whole country to the wolves which were already at the door.

Since the New Year, prospects have brightened, and our alarm has subsided sufficiently to allow a calm retrospect of the events of the past year, we are able to get a better perspective of the events of the past twelve months, in relation to those of the years that have preceded. And what do we

find? In spite of our fears, the sun continues to shine, the earth revolves on its axis, and there is no more favored spot on the face of the earth to-day than the Dominion of Canada, and particularly the Province of Ontario.

During the past year the war in the Balkans absorbed an enormous amount of capital, which would otherwise have been used in the productive arts. Nearer at hand the trouble in Mexico, and the fears that intervention might be necessary, has contributed to the general financial depression. As if these were not enough, the whole of Europe continues to be an armed camp. Expenditures on armaments are increased until the load is almost at the breaking point, and a condition of armed peace exists that is almost as disastrous as war, insofar as the withdrawal of capital from ordinary requirements of trade and commerce are concerned.

In spite of these conditions, our country has forged steadily ahead. The wheat crop in the western provinces amounted to nearly 200,000,000 bushels, a substantial increase over the previous year. 4,000 miles of new railway were completed, and the Hudson's Bay Railway is well under way. The total amount of steel produced in Canada was 1,040,000 tons, as against 780,000 tons for the year previous. Canadian railway earning amounted to about \$218,000,000, being substantially greater than for 1912. In order to take care of our ever increasing commerce, construction has started on the new Welland Canal, and another canal at Sault Ste. Marie is under consideration. A start is being made on the improvements on the French River, which it is expected will eventually form a part of the Georgian Bay Canal.

In our own province, more particularly the northern parts, where the Ontario Land Surveyors have done so much of the pioneer work necessary to the development of the country, we find things in general in a healthy condition. The Cobalt silver mines produced 30 million dollars last year. The output of the Porcupine gold mines amounted to \$4,425,000, an amount greater than that of all the previous years for the whole province put together. In the Sudbury District the nickel industry advanced by leaps and bounds, the old established companies enormously increasing their output, and a new syndicate preparing to enter the field on a large scale.

A large pulp and paper plant is being erected at Iroquois Falls, on the Abitibi River, and is but the forerunner of many

similar enterprises which will undoubtedly be started as this country's wealth in water-power and pulp-wood becomes better known.

The Canadian Northern Ontario Railway has been practically completed from Sudbury to Port Arthur, and the Algoma Central Railway is built far into the Clay Belt. These two railways have both been given substantial land grants, the survey of which will afford employment for a number of Ontario Land Surveyors for some time to come.

Colonization is going steadily on, and the vacant lands in Northern Ontario are being gradually settled upon, and last year a great impetus was given to this movement on account of the greatly increased local markets and high prices, and by reason of the bountiful crops, which were the best in the history of the country. A further impetus has been given to the colonization movement by the energetic manner in which the construction of wagon roads has been carried on by the Ontario Government, under the able direction of Mr. J. F. Whitson, O.L.S., Past President of this Association.

It is indeed pleasing to this Association to note the above record of substantial progress in a portion of the province, in the initial development of which our members have taken so great a part, and it is gratifying to be able to see that the optimistic predictions of some of our members, which this Association has so frequently endorsed, are being verified in our own generation.

These various marks of progress are all of interest to the surveyor and engineer for two reasons. In the first place they are largely the result of the work of the surveyor, and secondly they open up new opportunities for those members of the profession who see the time coming when the amount of survey work done by the various governments will be greatly curtailed. In a few years the portions of the province that are suitable for settlement will be largely surveyed, and surveyors who depend to a great extent on this class of work will be forced to look elsewhere for employment.

Two great avenues are opening up which will afford employment for surveyors for years to come. One is the development of water powers of which Ontario, and particularly that portion north of the Height of Land, possesses an amount of such magnitude that it can only be guessed at, and the other is the development of our ordinary country roads.

There is no question which has assumed such importance in the public mind as that of improving our system of road construction, and there is no class of men better fitted for the helping forward of that movement than the members of the Ontario Land Surveyors' Association. Road construction has heretofore been largely left in the hands of men of little or no engineering skill, who performed their work in a haphazard way, and the results have been most unsatisfactory.

The enormous increase in the number of automobiles, and the consequent desire on the part of the owners of these cars for better roads, has resulted in awakening the public to the folly of our present methods. Not only this, but the extensive use of motor cars, both for pleasure and for the moving of freight, has resulted in the practical destruction of many of the roads already built, and the resulting new conditions of traffic require methods of construction which are impossible under the old haphazard system. These changed conditions call for a type of construction which requires the services of experts, for no matter what the type of road, its success depends upon the skill and care which have been expended upon its initial construction. It is here that the members of our Association can perform a great service to the public, and at the same time profit professionally.

In order that this subject may receive the attention that it deserves at the hands of this Association, I beg to suggest that we amend our by-laws so that our list of standing committees there be added one on "Roads and Pavements." A number of our members have already specialized along this line, and much good can be accomplished by having such a committee, in order that discussions on this very important subject may be a regular part of our annual programme.

During the past year the Council of the Association have dealt with the question of a new standard of measure, with the result that we have adopted a standard similar to that used by the Dominion Land Surveyors. This standard is supplied by the manufacturers at a very reasonable price, and is in every way superior to the one formerly used. It has been adopted by the Surveyors' Associations of several of the other provinces, and it is hoped that its use will become general throughout the Dominion. Any Ontario Land Surveyor possessing one of these standards, who wishes to become a Dominion Land Surveyor, only requires to have his standard tested and stamped by the Surveyor General at Ottawa, in

order to conform with the provisions of the Dominion Lands Act. Vice versa a Dominion Land Surveyor writing on the examination for an Ontario Land Surveyor's commission does not have to purchase a new standard, but may have his own tested and stamped by our Secretary-Treasurer at a nominal fee.

During the past year the Department of Justice at Ottawa has decided that the lands recently added to the Provinces of Ontario, Manitoba and Saskatchewan are to be administered by the provinces. Under this decision all applications for land, and all returns of surveys in the District of Patricia have to be made to the Department of Lands, Forests and Mines, Toronto. This vast territory having an approximate area of 150,000 square miles now forms part of the Province of Ontario, and while little exploring has been done there, enough has been done to show that it is a land of great resources awaiting the advent of the pioneer. Even as the members of this Association have borne the brunt of the pioneer work in the development of the Clay Belt, so may we look forward to having an equal share in discoveries equally as important in this great territory, that is at present almost unknown and uninhabited.

It is with great regret that I mention that during the past year the hand of death has fallen upon five of our members as follows: Joseph Cozens, Sault Ste. Marie; A. O. Graydon, London; George McPhillips, Winnipeg; P. A. Peterson, Montreal; J. K. McLean, Ottawa, (Dept. of Indian Affairs).

These gentlemen all occupied prominent places in the professional life of the country, and you will join me in expressing our sympathy with the friends who mourn their departure.

As you will see by the report of the Secretary-Treasurer, the affairs of the Association are in excellent shape. We have 255 active members on the roll, including eight new members who have recently been passed by the Board of Examiners. In looking over the register, and comparing it with the lists of members who attend the annual meetings of the Association, one cannot help but be struck by the fact that a very large proportion of our members never take any active part in the affairs of the Association, either by attending the meetings, preparing a paper, or submitting a question to the various committees. Why this should be so is hard for us who derive so much pleasure from these meetings to under-

stand. This Association possesses a charter which it would be a very difficult matter to obtain now, and it is to be hoped that the younger members will realize the importance of doing their utmost to make the Association a power for good among the members of the profession. There are very few members whose business does not bring them to the city at least once during the winter, and if they would once get into the habit of arranging their affairs so that they could come here at the time of our annual meeting I am sure that they would find the time so well spent that they would wonder why they never did it before.

In conclusion allow me to express my thanks for the honor you have done me by electing me as your President for the past year. I am only sorry that I have not been able to do more to advance the interests of the Association, and I hope that the same hearty good will that has been extended to me will be offered to the next occupant of this chair. I trust that this meeting will be one of mutual profit and benefit, and that the affairs of this Association will continue to prosper in the future as they have in the past.

REPORTS

SECRETARY-TREASURER'S REPORT.

Mr. Chairman—

I have the honor to lay before you the report of the business of the Association transacted between the 22nd of February, 1913, and the 16th day of February, 1914.

The minutes of the last Annual Meeting were revised and, together with the papers presented at that meeting, were put in the hands of the Business Printing Company of Toronto for publication. This was completed by the 1st of September, and copies were mailed to all members in good standing and to those not more than one year in arrears.

Exchange of reports were made with the Dominion Land Surveyors Association, Manitoba Land Surveyors Association, Ohio Engineering Society, Illinois Society of Engineers and Surveyors, Iowa Civil Engineers and Surveyors Society and the Indiana Engineering Society. Our report was also sent to the different Libraries and Scientific Societies on our mailing list.

The official register of members has been kept up to date and revised from time to time when necessary, and now tabulates as follows:—

Active Members	255
Withdrawn from practice	107
Deceased	97
	<hr/>
Total roll.....	459

It was found necessary to give up the lease of the offices 701 Temple Building, and remove the office to the Parliament Buildings for convenience of the Secretary. In accordance with

your instructions the Association Library has been moved to the Engineers' Club where it is being housed and taken care of at an annual rental of \$30.00.

During the year it was found expedient to transfer \$1000.00 from the Association's current account to the Savings Account.

The payment of annual fees has been fairly well met by members, and I am able to state that arrears to the extent of \$372.00 have been collected, and a further amount of \$160.00 is collectable. The balance of arrears may be considered insolvable and a loss account.

As a result of the request for the relief of Mrs. Cameron, \$250.00 was denoted by subscription from different members of the Association and forwarded to her. In acknowledging receipt of the cheque the recipient desired me to express to the members her heart-felt thanks for their kind assistance.

The Financial Statement herewith shows the various business transactions of the past year and the present state of the Association's finances. There are no outstanding liabilities other than current expenses.

**STATEMENT OF BALANCES, RECEIPTS AND EXPENDI-
TURES BETWEEN 22ND FEBRUARY, 1913, AND
THE 20TH FEBRUARY, 1914.**

DR.

To balance in Savings Account 22nd February, 1913.	\$ 304.35
“ “ Current “ “	1,706.63
“ cash on hand “	18.28
“ receipts Board of Examiners Account.....	995.00
Including Government Grant.....	200.00
“ annual membership fees.....	1,072.00
“ amount collected for advertisements.....	41.50
“ interest on Consumers' Gas Co. stock.....	100.00
“ accrued interest on Savings Account.....	26.70
	\$4,464.46

CR.

By outstanding cheques 1913 balance.....	58.75
“ amount paid Auditors.....	10.00
“ “ “ Secretary-Treasurer	400.00
“ “ “ Stenographer (Annual Meeting)..	60.00
“ “ “ out for postage.....	113.27
“ “ “ publishing report	541.65
“ “ expenses of members of Council.....	56.65
“ “ paid for marking standards.....	15.00
“ “ freight, cartage, brokerage and sundries.	35.28
“ “ office rent	15.00
“ “ printing and stationery.....	75.75
“ “ binding reports and survey acts.....	168.25
“ “ paid solicitors.....	75.13
“ “ “ premium Secretary's Bond.....	7.50
“ “ rent lecture room and expenses.....	26.35
“ “ over deposit Oct. 14th, 1913.....	40.00
	\$1,698.58
“ “ paid Board of Examiners.....	1,006.50
	\$2,705.08

SUMMARY.

Balance and current revenues.....	\$4,464.46	
Total disbursements.....	2,705.08	\$1,759.38
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Balance in Bank less outstanding cheques.....	\$1,570.75	
Cash on hand.....	188.63	\$1,759.38
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ASSETS.

Cash in bank.....	\$1,570.75	
20 shares Can. Gas. Co. stock.....	1,760.00	
Office furniture.....	140.00	
20 Standard Lufkin Rule Tapes.....	200.00	
Arrears of fees collectable.....	160.00	
Cash on hand.....	188.63	\$4,019.38

LIABILITIES—NIL.

Respectfully submitted,

L. V. RORKE,

Secretary-Treasurer.

 AUDITORS' REPORT.

We hereby certify that we have examined the Secretary-Treasurer's vouchers, receipts, final statement and bank account and find them correct.

Russel R. Grant,

John van Nostrand,

Auditors.

REPORT OF COUNCIL OF MANAGEMENT.

At the regular meeting of the Council held on the 15th April, 1913, Mr. G. B. Kirkpatrick, was appointed Chairman for the ensuing year.

The following members were appointed Chairmen of the respective Committees:—

- C. J. Murphy, Land Surveying.
- G. A. McCubbin, Drainage.
- Owen McKay, Engineering.
- Thos. Fawcett, Typographical Survey.
- L. V. Rorke, Publication.
- A. T. Ward, Entertainment.
- G. B. Kirkpatrick, Legislation.
- Willis Chipman, Repository and Biography.
- J. F. Whitson, Exploration.
- Willis Chipman, Polar Research.

It was also resolved that exchange of Annual Reports be made with the Dominion Land Surveyors Association and the Saskatchewan Land Surveyors Association.

The question of the validity of our Standard Measure was referred to the solicitor for his opinion. The Secretary was authorized to procure Lufkin Rule Steel Tapes for supplying successful candidates and members as our Standard Measure.

At the Council of Management held on the 17th February, 1914, by-laws were passed exempting from annual dues under section 41, sub-section 5, of the Survey Act, the following members: E. G. Barrow, James A Bell, Samuel Bray, Alexander Baird, James Dickson, R. P. Fairbairn, and James Warren, and a by-law was also passed giving the Board of Examiners authority to accept a senior matriculation certificate in mathematics in this Province in lieu of a Preliminary Examination.

G. B. KIRKPATRICK,

Chairman.

REPORT OF COMMITTEE OF PUBLICATION.

Mr. President,—

The proceedings of the last Annual Meeting of the Association were put in the hands of the Business Printing Company, Toronto. 1,350 copies were printed at a somewhat increased price from former years due to the higher cost of labor and material, and to a better class of paper being used than formerly. Copies of the reports were distributed as follows:—

Illinois Society of Engineers and Surveyors	200
Indiana Engineering Society	175
Iowa Engineering Society	150
Ohio Engineering Society	200
Dominion Land Surveyors Association	150
Alberta Land Surveyors Association	25
Manitoba Land Surveyors Association	50
Saskatchewan Society of Surveyors	25

To Members of the Association in good standing, also to the various Scientific Libraries and Societies with which we exchange copies, and to the several Libraries requesting same.

Several volumes of Exchange Reports and also of our own reports which were in paper form have been neatly bound and are to be found in the library. There was also printed and neatly bound in leather, 250 copies of the Survey Act and extracts from other Acts relating to surveys. These were distributed to members in good standing.

The advertising pages of the report are not in demand, and the practice of advertising has not yet been a very profitable undertaking, and your Committee would recommend that it be discontinued.

Back numbers of the Association's reports, with the exceptions of the years 1893, 1908, 1909, 1910 and 1911, are in stock in the repository, and can be procured on application to the Secretary-Treasurer.

Respectfully submitted,

L. V. RORKE,

Chairman.

REPORT OF BOARD OF EXAMINERS.

An adjourned meeting of the Board was held on the 2nd of May, 1913, and the following candidates presented themselves for Final Examination under the provisions of a resolution passed on the 13th February, 1913; and passed the examination:—

Messrs. Louis Arthur Kinnear,
George Louis Rainboth,
John Ainslie Baird,
Louis Francis Eadie,
Walter Sydney Malcolmson,
Harry Charles DeQuincy Sewell.

The regular meeting of the Board met at the Parliament Buildings, on Monday the 2nd of February, 1914, the following candidates passed their preliminary examination:—

Matthew Rae, Unionville,
William Wallace Perrie, Hamilton,
John Frederick LaPlant, Simcoe,
Harry W. Richardson, Hamilton,
Leopold Wright, Toronto,
Thomas Norman Enright, Toronto.

The following passed the required Final Examination:—

Norman Barry MacRostie, Ottawa,
Frank H. Muckleston, Toronto,
Grant L. Berkeley, Toronto,
Karl Huffman, Toronto,
Milton E. Crouch, Toronto,
Percival Anthony Jackson, West Toronto,
Roy S. Kirkup, Fort William,
Samuel Gladstone McDougall, Ottawa.

The following bonds have been approved and filed with the Provincial Treasurer, in accordance with the provisions of the Act respecting land surveyors, 1st George 5th, Chap. 41, Sec. 35:—

William A. Sibbett,
Colin W. G. Gibson,
James R. Gill,
Guy L. Ramsey,
David A. Niven,
Douglas S. Ellis,

F. J. K. Benner,
 Walter R. White,
 John B. Hellferth,
 Samuel E. Flook,
 Henry C. D. Sewell,
 Louis A. Kinnear,
 George L. Rainboth,
 Edward Cavell,
 John A. Baird,
 Richard F. Dynes,
 E. G. MacKay,
 Walter S. Malcolmson,
 Louis F. Eadie.

The following articles were filed by the undernamed pupils during the year:—

Name of Pupil.	Name of Surveyor.	Residence.	Date of Articles.	Term.
Wood, J. R.	Geo. Ross	Welland	Feb. 19, 1913	1 year
Pepler, S. J.	N. D. Wilson	Toronto	Feb. 5, 1913	1 year
Berkeley, G. L.	N. D. Wilson	Toronto	Feb. 5, 1913	1 year
Wear, D. H.	F. M. Eagleson	Winchester	May 5, 1913	1 year
Riddell, J. M.	J. S. Dobie	Thessalon	Mar. 20, 1913	1 year
Cassels, W. L.	S. E. Farley	Ottawa	Dec. 1, 1913	1 year
McFaul, W. L.	E. P. A. Phillips	Port Arthur	Sept. 1, 1913	1 year
Eaton, H.	I. E. Jackson	Hamilton	Apr. 30, 1913	1 year
Wilkins, C. H.	J. H. Shaw	North Bay	Nov. 1, 1913	1 year
Dunkley, J. B.	J. E. Jackson	Hamilton	June 11, 1913	1 year
Lanting, J.	G. F. Summers	Haileybury	Feb. 7, 1913	1 year
Fletcher, W. J.	J. J. Newman	Windsor	June 30, 1913	1 year
Ross, O. W.	J. C. Street	Ottawa	Feb. 1, 1913	3 years
Campbell, K.	F. F. Clarke	Toronto	Feb. 6, 1913	1 year
Gray, A. W.	W. A. McLean	Toronto	Jan. 30, 1913	3 years
Scott, J. R.	Geo. Ross	Welland	Feb. 7, 1913	1 year
McAndrews, J. B.	E. Gardiner	St. Catharines	Feb. 7, 1913	1 year
Pearson, A. W.	F. F. Clarke	Toronto	Feb. 3, 1913	1 year
Moore, E. L.	Spight and van Nostrand	Toronto	May 1, 1913	3 years
Yates, C. R.	Spight and van Nostrand	Toronto	May 1, 1913	3 years

G. B. Kirkpatrick,

Chairman of Board.

REPORT OF COMMITTEE ON ENTERTAINMENT.

Your Committee on Entertainment beg to report as follows:

The Annual Dinner was held on February 18th at the Engineers' Club, instead of at McConkey's Restaurant as heretofore. The change was decided on as being more convenient to the members attending the meeting and the resulting increase in members is very gratifying. The following were present:

Guests:—Hon. W. H. Hearst, E. Douglas Armour, K.C., R. F. Stupart, F. Arnoldi, Mr. Muchin, E. A. Zavitz, Prof. L. B. Stewart, D. G. Boyd, R. B. Wolsey, C. McCrea, M.P.P., Dr. J. Bach, J. H. Pettit, Mr. Work, W. H. St. John, J. B. Proctor, S. A. Griffin, K. A. Farrell, J. S. Kee, B. G. Leigh, Mr. Bartram.

Members of the Association:—Willis Chipman, G. McCubbin, L. V. Rorke, H. J. Beatty, H. Dempster, H. deQ. Sewell, D. D. James, R. R. Grant, E. D. Bolton, H. L. Esten, N. C. Lloyd, T. Ransom, M. Gaviller, A. G. Ardagh, J. S. Dobie, E. Stewart, E. W. Neelands, R. W. Code, L. F. Eadie, H. T. Routly, W. H. Browne, E. T. Wilkie, N. A. Burwash, J. Hutcheon, D. A. Niven, T. B. Speight, A. J. van Nostrand, A. T. Ward, T. D. Le May, J. B. Hellferth, W. E. McMullen, J. F. Whitson, H. M. Anderson, J. H. Shaw, J. E. Jackson, J. W. Tyrrell, G. S. Abrey, C. F. Aylsworth, J. J. Newman, W. G. Webster, J. J. MacKay, O. R. Blandy, R. M. Gourlay, F. Mucklestone, A. P. Walker, E. MacKay, J. Lang, J. W. Fitzgerald, W. S. Gibson, F. V. Siebert, N. D. Wilson, John van Nostrand, K. Huffman.

We regret to record the unavoidable absence of several distinguished guests, owing to an engagement at the Government House.

The dinner was excellent and the musical programme ably carried out by members and friends of the Association. Messrs. Boyd, B.C. Leigh, R. S. Bartram, Phillips, Sewell, Le May, taking part.

Your Committee wishes to express its appreciation of the action of the Engineers' Club in according the full privileges of the Club to members of the Association during the meeting.

Your Committee wishes also to express their gratitude to all those who helped to make the evening a success, and would like to take this opportunity of reminding those members who were not present that the dinner only happens once a year and that it should be attended by every member that can possibly do so, as it is one of the surest means of bringing the members of this widely scattered Association into personal contact with one another.

Respectfully submitted,

A. T. WARD,

Chairman.

REPORT OF COMMITTEE ON REPOSITORY AND BIOGRAPHY.

If the recommendations contained in the 1913 Report of this Committee be acted upon by their successors, the Committee of each year doing something—filling in a gap here and there—the Proceedings will eventually become a treasure house of biography. But little was done, however, during the past year, one reason being that the Chairman did not receive his "Commission" until a few weeks before the annual meeting. He immediately wrote seventy-eight personal letters to surveyors, whose names appeared in the List of Members, who were admitted to practice prior to 1880, asking each to contribute a biographical sketch of the surveyor to whom he was apprenticed. Twenty replies were received, but very few biographical sketches were received. The information obtained, however, will serve as a guide for future investigation. We append those that we consider sufficiently complete to merit publication.

During 1913 arrangements were made with the Engineers' Club of Toronto for the housing and care of the library of the Association. The libraries of the Ontario Association of Architects, and of the Toronto branch of the Canadian Society of Civil Engineers are also at the Engineers' Club, and it is the intention to compile a joint index to all the books, each library, however, to be distinct and separate.

The Engineers' Club has recently purchased a site for new quarters on the west side of University Avenue, opposite the

Armouries. The new club premises will doubtless provide better accommodation for our library, and eventually should become the headquarters of many other technical libraries.

We would suggest that the surveyors in each county should investigate the early surveys made in his county, exploratory, base-line work, or township subdivisions, secure such information as he can from descendants of the surveyors who made the surveys, and transmit this information to the Chairman of the Committee. The entire history of the early surveyors and those who made the surveys can never be properly written, but something can be done by the patient efforts of the members throughout the province, supplemented by research in the Crown Lands office.

Year by year a link with the past is forever lost, and what may be obtained to-day may be unattainable to-morrow.

Respectfully submitted,

WILLIS CHIPMAN,

Chairman.

COL. JOHN STAUGHTON DENNIS.

By Chas. Unwin, O.L.S.

Col. Dennis was the son of Joseph Dennis, who lived and died at "Buttonwood" near Weston. The old Dennis home was secured about ten years ago for the Weston Sanitarium. His grandfather, John Dennis, owned and lived on a plot of ground on the north side of King St., Toronto, between Yonge and Victoria.

Col. Dennis was a pupil of Charles Rankin, Deputy Surveyor, and was admitted to practice January 4th, 1842.

In addition to a large country practice he made important government surveys, among which may be mentioned the subdivision of the Indian Peninsula in the north side of Balsam Lake in the Township of Bexley; the northern parts of the Townships of Bentinck and Glenelg; and a number of Indian reserves on the north shores of Lake Huron and Lake Superior.

Mr. H. J. Cambie, of Victoria, B.C., who served his apprenticeship with Col. Dennis, 1857-1861, writes that shortly after

the completion of the Grand Trunk Railway from Montreal to Sarnia, and of the Great Western from Niagara Falls to Windsor, townsites of sufficient size for a city were laid out at many stations. Mr. Dennis was employed in this work. The boom soon burst and by 1861 land surveying was at a low ebb.

Vernon B. Wadsworth and Milner Hart were fellow pupils with Mr. Cambie.

J. S. Dennis, of C.P.R. Lands Department, Calgary, is a son.

Of subdivisions of private parties one of the largest was that of the Crookshanks estate, extending from Robinson St. a few yards north of Queen to Bloor St., and westerly from Crookshanks Lane (now Bathurst St.) to Hope St. (now Manning Ave.)

Mr. Chas. Unwin secured his apprenticeship with Col. Dennis, and after passing his final examination in April, 1852, laid out for Col. Dennis part of the village of Norval.

Col. Dennis married Miss Maria Oliver, of the city of Kingston, sister of Mr. Hugh Scott, of the firm of Scott and Walmsley.

A son of Henry Dennis, brother of Col. Dennis, resides on part of the old homestead at Mount Dennis, between Toronto and Weston.

In 1851-1852 Col. Dennis, William Hawkins, David Gibson and John Knatchbul Roche were appointed Examiners for Provincial Land Surveys.

At the time of his death on July 7th, 1885, which occurred at "The Bungalow," Chelsea, P.Q. (near Ottawa), Col. Dennis was Surveyor General for the Dominion of Canada, which office he had held for years. He was in his 65th year.

EDWARD ROBERT JONES, P.L.S.

By J. St. V. Caddy, O.L.S., Ottawa.

Mr. Jones served his apprenticeship with the late Albert P. Salter, with whom he later went into partnership after passing his final examination July 9th, 1850, and practised in the Counties of Essex, Kent and Lambton, having their office at Chatham, Ont. In 1853 Mr. Jones married Miss M. L.

Berryman, a sister of the late Dr. Berryman, of Toronto. Shortly after his marriage Mr. Jones moved to Sarnia Township, living in the old homestead "Maxwell," about eight miles above Sarnia on the shores of Lake Huron. It was not found convenient for the practice of land surveying, however desirable otherwise, and it was with regret that Mr. Jones decided to move into the Town of Sarnia, where he practised his profession for many years. His death occurred about

Among other work that Mr. Jones did for the Government was the laying out of the Township of Huron, the subdivision of part of the Sarnia Indian Reserve, etc.

Mr. Jones was a gentleman of the old school, very strict in the observance of his duties when at work, and most careful that everything that he did should be exact. He was a great sportsman and a dead shot, with either shotgun or rifle, and many a deer has fallen to his unerring aim; he had a fine sense of humor, hospitable, generous, and the soul of honor.

WM. JOHN McDONALD.

By James Marshall, O.L.S., Blyth.

Mr. McDonald was a son of Duncan McDonald, who resided near Perth in the County of Lanark, and was born about 1834. Mr. McDonald served his time with John Morris, P.L.S., of the Town of Perth, who served under articles to Josias Ritchie, P.L.S., and passed his final examination on April 11th, 1857. Prior to 1861 Mr. W. J. McDonald lived at Arnprior and practised his profession there, but in the autumn of that year removed to the town of Perth owing to the illness of his wife, who was a daughter of Josias Ritchie, P.L.S., who lived near Perth. After the death of his wife in 1862 he continued his surveying work throughout the county until the autumn, when he removed to Bayfield, County of Huron, where he formed a partnership with John Denison, P.L.S. He returned in 1863, married his first cousin, Sarah Smith, and remained at Arnprior thereafter.

In 1863-64 he surveyed the Township of Wylie for the Government, at which time James Dickson, Andrew Bell and James Marshall were articulated to Mr. McDonald.

Mr. McDonald died at Arnprior, 186— from pneumonia.

JAMES KEACHIE McLEAN.

By **K. A. McLean** (Mrs. J. K. McL., 26 Rideau Terrace, Ottawa).

Mr. Jas. K. McLean was born at Galt, Ont., in December 19th, 1851, and died suddenly on May 25th, 1913, on the Sarcee Reserve, near Calgary, Alta., where he had commenced his season's work for the Department of Indian Affairs. He held the position of surveyor for the Department of Indian Affairs, Ottawa.

Mr. McLean received his early education at Dr. Tassier School, Galt, and served his apprenticeship with the late Hugh Wilson, of Mount Forest, and passed his final examination on April 8th, 1876. Charles Booth served the first year of his apprenticeship with Mr. Wilson, and the remaining time with Mr. McLean.

Mr. McLean served with the surveyors in the North-West Rebellion of 1885. A photograph of fourteen of the surveyors taken in 1885 at Winnipeg includes the following:—

T. R. Hewson, Peterborough; Lewis R. Ord, Thessalon; J. F. Garden, Meaford; H. C. Denny, Toronto; C. E. Wolfe, Ottawa; A. F. Cotton, Ottawa; C. F. Miles, Walkerton; F. W. Armstrong, Orillia; T. Kains, Lindsay; H. B. Proudfoot, Clinton; Edgar Bray, Oakville; Thos. Drummond, Montreal; J. K. McLean, Elora; Chas. McGrath, Ottawa.

Three children survive: Donald R. McLean, Calgary; Salina A. K. McLean, Ottawa; Agnes M. McLean, Ottawa.

AYLESWORTH BOWEN PERRY, P.L.S.

By **Geo. B. Kirkpatrick, O.L.S., Toronto.**

The subject of this sketch resided on a farm at Violet (then Comers Mills), in the Township of Ernestown, near Napanee. He was licensed to practise as a Provincial Land Surveyor on March 3rd, 1842. He had an extensive private practice in the Counties of Lennox and Addington, Frontenac and Prince Edward, and was employed in the Government Surveys from 1851 to 1866.

Among his artied pupils who afterwards became land surveyors were, W. B. Ronbough, S. O. McGuire, W. R. Aylesworth, N. F. Perry and G. B. Kirkpatrick.

He died in 1887, leaving a widow, one daughter and two sons. Mr. Perry was a Methodist.

JOHN MORRIS, P.L.S.

By A. E. Morris.

John Morris was born in the Township of Drummond, County of Lanark, adjoining the Town of Perth, on the 9th day of May, 1824. He received his early education in the Town of Perth, and was indentured to the late Josiah Ritchie, P.L.S., who resided on his farm in the Township of Bathurst, close to Perth.

Here he remained for one year, and at the expiration of that time he passed his examination, receiving his certificate of P.L.S., on June 9th, 1847. He then returned to Mr. Ritchie with whom he spent the following year surveying through Lanark, Carleton, Frontenac, Addington and Renfrew Counties. At the close of the year he left for Ottawa, where he spent more than a year doing survey work for the settlers along the Ottawa River. The next years were spent at his home in Perth, where he continued to practise until the year 1854, when he took a contract to subdivide a part of the Townships of Alico in the County of Renfrew where the town of Pembroke stands. At the conclusion of this work he again returned to Perth where he resumed practice, doing a great deal of work for the lumbermen who controlled large limits along the Mississippi, Clyde and other streams in the adjacent counties. He did considerable drainage work also in these days, as well as the subdivision of village and town property. In the year 1872, following the first Riel Rebellion, he received a contract to survey some townships in the Stony Mountain district, Manitoba, west of Winnipeg, which he completed early that season. Returning to Perth he took up practice until the Spring of 1880, when he received another contract in Manitoba in the Turtle Mountains. He finished this, and in the following year, 1881, took a third contract near Souris River in the south-western part of Manitoba, finishing this one late in the season.

This was the last work he did in the West, and from that time until his death on the 10th of April, 1889, he continued local practice in Perth.

GEORGE CHARLES RAINBOTH.

By G. L. Rainboth (son of G. C. R.).

Mr. G. C. Rainboth was born on October 4th, 1846, at St. Andrews', Argenteuil County, Quebec.

He was admitted a Provincial Land Surveyor for Ontario on July 1th, 1868, and in 1871 a Provincial Land Surveyor for Quebec. He was articled to the late Robert Forrest, P.L.S., and served in Capt. Forrest's Company of Volunteers during the Fenian Raid, for which he received the Victoria Medal and Veteran Land Grant. In 1872 he obtained his commission of Dominion Land Surveyor. From 1869 to 1871 he accompanied the late Mr. Lindsay Russell, former Surveyor General of Dominion Lands, on numerous surveys through the Ottawa Valley.

Mr. Rainboth's first government surveys in the West were in 1872, and continued until the Reil Rebellion, 1885. He afterwards returned on the out line, exploratory and contract work, spending altogether fifteen years in that section of the Dominion. He was also engaged on many timber limit surveys in both Ontario and Quebec, in the upper Ottawa country. In 1902 he was admitted a member of the Canadian Society of Civil Engineers.

Nine years ago he was placed in charge of the Canadian party on the resurvey of the International Boundary Line, first on the 45th parallel between the State of Vermont and the Province of Quebec, and later between New Brunswick and Maine.

It was on this last work, during the Fall of 1910 along the St. Francis River, that he was stricken with the fatal illness which caused his death, passing away at Levis, Que., Nov. 2nd, en route for his home at Ottawa.

Prior to 1909 Mr. Rainboth had been most of his life a citizen of Aylmer, Que. He was Mayor of Aylmer in 1900 and 1901, and had the honor of welcoming the Duke and Duchess of Cornwall (now King and Queen of England) on the occasion of their visit to the Lakeside Town.

Mr. George C. Rainboth is survived by his widow, two sons, George L. and Ernest; four daughters, Mrs. E. Maill, Mrs. R. L. Squire, Louise, and Augustine. Mr. E. J. Rainboth, O.L.S., of Ottawa, is a brother of deceased.

REPORT OF SPECIAL COMMITTEE RE THE STANDARDIZING OF GOVERNING LINES ON SUBDIVISION PLOTS AND PLANS.

The resolution passed at the Annual Meeting of the Association appointing a Special Committee to report to the

Council with reference to the fixing of an absolute governing line both on the ground and the plan of subdivisions from which all lines are to be ascertained, was carried out, and the following report was made to the Council of Management at their regular meeting in April, 1914:—

That in the opinion of this Committee every angle in the exterior boundary of a subdivision plan of an original farm lot or part of an original farm lot, or of any subdivision plan laying out a new street, should be monumented, and that all bearings on such plans should be calculated from one course in the said boundary to be designated on the plan as the governing line, and that the course of such governing line should be determined by astronomic observation or other satisfactory method. Further, that one monument should be planted at each street intersection shown on any such plan. That the monuments referred to above should be composed of:

- (a) Stone or reinforced concrete 4 inches square at the top, 8 inches square at the base and 4 feet 6 inches in length.
- (b) Of iron bar 1 inch square and 5 feet long.

Respectfully submitted,

T. D. Le May,

Chairman of Special Com.

This report was received by the Council of Management and approved, and it was referred to the Legislation Committee.

L. V. RORKE,

Secretary.

REPORT OF COMMITTEE ON LEGISLATION.

Your Committee on Legislation for the year 1913-1914, beg to report as follows:—

The by-law passed by the Council of Management on the 17th February, 1914, wherein it was resolved that a fee of \$10.00 be collected from all final candidates before presenting

themselves to the Board for examination was submitted to E. Douglas Armour, K.C., for his opinion regarding the validity of such by-law. His opinion being to the effect that the Council of Management had not the right to pass such by-law, your Committee therefore asked for legislation covering the ground, and the following amendment to the Ontario Land Surveyors' Act was passed during the last session of the Legislative Assembly:—

“Section 39 of The Ontario Land Surveyors' Act is amended by striking out the clause lettered (f) and inserting in lieu thereof the following:—

(f) By each candidate for the final examination on presenting himself for such examination \$10.00, and on obtaining a certificate to practice, \$22.00.”

An amendment to The Surveys Act was also passed, and is as follows:—

“Sub-section 2 of Section 31 of The Surveys Act is amended by adding thereto the following clause:—

(a) The provisions of this section shall not apply to a lot the whole or any part of which has been patented prior to the 24th day of March, 1911, and the said clause shall be deemed to have been in force on and from the 24th day of March, 1911.”

Another amendment suggested by the Association and which was carried out was an amendment to the Municipal Act, which amendment reads as follows:—

“Clause (a) of paragraph 13 of Section 406 of The Municipal Act is repealed and the following substituted therefor:—

(a) An engineer so appointed and his assistants shall in the performance of their duties possess all the powers, rights and privileges which a surveyor possesses under the provisions of Section 6 of The Surveys Act.”

Respectfully submitted,

G. B. KIRKPATRICK,

Chairman.

REPORT OF COMMITTEE ON POLAR RESEARCH.

Mr. President:

The report of your Committee this year will be brief, and may be found uninteresting as compared with reports of 1910 and 1913.

In June, photographs taken on the fatal Scott Expedition appeared in the Canadian newspapers, and later on, moving pictures were exhibited.

Dr. C. S. Wright, of Toronto, physicist of the Scott Expedition, was one of the relieving party who discovered the last camp of the lost explorers. His narrative appeared in the Toronto News of June 11th, 1913.

Recently Commander Evans, of the Scott Expedition, lectured in many Canadian cities, his lectures being illustrated by interesting moving pictures.

The adventures of Dr. Douglas Mawson in the Antarctic, to the westward of the sphere of activities of Scott and Shackleton, his marvellous escapes, the hardships endured, and the courage displayed, make inspiring reading. He only returned to civilization in February, after an extra winter's sojourn in the Antarctic. It might be noted that he signaled his return by immediately joining the benedicts.

On June 17th, 1913, Mr. Vilhjalmur Stefansson left Victoria, B.C., in the "Karluk," Capt. Bartlett sailing master, for the Canadian Arctic. This expedition is being financed by the Dominion Government. The vessels the "Sachs" and the "Alaska" accompanied the "Karluk." During a gale in October, the "Karluk" was separated from the other vessels in the vicinity of Cape Barrow, and it is possible that she may be drifting in the ice pack across the Arctic towards Greenland. Capt. Bartlett and his men are in no grave danger, as the ship was provisioned for five years. Stefansson and the majority of his party were on shore when the vessel disappeared. On Feb. 3rd Stefansson reported from Fort McPherson via Dawson, stating he had sledged eastward from Barrow to Collison Point where the "Sachs" and the "Alaska" were in Winter quarters, thence onward to Herschel Island, reaching there Dec. 31st. During the spring he intended to travel northward with a small party, about three hundred miles on the polar ice, approximately along the 144th meridian. Survey parties will

at the same time be working in the Mackenzie River Delta, with the object of discovering navigable routes for light draught vessels. As patriotic Canadians, we trust he and all members of his party may return in safety.

Capt. Ronald Amundsen intended to start from San Francisco this season for an Arctic cruise in the old "Fram," but recently announced that it would be impossible to outfit the vessel in time, and the date of departure has been delayed a year. He proposes to drift north-westward from Behrings Strait to Greenland, the route of the ill fated De Long Expedition.

Sir Ernest Shackleton is now organizing another Antarctic expedition trip, for which hundreds are volunteering their services. His objective point is the South Pole.

Another British expedition, under Commander J. Foster Stackhouse, is also proposed for the purpose of spending four seasons in the Antarctic exploring King Edward VII. Land and Graham Land. The "Discovery," which Capt. Scott used in his first expedition, has been chartered by Commander Stackhouse, who will sail for the south in August.

It may be difficult for the laymen to understand why men who have suffered such fearful hardships as our Arctic and Antarctic heroes endure, should desire to return again and again to these solitudes. Comfort, safety, social life and family, all are left behind, not for a few months, but years, for the most desolate, the most uncomfortable spots on the earth. The land surveyor who appreciates the beauties of nature as exhibited in our great north land in winter as well as summer, may understand in some degree the spirit that beckons the explorer to these unhospitable regions.

The scientific observations made during recent polar expeditions will undoubtedly prove of inestimable value in solving many problems relating to climatology and oceanography. It is quite within the possibilities that wireless stations will eventually be established and maintained at points beyond the present limits of inhabited territories, which may supply notification of coming weather changes many days in advance. We deplore the loss of life, but it is worth the price.

Respectfully submitted,

Willis Chipman,
Chairman.

We append a photograph taken on Jan. 11th, 1913, at the home of the National Geographic Society, Washington, which may be considered of sufficient interest to be published in the proceedings. Capt. Ronald Amundsen, and many others notable for their exploratory and scientific work appear in the group.

Commander Robert E. Peary attained the North Pole April 6th, 1909.

Capt. Ronald Amundsen attained the South Pole Dec. 14th, 1911.

Capt. R. E. Scott attained the South Pole Jan. 18th, 1912.



THE FIRST MEETING OF THE POLES.

The first meeting of Robert E. Peary, discoverer of the North Pole (4), and Roald Amundsen, discoverer of the South Pole (3), at the home of the National Geographic Society, January 11, 1913. The other members in the group include J. J. Jusserand, the French Ambassador (2), James Bryce, the Ambassador from Great Britain (5), the Attorney-General, George W. Wickersham (13), the Minister from Norway (14), Hiram Bingham, leader of the Yale-National Geographic Society Expedition to Peru (16), Officers and Board of Managers of the National Geographic Society: President Henry Gannett (1), Colonel Henry F. Blount (6), Dr. Alexander Graham Bell (7), Mr. John Joy Edson, Treasurer (8), Rear-Admiral John E. Pillsbury (9), Gilbert H. Grosvenor, Director and Editor (10), George Otis Smith, Director U. S. Geological Survey (11), Rear-Admiral C. M. Chester (12), O. H. Tittmann, Vice-President, and Supt. U. S. Coast and Geodetic Survey (22), L. A. Bauer, Director Dept. of Terrestrial Magnetism Carnegie Institute (15), Franklin K. Lane, Chairman Interstate Commerce Commission (18), Rudolph Kauffmann, Managing Editor Washington "Evening Star" (20), Brigadier-General John M. Wilson, former Chief of Engineers, U. S. A. (21), C. Hart Merriam (29), Charles J. Bell, President American Security & Trust Co. (23), David Fairchild, Agricultural Explorer (24), George Shiras 3rd, former member of Congress and wild game photographer (25), John Oliver La Gorce, Assistant Editor National Geographic Magazine (26), George R. Putnam, U. S. Commissioner of Lighthouses (27), Frederick B. Eichelberger, Assistant Treasurer National Geographic Society (28), Frederick V. Colville, President Washington Academy of Sciences (31), Dr. S. N. D. North (32), T. L. Macdonald, M. D. (33), Edwin P. Grovenor, Special Assistant to the Attorney-General (30), Peter Stuyvesant Pillot (17), and Julien A. Ripley (19) of New York.

REPORT OF COMMITTEE ON DRAINAGE.

Mr. President and members, there has been no meeting of the Drainage Committee. I think yesterday forenoon perhaps there was not a single member of the committee here except myself, and I can only bring before the association one or two matters which I have not had a chance to discuss with the committee. Those of you who are engaged in drainage practice and have the misfortune to come before the courts sometimes, know that perhaps in order to pilot your work through safely you need to be as much of a lawyer as you do an engineer, perhaps a little more; and for this reason we need to be familiar with the drainage laws. It is absolutely necessary, if we can make our work stand up in the courts we must understand the drainage laws as they are. The Drainage Act is published; we all have access to that, and we all passed a preliminary and perhaps a final examination on it and don't know much about it then. When we get into practice we find the same difficulty arises in the Drainage Act, as in the Survey Act, perhaps; the Drainage Act is amended from year to year almost every year. The Drainage Act with amendments from time to time is only a small part of the Drainage law that we need to know. We have decisions of the County Judge in different counties on matters of the assessment and on matters of the Ditches and Watercourses Act, and there are almost as many views taken of the Ditches and Watercourses Act by the County Judges as there are perhaps counties in the Province. Perhaps that doesn't matter so much because the County Judge is final in regard to all matters under that Act, and whatever county you are practising in you soon get to know the views of the County Judge on some particular matters. With the Drainage Act it is different. The Drainage Act is dealt with by the Township Council and the County Judge and the Drainage Referee. Reports are made in the first place by the engineer, who is supposed to be competent to make them, and they are revised and improved perhaps by the Township Councils, and County Judges, and by the Drainage Referee. It is an interesting subject for speculation perhaps to consider what a report would be or a Drainage By-law if it were made in the first place by these officials who are competent to amend them, if they were made by the Township Councils, made by the County Judges and lawyers and revised and amended by the engineer.

Now, besides the Drainage Act we had a few years ago a volume of decided drainage cases which was published by Clarke and Scully, Mr. A. H. Clarke, one of the most prominent drainage lawyers, and Mr. Sculley, the Official Reporter of the Drainage Trials. That was in 1898. It was a collection of cases decided by the Drainage Referee and the Court of Appeal, and that book could be bought by all who were sufficiently interested in it. In 1903 a second volume was published bringing the drainage law pretty well up to that date. There has not been an edition of that work issued since 1903. About 1908 or 1909 another drainage work was gotten out by Mr. Proctor, an excellent book, but unfortunately just the very year, or year after this book was published the Drainage Act was all recast, all the sections were numbered anew, and the Drainage Act to-day is in different form from what it was when Proctor's book was brought out. The decisions handed down by the Court of Appeal are available to any person who takes trouble to look them up in the different law libraries. But where there is one decision handed down by the Court of Appeal there are perhaps fifteen or twenty decisions handed down by the Drainage Referee, and not one of these is available to the engineers, lawyers and County Judges following up drainage work, and who have to carry out the provisions of that Act. The decision of the Drainage Referee is simply filed in the county in which the case is decided. Perhaps the lawyers and engineers are engaged on the case to hear the judgment orally and they remember and profit by it. That is all the chance any of us have to become familiar with the decisions of the Drainage Referee. The idea that I have and that has been concurred in by two or three of the members I have had a chance to discuss the matter with, is this, that we might ask the Provincial Secretary, the Hon. W. J. Hanna, who is very much interested in drainage work, to have these decisions of the Drainage Referee published in pamphlet form. Information on road making is issued in bulletin form every year, and we all get these bulletins from the Road Department; the Department of Agriculture issues bulletins which can be easily obtained, and while the drainage problems are perhaps equally important I see no reason why the Government should not publish drainage bulletins incorporating these decisions of the Drainage Referee. Now, that is the idea which I wish to bring before the association, and simply to shorten discussion as much as possible and let the association pass on the matter in the course of a very few minutes, I simply present this resolution.

Moved by Mr. G. A. McCubbin. Seconded by Mr. H. J. Beatty.

That in view of the necessity of the Ontario Land Surveyors keeping in close touch with the drainage laws under which they are required to work, and in view of the fact that many decisions interpreting various sections of the Drainage Act are given annually by the Drainage Referee, which are not reported nor in any way made available for the guidance of either the surveying or the legal profession, the Honorable the Provincial Secretary and the Drainage Referee be requested by this Association to have the decisions or reports of the Drainage Referee published as drainage bulletins from time to time and distributed amongst surveyors, County Judges and others charged with the administration of the drainage laws.

Now I have heard indirectly that the Drainage Referee would have no objection to handing out these decisions for this purpose, and I believe if the matter were urged on the Provincial Secretary that he would find some way to publish these bulletins at the expense of the Government.

G. McCUBBIN,

Chairman.

Discussion.

Mr. Gaviller—There is one suggestion I would like to make with regard to that resolution and that is, it is well known to a good many that that drainage book of Clarke and Scully's is referred to in judgments of the Referee which are afterwards set aside on appeal. I quite agree with the purpose of the resolution, I think it would be a most excellent thing to be carried out, but I think a safeguard should be made as far as issuing these decisions of the Referee, that a certain time should elapse before they are published in case there is appeal and they are set aside. As far as the County Judges are concerned they are as different as black and white; they go in all sorts of directions. There is nothing in the decision of the county judge to guide you.

The President—You have heard Mr. McCubbin's report and his motion. Is there any further discussion or any question any person would like to ask before I put this motion?

Mr. Aylsworth—I don't see how you could publish those decisions in that way without giving all the evidence and a description of the case.

Mr. McCubbin—The judgment contains a resume of the evidence and a setting out of the points of the case; it is not merely judgment for plaintiff or defendant; the report of the Referee sets out in full the reasons for his judgment.

The President—Somewhat similar to those published from time to time in the Official Law Reports. They give a resume of the whole case, and then the judgment.

The President put Mr. McCubbin's motion which on a vote having been taken was declared carried.

REPORT OF COMMITTEE ON LAND SURVEYING.

Mr. President:—

A number of questions in surveying have been received. Your Committee have given consideration to some of these questions. The replies thereto are given herewith. One rather intricate question was received too late to consider properly, and as the sender promised to be present, it was thought he might help to explain it himself:

Question 1.

In lot number 2, in the Township of Barton, the limits of the concession road between concessions 2 and 3 have been delineated for a great many years by local surveyors in a certain position and five different subdivisions registered using this accepted position of the concession road.

In 1905, an outside surveyor is called upon to make a subdivision of which this concession road is the southerly boundary. He, instead of joining the two front corners of the lot by a straight line, places his front row of stakes along the fence, which fence is several feet out in the street.

In 1913, I am called upon to determine the boundaries of a lot distant about 100 feet from this concession road in this

erroneous survey. I can find no original stakes within 500 feet of the concession road, but find two of them establishing a lot line about this distance from the concession road. I also have authentic information to show that the original stakes of this surveyor were placed out in the street.

Should I proportion the distance between the true street line and the original stakes found, or should I replace the erroneous street line as first laid down by this surveyor and use it as the street line for the determination of boundaries of lots within the subdivision?

If I should use the true street line will I distribute the error in the 500 feet to the original stakes found, or place it all in the front row of lots?

If I use the erroneous street line are the owners of the front lots entitled to part of what originally was the street?

Answer.

Should proportion the distances between the original front stakes even if erroneous. The owners of the front lots are entitled to same rights as the original owners before the subdivision.

Question 2.

Section 3 of the Ontario Land Surveyors' Act reads:—"No person shall act as a surveyor of land in Ontario unless duly authorized," etc. What is the meaning of the words, "Act as a surveyor of land?"

Does the making of a survey, compiling of a plan and the writing of a description for the purpose of conveying land and the accepting of a fee for the same constitute a contravention of this section provided the man making the same signs the plan as a civil engineer?

What is the method adopted to prevent men contravening this section?

Does the Ontario Land Surveyors' Association maintain any machinery for the enforcement of this section?

Answer.

Surveyor of lands means an Ontario Land Surveyor. See Section 3 Survey Act. Making a survey, defining a boundary

and taking payment therefor is a contravention of the Act, compiling a plan or writing a description of land is not.

If the party will send evidence of the irregular practice to the Secretary, he will place it before the Council of Management and they will act according to this evidence, if the solicitor for the Ontario Land Surveyors' Association is of an opinion that they have a good case. Action has to be taken within six months of the offence.

Question 3.

I am called upon to determine the limits of the unopened side road between lots Nos. 30 and 31 in the 2nd and 3rd concessions of the Township of Saltfleet. I find on going on the ground that there is only one man within several miles of that locality who has lived there for more than ten years. This fact is due to extensive speculation in property so close to the city of Hamilton. This man, together with another man whom he brings from a considerable distance takes an affidavit that they acted as chain bearers on a survey of this side line made by David O'Keefe, P. L. S., about 1880 and point out to me on the ground six stones planted by him as the result of the survey. They are not familiar with surveying instruments but swear that this surveyor used an instrument from which he detached the head or metal part when moving from point to point. This I presume must have been a compass.

They also swear that he ran three trial lines from the base line north of concession 1 to a stone on the line between concessions 5 and 6, taking about three or four days in the process. From these stones the fences in concession 2 were built although the travelled road in concession 3 was opened prior to that date.

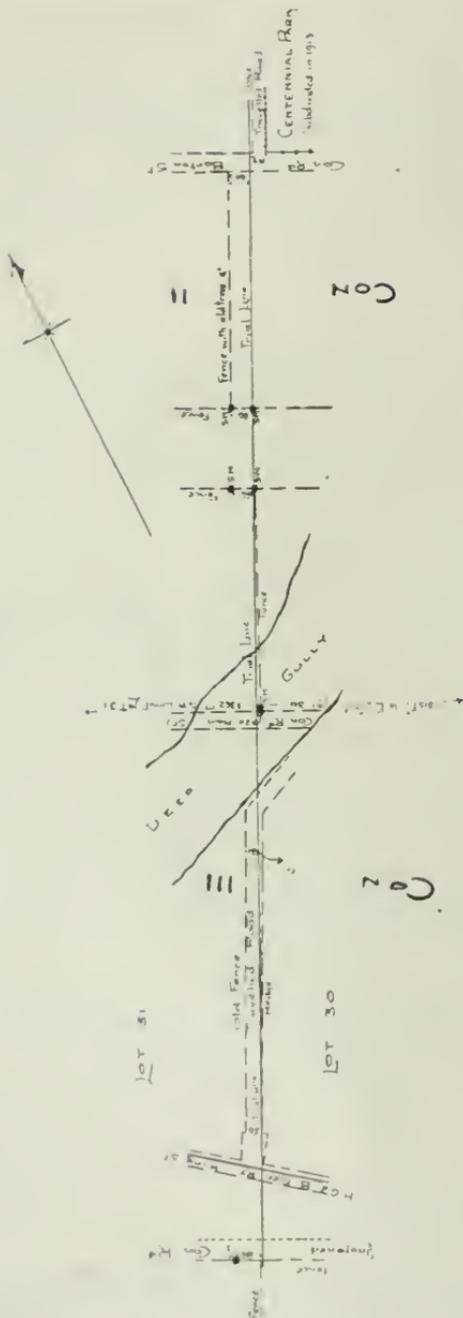
I have run a trial line with the results shown on the accompanying blueprint and find that the stones planted by Mr. O'Keefe are not in the same straight line.

(a) Should I abandon all or some of these stones, and if so, which one?

(b) How should I explain the fact of the jog at the road between concessions 1 and 2?

(c) Does not the fact of certain fences having been built and maintained in certain positions for over 30 years establish them as marking the lot line as against the survey?

TOWNSHIP OF SALT FLEET
(FRONT & REAR SYSTEM)



DATA - Affidavits from men present at planting of all six stakes by David O'Keefe PLS about 1880 - one at Main St to mark East side of side road between Lots 31 & 30 - One beyond King St to mark west side of same - four in Gen II two on each side. No other evidence obtainable due to land being largely held by Speculators.

PROBLEM - To locate four corners of Gen R^{II} (Main St) and unopened side Road

(d) Assuming that they do mark the lot line, may they be used as points from which to determine other lines?

Answer.

(a) Adhere to all stone monuments in concession 3 and adhere to stone monuments in concession 2, as far as they go. This will agree with the fenced and travelled road in concession 3 very closely. The township council will probably pass a by-law to compensate the owner and confirm the opening of the road. See also judgment of Justice Riddell, which was concurred in by full court in the Township of Alfred, re Charvonneaux vs. McCusker in 1910.

(b) Not sufficient data to form an intelligent answer.

(c) Yes.

(d) No.

The other questions which follow your Committee think that the writers wish to have a discussion on the matters referred to therein, and have the opinion of the members present.

Question 4.

The wording of Section 479, 3 and 4 George 5th, Chapter 43, appears to me to prevent the laying out of a lane in the rear of a row of lots fronting on any street, of a less width than 66 feet, and the Registrar of this county also holds this view, and there seems to be no alternative. If this was the intention in wording this section, in my opinion it ought to be amended, as I think a lane in the rear of the lots in a good many subdivisions is quite desirable.

Question 5.

I beg to bring into discussion plan No. 285 of York at the Annual Meeting of the Association. The subject will be full of interest for surveyors, especially those around Toronto.

Question 6.

In view of E. D. Armour's report to council in 1913, should there not be an absolute governing line indicated both on the

ground and on the plan by and from which all lines on the plan are to be ascertained:

1. That the governing line at least be monumented.
2. That the astronomical bearing by observation be determined.
3. That all markings used to mark governing lines, block corners, lot corners, etc., be standardized.

Question 7.

In connection with the ordinary mining claim surveying, the following questions are respectfully submitted on surveying. It is understood of course that absolute accuracy is unattainable and that accuracy in the measurement of either lines or angles is a matter of degree. Answers to the questions are requested in connection with the ordinary every day surveying of mining claims and not in connection with what might be called a tack survey of a valuable mine.

1. In case all four angles are read, what should be considered the maximum closing error allowable?
2. In the measurement of a 40 chain line over the average rough, rocky country, what maximum error might be considered allowable?
3. Without balancing angles, which closing error is admissible when the survey is calculated by latitudes and departures? Should the original angles and measurements be given in filing the plans, or should the plot be made to close?

Respectfully submitted,

C. J. MURPHY,

Chairman.

DISCUSSION.

Mr. Murphy—As to question D, the Committee do not quite understand that question. Of course if the writer means that these lines should be used to establish other side lines and original township lots, certainly not. Is Mr. Webster present?

Mr. Webster—Yes. There is a fence there which is recorded as the lot line for a number of years, north of the northerly

pair of stone monuments in concession 2. Could that fence be used as an evidence of the lot line and join the points further south to establish the side line? The whole establishment of the side line hinges on what you are going to take as the best evidence of the side line on the northerly end and I want to know whether we will take that fence between the stone monuments and Barton or go to the base line and take a stone that exists there. I might say that the trial line produced will pass on the west side of a stone which is proven to be an original stone at the base line. The same condition of affairs at Barton Street holds, that base line with regard to that trial line.

Mr. Murphy—That is pretty hard to say.

The President—Is there any evidence to show whether that fence was erected after these stone monuments were put there or was it built before?

Mr. Webster—There are some twenty and twenty-four inch trees growing along that fence line; I think they are older than the stones.

The President—If the fence was erected after the stones you are pretty nearly right in assuming it was erected as a result of the stones being put there; if it was there before the stones it would have a different bearing altogether.

Mr. Webster—It has the appearance of the usual lot line with large elm trees on it. I don't recall exactly the size or apparent age of the trees but they have been there for a great many years.

Mr. Murphy—Can't you get any evidence at all of Mr. O'Keefe's purpose and of what information he had when he put those monuments in?

Mr. Webster—He was settling a dispute between two men on that date. The only evidence I have is from the owner of lot 30 in the second concession who is an old man and who of course is an interested party, and he claims the line was run. There is a given road replacing that unopened side road. He claims the line was run to establish the limits between two farmers in lot 30 and 31 in the second concession. His survey was purely for the determination of the line in the second concession. I don't think he established anything in the third. He did establish the line in the fourth concession but there is very little trouble about that. There is liable to

be a lawsuit one way or the other as to the position of the corner of Main Street.

Mr. Murphy—The Committee thought it would be hardly enough evidence for them to give a decided opinion about that, but considering what was written in here, and that judgment which Mr. Wilkie has here, I think might have some bearing on the question.

Mr. Wilkie—I don't think it has any bearing on that. When you get through I will read it.

Mr. Murphy—That is all at present. That jog in the concession road is something that cannot be explained.

The President—You spoke, Mr. Webster, of the stone monument being here originally.

Mr. Webster—The original corner of the base line is still there. We have a stone established as replacing the original corner just inside of the fence on the side road on the west side; that trial line produced—I just took those two stones and produced them to get relative position. That line produced strikes a little to the west of the stone monument; it is about in the same position in regard to the travelled road as it strikes at Barton Street. The original is just inside the fence of the first concession road. Those concessions are fifty chains. Between those two stones it is about 1,200 feet. Those stones are a little out of scale; the space between them is about a third of the concession.

Mr. Speight—Why not draw a straight line?

Mr. Webster—You couldn't draw a straight line from both of them.

Mr. Speight—Was not the line between 30 and 31 a continuous line?

Mr. Webster—That is just the difficulty. Under present conditions I don't see any way of making it a continuous line.

Mr. Speight—Perhaps some of us will remember a year or two ago Mr. Wilkie gave a paper here on a survey he was concerned in somewhere down near Manchester, where Justice Riddell held that the stone monuments such as those behind here were the evidence, if you could find no authentic history of by whom they were planted; he said in cases such as those that we would have to accept those as the boundaries and it was then taken to higher Court and upheld there. So that

from that judgment I think you would be quite safe in accepting those two monuments.

Mr. Webster—That is, you would bend the side road at each monument regardless of the fact that the side road was supposed to be straight in the original survey?

Mr. Speight—Yes.

Mr. Murphy—You would not expect any two concession lines to be straight, not necessarily so.

Mr. Webster—I have been unable to determine—to find anyone who would tell me that in a front and rear system of having a missing lot corner, you should join the two adjacent corners by a straight line or proportion east and west and north and south.

Mr. Speight—Unless there is something in the notes to explain it I would be inclined to proportion on each side. I think, though the Act does not specifically say so, you could read that into it.

Mr. Webster—You would proportion both ways?

Mr. Speight—Yes. The same thing occurs in the single front township; the surveyor ran the same way, he ran up one side and came over and ran down the next concession and so on, and on the original plan they would be all probably shown to be one hundred or one hundred and five chains.

With regard to question 2 about where a plan has been erroneously put in, showing lots fronting out on the street, where it can be shown conclusively it has gone beyond the original line of the street. About twenty years ago I was concerned in a case on Christie Street, in Toronto, where we marked out two lots for a man, fronting on Christie and Bloor Street, and we said to him there is no person that would mark these lots according to that plan, but there are grave doubts whether the plan has not included part of Christie Street, but he was one of those men who liked to have a fight, and he went in with his eyes open and he got the worst of it. The City proved they had right of user of that twenty feet and on that ground he was thrown out. There is no question the City did not dispute the fact that his lot went out on the road, but it was erroneously put there. More

recently we have another case on the widening of Danforth Avenue. We marked several lots out there. The registered plan had been made, but the front lots encroached some feet on the street. Then the widening of the street came in and then a man who bought several lots put stores up there and got the foundations in and so forth, and the City made him step back. I don't think there is any question where you know the lots have erroneously encroached on the street, then you must divide from where you know the original point is, from that plan.

Mr. Murphy—There is no doubt you knew they were erroneous. They were several feet on the street, but still if you had to define any interior lot you would not cut him off that several feet?

Mr. Speight—No, certainly not.

Mr. Sewell—Would that affect the other lots?

Mr. Murphy—No.

Mr. Sewell—I mean to say, take the case of where the road allowance has actually been encroached upon for sixty or seventy years, a surveyor goes along and he takes the line of the fence and he lays off, say a lot 120 feet deep, then he continues and he goes on to the bottom of his property, 25 feet, 50 feet, or whatever it may be. Then when you come back, suppose he does not post the lots, he simply lays them off as 25 and 50 feet, and so on down to the end, how is that going to come out? Would you give the man his 120 feet from where the street line actually exists or would you cut off that 20 feet of encroachment?

Mr. Murphy—No, I would think if you could find he had erroneously laid out the lot which encroached on the street several feet you would use that for interior work. Supposing for example you had to mark out the front lot and knew it did encroach on the street, I think you would have no option; you would have to mark off where it did come, according to the registered plan, and give your client a caution about the matter.

Mr. Sewell—In marking a lot further down would you give it according to his survey or take it from the street line?

Mr. Murphy—Take it from the surveyor's original corner—the erroneous corner.

Mr. Speight—Mr. President, it seems to me in a question such as that on the board, with the older travelled road there you could make a municipal survey of it and take the stone monument over at the front of the fourth concession there and this other stone monument, and take 66 feet between concessions 2 and 3, drawing a line between those two points and then having advertised in the regular way and nobody else showing anything any better, you get it confirmed.

Mr. Webster—I am getting a reputation for municipal surveys and I don't want to put in too many of them.

Mr. Speight—The other way would be to get the township to pass a by-law putting a road through whichever way they may deem best, and then compensate.

Mr. Webster—I might say I am doing this work for the City of Hamilton, in connection with their City planning process, and the township do not enter into the question at all, and it puts me in an awkward position. I have no standing with the township, neither am I employed to settle the dispute between owners, it is merely to establish these streets when they are opened up in subdivision. There is another point in your proportioning east and west, the proportion along Barton Street east and west throws the travelled road in concession 1 about right, and throws the stone monument on Main Street a little too far west; that is the proportioned corner on Main Street would fall below the stone monument, and the proportion on Barton Street would fall above.

Mr. Murphy—I don't think that method could be applied at all. I have read the preamble of that Statute (which is not in the Act), and I think the principle is totally against that method of proportioning for concession roads by measuring on concession lines.

Mr. Webster—Your idea is that the two nearest undisputed points should be joined by a straight line.

Mr. Murphy—Yes, I think you should not proportion the concessions. I think the principle of the Act is totally at variance with that.

Mr. Webster—In the proportion of the lost corner, how would you obtain a bend without proportioning along the concession?

Mr. Webster—I can't explain that.

Mr. Shaw—I had some experience about that. I laid out a subdivision part of a lot in which I included the original road allowance, this having been closed by the Council by by-law and sold to this man in question and registered. That went all right, but the next farms below do the same thing and they go to the Registry Office and they say, This man has laid out land that is not patented, and the Registry Office refuses to take it. This road allowance is closed by the Council and deeded to a man and it is not patented, the objection is raised and they are stuck there.

Mr. Webster—I understand you to say, Mr. Speight, that having four points, two at the concession each way on the side line, and two a lot away in each direction on the concession line, that you would proportion both ways.

Mr. Speight— I think that would be the better way to do it. It is debatable.

Mr. Webster—This is a very vexed question in our section.

Mr. Speight—Unfortunately I don't know of any case that has a bearing on it. Perhaps Mr. Kirkpatrick could tell us.

Mr. Kirkpatrick—I have read the preamble to that Act but there is not the slightest doubt that you can't go past the side line. The side lines were run, and they are to be adhered to in every case; you can't divide up between two side lines, because I have heard of that being done and in that case it was thrown out at once. You can only stick to the line as it was run in the original survey. If you can't find the monuments between the base line and concession line, you draw a straight line. If you find the monuments you find from the nearest proved monument and then join the two and produce them which ever way you can. That is the way it was done. There was a case, and Mr. Justice Armour sent me up there; Mr. van Nostrand and I went up there and that is the way we did it. We found evidence of two monuments and produced them and the Judge confirmed that survey right off. There is no doubt that in Saltfleet and some of those townships the surveyors have in the past divided up on the concession roads, but it is directly against the law and if you get the preamble you will see exactly what it says.

Mr. Murphy—I think that is so. I have the preamble, and it is about 20 Victoria, so that is pretty old, and it recites that surveyors have been in the habit of measuring along the concession lines in the customary way thereby making

erroneous surveys, and that Act was passed on purpose to correct that.

Mr. Webster—I think Mr. O'Keefe was employed by two different men and he did the whole side line at once.

Mr. Wilkie—Which showed he was following the Act in producing the original side line.

Mr. Murphy—You would think an old boundary fence or almost anything, for instance a line of trees, that a person could get evidence of, would be the best evidence you could get of the position of the original line, and I certainly would not pass it; even if it was in the centre of the concession I would take that.

Mr. Webster—You would make a jog at Barton Street in the replacing of the side line?

Mr. Murphy—I think I would.

Mr. J. J. McKay—That evidence shows he could not have done that because up at the base line, according to the evidence, there is a stone marking where an original post was put and at the present time the existing roads have monuments on both sides, for a considerable number of years back, and if he had used the stone at the base line he would have got those two stones in the same position he has them here to-day.

Mr. Blandy—In connection with that diagram, that shows a jog in the side line in front of concession 2. Would it seem reasonable to suppose there is a jog in the side line again in front of concession 3, because the evidences of the fences on the ground distinctly go to show that that trial line as shown on the board does not in any way correspond with the fences there on the ground, and there are men in that neighborhood that are willing to take affidavits regarding those old fences. I had occasion to make a survey in concession 3, running that line, and the fences on the ground in no way correspond with that trial line as shown producing those two stone monuments in concession 2.

Mr. Murphy—The theory is that any side line in two different concessions is not necessarily in the same straight line; that even a side line in one concession is not necessarily in a straight line, and if any evidence can be got that you are able to establish a side line which is crooked, I don't think I would like to pass by that.

Mr. Blandy—It is quite evident Mr. O'Keefe did not proportion the distance east and west because there is a shortage measuring west and a surplus measuring east from that stone monument shown on the side of Main Street there, and it is just a question whether that side line should not be jogged again at Main Street to establish it through to the third concession, according to the evidence on the ground.

Mr. Murphy—According to this trial line there certainly is a bend there in one concession. There is nothing strange about that. We know those side lines in those townships were run with a compass.

Mr. Gaviller—I think Mr. Murphy has hit the point in many of these cases, and that is what a great many surveyors in the present day do not seem to remember, that there were no theodolites in the days when townships were run and they were invariably run with the compass and the bearing given on the Government field notes. It is very questionable. You have to calculate it to find whether it was the magnetic or astronomical bearing. In my experience in working in townships that were made in the thirties, if there is any dispute as to a concession line or any line run by a compass, I find it more convenient to take a compass and trace from point to point on that line endeavoring to find any trace of the original survey. You take a transit and go up into that country and chop through a whole lot of bush, and in some cases I have found that the line was about a mile and a half or two miles out and ran pretty well down to the old survey, and then go another mile further and find it was some twenty or thirty rods away from the established old line with the posts on it. Some may think that is because of the local attraction with the compass. In some few cases you can trace the old compass line, and let the needle swing and you will find you are on the bearing, by going on a curve and coming back again on your original bearing. But in a case like this which has just been mentioned, now when he says the original survey was made with a compass, and as Mr. Speight mentioned on the diagram there, the old custom was to begin at the south town line of the township and measure up the width of the concession, run across it and then measure up another width and then run back again—that system where the concessions were not run has caused an enormous number of jogs and twists in the line. As Mr. Kirkpatrick remarked, we must stick to the original survey where it can be found. The whole problem seems to be to find out as much as you can about the original survey and then go to work and take your

evidence, and people will swear to all sorts of things; and you generally find where a tree is marking a road allowance and there is an R on it, most of the settlers will put that R so that it is four rods away from their own property.

Mr. Speight—I think in this particular township under discussion this line was run to the south of the lake. If we have any two points—if we have a post there and there we would have to join them, and if we have nothing here at all then we can produce that; but if you had a post there and a post there I think I would be inclined to proportion it.

Mr. Webster—The original survey did not proportion.

Mr. Speight—I know that. The single front township is just done in the same day. I think in most cases you get nearer the actual fact by proportioning.

Mr. McKay—If you run a line from the stone monument at Main Street to the monument at the base line, it would come very close to that corner called Centennial Park corner. It looks to me if you did that and disregarded the other two stones you wouldn't know exactly why he put that there.

The President—You didn't have access to his notes.

Mr. McKay—The only evidence we have is an old man of 80 years and he is in his dotage, and he don't remember back thirty or forty years distinctly.

Mr. Blandy—There is nobody who seems to know anything about the stones. The trouble with that survey is it is hard to find any evidence on the ground except the fence, especially in the third concession, of where that true line should be. Supposing you receive evidence showing that the fences will be sworn to in different places, what are you going to do? Are you going to join the stone monuments with the points given in evidence that way, and bend it from point to point, and join through the concessions?

Mr. Murphy—I think the evidence is everything.

Mr. Webster—I might say there is a fence running from the stone monument on the north side of Main Street to the lower monument of the first pair, the easterly one; then the owner of lot 30 owns a strip extending into lot 31 which is not fenced, and then there is a fence from the easterly stone monument of the northerly pair to Barton Street as shown on the board. The object of the survey is, we have a number

of lines we are getting up for the City of Hamilton incidental to compiling their suburban plan under the city planning proposition. The owners are quite satisfied with the fences and there is no one in the country who has not regarded those fences as marking the lot line for any number of years; but, on the other hand, the City are anxious to have those side lines as straight as possible; that is, they are insistent there should be as few jogs as possible, and if there is any reason to believe that line can fairly be gotten up without putting jogs in it I think it is almost necessary in view of the future development of that particular section that it be done that way. Of course that is entirely secondary to the getting up of the line as correctly as possible.

Mr. Murphy—It seems to me with that policy there you can't satisfactorily define the true line of the road and if the corporation want to straighten the road or open up the road, that they will have to give compensation. Anything that you could indicate on your plan would be useful.

Mr. Webster—It is not proposed to open the road this year or next year or any particular time; it is merely to delineate it on a plan with a view to opening that road when it comes in as a subdivision. There is considerable excitement in the Township of Saltfleet, because in many cases we have gotten up lines and tread on many people's toes, and a lot of people have gone to the Council and said: What authority have these men to plant these monuments? And the men on both sides of these lines are naturally up in arms if we change the lines any way. In other words I personally believe those monuments planted by Mr. O'Keefe were run with a compass and were not run the way they would be to-day. I have no idea how he made the survey or anything about it.

The President—It appears to me apart from any theoretical consideration of the Act, here is the travelled road, and here are the stone monuments that have been planted and respected for thirty years; the owners on both sides are satisfied with those fences and everybody that has anything to do with the properties concerned have regarded them as the boundaries for years, and it certainly seems to me to upset those evidences you are going to have an awful lot of trouble.

Mr. Ardagh—With regard to your answer to question 3, it may be misleading. I would like to have it modified or explained, you speak of the fences as established, being con-

sidered the lot line. It may be a property line but not the lot line necessarily.

Mr. Murphy—The reason of that is that we considered the fence, wherever it was, the best evidence of where the lot was.

Mr. Ardagh—If that is so it is all right, but I find some surveyors have been in the habit of taking the fence lines and calling them lot lines simply because they were there, and a case came up in our own Registry Office not long ago where the surveyor presented a plan and he put on the plan "Fence for lot line" and the Registrar refused it and said, "You must call this the lot line; you must not name it fence for lot line." In another case I know a fence was taken for a lot line and the acreage calculated from it; the fence was crooked. I make a survey and I joined the two points and I calculated according to what I considered the true lot line, but of course it disagreed with the other survey. The answer to the question seemed to me to give the idea that you might call a fence line a lot line when it had been established a number of years, instead of simply a property line, a lot line being the line joining two original points, no matter whether the fences were there for 100 years or not.

Mr. Murphy—In the case where you quite satisfactorily defined an original lot line and there is no doubt at all about it, it would be better to show it on your plan or show that the old fence was erroneous and say what the mistake or error was; but as you know there are a great many places where you cannot find any original monument, and you make measurements and get any evidence you can about the thing and the result of a lot of work is that you consider this fence or these fences are as near as may be the lot lines, or as near as you can establish them.

Mr. Wilkie—In reference to this case which Mr. Murphy referred to, it has not a great deal of bearing on this particular question, other than the peculiarity that was brought out in the judgment given by Judge Riddell. I refer to the case of *re Charbonneau*, O. L. R., Volume 22, page 46. Some of the things brought out here are certainly interesting. It is probably of more interest to me than to the rest of you but still there are some points in it that are worth considering. In connection with the posts I was unable to get information as to certain posts and a great deal was made of that fact by the lawyer for the defence, and Judge Riddell says: (Cites from Judge Riddell's judgment). You all know the

objections that lawyers will take if you don't get sworn evidence according to the Statute. Judge Riddell says there must come a time when you can't get it, that the posts must speak for themselves. I don't think we should rely on that and avoid taking the evidence. The bearing that case has on this is very slight other than possibly Mr. Webster could not get some of the information he wanted, and perhaps the posts speak for themselves.

Mr. Webster—There was a point brought up in connection with fences and lot lines. I was on a case where I was determining the lines and where the description mentioned it as being a certain distance from and parallel with the lot line. I found both ends to be correct but on joining the two ends I found the fence line bowed out about 42 feet and I joined it by a straight line. The Judge stated distinctly I should have taken the fence, no matter how crooked it was, as being the lot line.

Mr. Murphy—I would have done just the same as you did.

Mr. Wilkie—I was in a case somewhat similar to Mr. Webster and I had to join two extreme points by a straight line and I brought in an altered plan showing the curves and crooks along the line existing on the ground, and another surveyor had attempted to put down that same line at the other point and the Judge asked him, "How did you get this line joined?" He says, "I took the bearing of it." "How do you get the bearing of a crooked line?" He upheld the contention that the straight line was the proper one, the reverse of the contention of the Judge Mr. Webster went before.

Mr. Murphy reads question number 4, with answer of Committee.

The President—Possibly he refused to file the plan because the street was less than 66 feet.

Mr. Murphy reads question number 5.

Mr. Murphy—Mr. Dalton does not send any diagram and asks to have a discussion in reference to registered plan No. 285 of the County of York, at the Annual Meeting.

Mr. Stewart—Has that been referred to your Committee for a finding?

Mr. Dalton—(Explaining plan). It is part of plan No. 285 registered in the County of York; it is a subdivision of

lot 1, concession 4, west of Yonge Street. The south boundary is Eglinton Avenue. This pink road running through the centre is the Weston Road and this green mark is the Grand Trunk Railway. The original survey was made in 1867. It has been staked and has been resurveyed and in the original the Weston Road was laid out evidently intended to be 66 feet wide. In 1885 Mr. Sankey made a survey of the Weston Road and in the office plan there was no angle at that point and in the registered plan that angle is there. This distance on the line between 2 and 3 is given representing that angle, also proving that it is intended to be an angle at that point. According to Mr. Sankey's notes he ran a line straight from this point to a point where he said he found an original stake. In running that through he made his notes on the office plan and showed this to be six chains and sixty-six links. On the registered plan that line is seven chains and three links. There are thirty-seven links between Mr. Sankey's survey and the registered plan. The office plan showed that distance to be the same as the registered plan but by some means or other they have left this angle out in the office plan which is not on file still in their office. At this point, 66 feet from that line, he plants a stone monument and he states also he found a stone monument at this point. This line now is staked out on the registered plan; this is also subdivided and is staked off according to Mr. Sankey's line here. Now when you come to measure across that road it is only 50 feet in width. It is staked out on both sides. Now the question is how is that Weston Road to be established? If you divide this up proportionately I think Mr. Sankey myself is wrong. There is no bearing given for any line except this line here and a portion up at the northwest end of the Weston Road. There is no bearing given of this angle, and the only way I see of establishing the angles is to survey these lines and run them across and establish the points consecutively on the Weston Road. What I want to find out and get is the opinion of the Association on the proper manner of establishing the Weston Road at that point. The Weston Road is shown here one chain and forty-eight links across on a lot line; it is shown here to be one chain and thirty-three links. If you take the bearings of these two lines and arrive at the angle you will find that the distance across on the angle of the road will exactly make one chain straight across the road at both ends, but there is no distance given along here. But I notice in the office plan which I referred to before, that there is a very faint writing along the centre of the road. We used a reading glass in order to read the writing in pencil; it was blurred because

it was made in 1867, but it looked to be that the Weston Road is one chain wide.

Mr. Speight—There are very few places where the Weston Road does measure 66 feet. It is a trespass road very largely all the way between the City and Weston, and in most places it measures from fifty to sixty feet.

Mr. Dalton—South of this, down to the City, it is only 60 feet wide. If we measure across the north boundary of the plan and divide it properly, the fence here is about three links on to the Weston Road, but take the other side and it is about forty-three links on to the road. There is a great discrepancy, and the fence line is straight along on both sides.

Mr. Speight—I am afraid the surveyor will have his troubles in insisting on getting sixty-six feet wide there.

Mr. Shaw—The plan does not agree with the work on the ground.

Mr. Dalton—I think it would agree there if you established the points from the Grand Trunk Railway on the original line.

Mr. Murphy—Are you sure the Grand Trunk is on the original line?

Mr. Dalton—That is another question. A railroad is kept pretty close to its boundaries.

The President—What was your idea of it?

Mr. Dalton—I think the proper way to establish the Weston Road is to go proportionately by these chainings given in the original plan as registered. I found a difference of over a chain across from the Grand Trunk Railway to this line established here.

A Member—I think unless you are satisfied the surveys are made accurately that nothing on the ground should be gone by.

Mr. Murphy—The City would have to provide for that extra width in any event.

Mr. Dalton—If we don't make that 66 feet wide now who takes the responsibility of it?

Mr. Murphy—You will.

Mr. Sewell—It seems to me this is one of the cases of a road which has been a travelled road and which has been of varying widths, and unless you can get some absolute evidence that it is 66 feet I don't see how you can work on it.

Mr. Dalton—There is evidence on the registered plan.

Mr. Stewart—Has this matter been referred to the Land Surveying Committee?

Mr. Murphy—It was referred to us but we were not asked for an opinion on the thing.

Mr. Stewart—I think it is impossible for this whole assembly here to be able to get the information that a committee could get and pronounce on that, and it is considerable waste of time. I think these matters ought to be referred to the Committee and let them get all the evidence they can, and then pronounce on it.

Mr. Murphy—I think the question is one more suitable to local practitioners around here.

The President—I think a good idea would be to leave this in the hands of the Land Surveying Committee and let them take the matter up with Mr. Dalton and give him a decision, what they think on it.

Mr. Dalton—That will be satisfactory.

Mr. Murphy—These two questions are much on the same lines; they are things that have not been referred to us for any opinion, it is more that senders ask to have some discussion about them. This one is from Mr. Ransom.

(Reads question No. 6.)

Mr. Ransom—A year ago there was some discussion on the interpretation of the Registry Act with regard to plans and the opinion of Mr. E. D. Armour was solicited by the Association, and his whole report was summed up in those few lines. He said, in his opinion, posts were not necessary in a subdivision, and that opinion, from reading between the lines, he has got from the fact that a lot of surveys in the past have been so erroneous in the determination of the original markings that he feels surveys are better off without posts being planted at all; that sub-division surveys would be more satisfactory if the lots were not staked out. He goes on to say, "As I have formed the opinion that posts are not

necessary," etc., and after some discussion he says, "Therefore there should be an absolute governing line indicated both on the ground and on the plan," etc. He kind of contradicts himself. In the first place he says no posts are necessary, but lower down he says the governing line should be marked on the ground. He qualifies the first statement. That means, if we mark the governing line absolutely on the ground then we do not need necessarily to post the remainder of the subdivision; that is, we will have a better survey if the governing line is firmly and permanently marked and used as a basis for the survey, and the basis for planning the plan, and also as the basis for any future resurveys; and it is only following out the principles that are used in all the higher practices on surveys, the principle of base lines and governing lines, and I felt I would like to have the opinion of the Association on why there is not something in our Act that would fix the method of subdivision. We have nothing in the Act to bind the Association to any mode of procedure for subdividing property, and if that governing line cannot be easily ascertained beyond doubt, it is going to throw a whole subdivision into confusion. It is well known that an astronomical bearing is something that is permanent. We all have to know how to take an observation and deduce the governing line, and that is another method of keeping its permanency. The third suggestion there is the standardizing of all markings. We have had a lot of discussion about original markings, but the difficulty a surveyor is up against in the present day, especially when he comes upon wooden stakes, is to know—for instance, a subdivision is done ten years ago and it is to know, when he finds a stake, whether it is the original survey stake or planted six months or a year later. I think it would be an improvement if stone monuments were standardized to be so many feet long, of a certain size and to be marked in a certain way, and that any monuments marking governing lines should be marked with the name of the surveyor, the date when planted, and that in a block corner survey a different style of monument or stake should be used, and that more care should be taken with original survey stakes. It would cost more but it would pay, so that ten years later there would be no doubt, there would be no question as to who planted the stake. I know of cases where there are so many stakes and you can't distinguish between the original survey stakes and the ones put in by engineers and different people interested in the property. It is just a plea for more permanent marking and standardizing. It seems to me it would be wise if we had a standard for different points.

I would like to have the opinion of the Association on those points.

The President—It seems to me while there is a lot of good stuff in what you say, it is opening up a pretty big field to start on a discussion of that kind before the whole Association. Wouldn't it be better to take that up with the Committee and have them bring in a recommendation so that we could get it more in concrete form, and let the Committee thresh out the details of what ought to be done as regards something of that kind, and then the meeting as a whole could take up the benefit of their reasoning on the matter.

Mr. Ransom—I had that in view and I notified the Chairman of the Land Surveying Committee, but I was a few days late in getting the question to the Committee. I would be quite satisfied to see the discussion put on the books and the surveyors could consider it in their leisure time, and a year later the thing could be threshed out.

The President—My idea of that is this, when you bring up a matter of that kind one man will have one idea and another man another and it takes you an hour or two before you get anywhere. If you bring that before the Committee they can leave out a lot of unnecessary things and bring certain recommendations before the Association.

Mr. Speight—I think the President has made a good recommendation. Mr. Murphy, do you think it might be left over for another year?

Mr. Murphy—Yes.

The President— I don't want to throw any cold water on your suggestion but it is merely a question of getting through with the business of the Association.

Mr. Murphy—The other questions we have got here are very much of the same nature. We have one that came to me only Saturday afternoon and it is a most formidable looking thing; the Committee tried hard to get it in shape. It came from Mr. Newman. We really can't understand it.

The President—How long will that take, Mr. Newman?

Mr. Newman—That I don't know. I wrestled with it for a long time; I had it up with the Surveys Department of the Parliament Buildings and it has been before the Referee on

Titles. It is a question of description, and I don't know whether the Association is in any shape to deal with it at all or not, because of the fact that the patents were issued for certain blocks of land before the survey was made by the original surveyor, and the descriptions given in the patents do not at all conform with the field notes as given by the surveyor who subsequently made the original survey, and now these people have had possession since about 1864 and it is in order to quiet the title. Mr. Holmsted seems to think it cannot be done and I was in hopes of getting it down in time so that the Committee could deal with it.

The President—From what you say it might be something that would be of a great deal of interest but it might mean taking up a lot of our time unnecessarily. Would it answer your purpose to take that matter up informally and go into it with the members of the Committee and talk it over with them and get what information you want, and if we have time we can bring that up a little later, or if it is very formidable you might present it to us in the form of a paper.

Mr. Newman—I don't think it is a subject that could be threshed out at the present time.

The Secretary—If I might make a suggestion with regard to the question drawer, we must all admit this is a very important subject and is of very great interest to all the members, and I find questions come in rather too late for the Committee to give them full attention. I would suggest if the members could possibly send in their questions before the end of the year then notices of these questions could be sent out with our programmes stating these questions would be up for discussion, and the members could look over them and know what was coming up and give the Land Surveying Committee time to go into the matter before the meeting and have everything in concrete form.

Mr. Stewart—I think it would be well to have a special committee on such questions as Mr. Ransom has brought up.

Mr. Jackson—If anything in the shape of permanent markings was to be adopted it would not be a matter to be referred to the Committee but it would be a matter the Association would have to decide on first and if you thought fit appoint a committee to investigate the whole thing. Would you recommend that Mr. Ransom's question about the standardization of permanent marks should be referred to the Committee or referred to the Association?

The President—I don't know that it is for me to refer it. If you have any ideas along that line I would suggest you make a motion.

Mr. Ransom—I may have been wrong in directing this discussion to the Land Surveying Committee. Would the Committee on Legislation have that in their power?

The President—If it becomes a matter of legislation it should come through that Committee.

Mr. Ransom—What I wanted to find out was whether the Association would act upon a motion and appoint a committee and put it in their hands for action?

The President—Supposing we defer that for the present and bring it up under the head of new business and in the meantime the members can talk it over and possibly decide on some course of action, and perhaps Mr. Newman could bring this problem of his up under new business too, after he has consulted with the members of the Land Surveying Committee.

PAPERS

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

CONTOUR SURVEYS ON ABITIBI RIVER.

By H. T. Routly, O.L.S.

At Iroquois Falls, on the Abitibi River and about 450 miles north of Toronto, there is now under construction for the Abitibi Pulp & Paper Co. a concrete dam, power house, and pulp mill. The pulp mill will have a daily capacity of 180 tons and is of the mechanical grinding type wherein the logs or blocks are forced against large revolving stone grinders, and the wood reduced to pulp. It was originally intended to construct the above mill only, at the present time, and to build a mill for the manufacture of news print paper at some later date. The indications are, however, that the capacity of the present mill will be increased to 220 tons, while a sulphite pulp mill of 60 tons and a paper mill of 220 tons capacity will also be constructed during the present year. The power required is being developed at Iroquois Falls, where the Abitibi is estimated to give a minimum regulated flow of 6,500 cu. ft. per second. The natural head of 22.5 feet is being increased to 35 feet by a concrete dam across the river at the head of the Falls, and about 20,000 h.p. will then be available for the company's operations. This dam raises level of the water above the Falls from an average elevation of 802 to 817.5 above sea level and back floods the Abitibi eleven miles to Twin Falls, and its tributary the Black River twenty-two miles to MacDougall Chutes, practically eliminating both these falls, the upper reaches of which are at practically the same level.

About Nov. 25th, 1912, telegraphic instructions were received from the company's consulting engineer, Mr. Henry Holgate, C.E., to make the necessary contour surveys in connection with this back flooding, and to rush the work. The instructions were to run the limits of the flooded area at an elevation 820.00 as nearly as possible; any necessary deviation

from this level to be above rather than below, in order to protect the company against any future damages from flooding lands not acquired. In acknowledging receipt of instructions a rough estimate of the time and staff required was given, with an enquiry as to the time allowable for completing work. A small party was at once taken to make preliminary examination and prepare a central camp. It was decided to establish this at the junction of the Abitibi and Black Rivers, from which point about forty per cent of the entire work could be reached conveniently. We travelled by T. & N.O. Ry. to Iroquois Falls Junction, now Porquois. It is from this point that the Branch Line to Porcupine, 28 miles south-west, is built. During 1913 there has also been constructed a branch line six miles north-east of the site of the company's plant. In December, 1912, however, the river was reached from Porquois only by a newly chopped out road along the line between the Townships of Teefy and Walker. This was one of the first roads opened under the \$5,000,000 New Ontario Road grant, and crosses a number of deep narrow gullies over which no bridges had then been built. As it was impossible to take any quantity of supplies over this road it was decided to take them in by way of Montieth and the old construction Tote Road along the Driftwood River.

Arriving at the Abitibi River, we were disappointed to find it running high and full of this ice floes. Evidently the river had been frozen over, but had been broken up by a recent thaw. Along the shore was a narrow margin of ice from six to ten feet wide, and two or three inches thick, but not strong enough to carry a man, as it was partly suspended, the water having fallen nearly a foot after this ice had been formed. A day was spent in making a preliminary tour of inspection to size up the best method of attacking this work.

Returning to Haileybury to forward more men and supplies, instructions were received to meet the company's directors in Montreal. Arriving there I was asked to submit a careful estimate of the amount of work involved, together with a number of alternative propositions for their consideration. Three were outlined and discussed, viz., lump sum contract, cost plus a fixed sum, and specified items at contract prices. It is interesting to record the estimated quantities and prices tendered under the third proposal, and these are given in the hopes that they will provoke discussion and comparison. They are as follows:

1. For running shore line traverses and bench levels along both sides of the Abitibi, and a single line on the Black, Shallow, Driftwood, and Wah-taybeg Rivers, estimate 40 miles at \$30.00 per mile.....	\$ 1,200.00
2. Finished contour survey lines, including all trial lines, offset lines, stadia work, levelling, etc., all work of tying in township surveys and all plans and descriptions required by the Department of Lands, Forests and Mines, estimate—123 miles at \$100.00 per mile.....	\$12,300.00
Total.....	<u>\$13,500.00</u>

Time of completion, March 31st, 1913.

The plans required by the Department consisted of one large general plan and triplicate copies of individual lot plans, together with field notes, descriptions, etc.

Having established headquarters at the junction of the Black and Abitibi Rivers, work proceeded somewhat as follows: Owing to the lower part of the Abitibi River being open, it was decided to commence work on the Black and Driftwood Rivers, as they were frozen, and a line of bench levels had to be carried up from a reference point given by the company at Iroquois Falls. This proved to be very difficult, and it was exceedingly hard to work along the shore, owing to the heavy growth of timber and the broken nature of the country. It was a full day's work to simply walk down along the shore the six miles and back. The ice did not permit of working outside the tree line and river was still running full of thin floes and dangerous for canoeing. Much of the timber hangs out over the banks and a good deal of cutting was necessary at each level station and turning point, although the level and rod were used on opposite sides of the stream. Our instruments were good for reading reliably only to about 600 feet, and as the river averaged 350 feet wide, progress was slow. Had we known it, the water level at the mouth of the Black River was practically the same as a short distance above Iroquois Falls and might safely have been used for a beginning.

Reaching the mouth of the Black, bench levels were established for some distance up stream and up the Driftwood to the end of the flooding. When the ice took on the Abitibi, check levels were run over these benches, and thereafter bench levels were kept run well ahead of the contour parties throughout the whole of the work. These were checked by independent readings with a second instrument. This was considered necessary as the value of the entire survey depended on the accuracy of the bench levels, and we had no idea during the progress of the work that we would be able to get any independent checks.

Various methods of locating the contour in the thick timber were considered, tried, and abandoned. From the very beginning it had been decided that for locating the contour where it was known to be far inland, the best method would be to follow it with a good levelling instrument, cutting out the line as we proceeded. After various trials of other methods this was eventually found to be the most economical and satisfactory method for all cases and was used throughout almost the entire contract.

Levelling parties consisted of an instrumentman, rodman, and three good axemen. They followed as closely as possible along elevation 820, at the same time endeavoring to establish good long courses. In finding and cutting the contour quickly, as much depended on the bushcraft and experience of the rodman in choosing his ground as on the speed and skill of the leveller in changing rapidly from one station to another. The levelling instruments had to be kept in perfect adjustment because the foresights were usually the full length of a course, while the back sights would be only a few feet. When most convenient, and generally about every quarter mile, a checking line was cut out to the river and levels checked on a bench or the ice. By frequent checking any errors were detected before much line could be run incorrectly. The levelling parties averaged a half mile per day working in green bush, and much more of course when they struck brule or open country.

Every reasonable effort was made to have the contour courses as long as possible. The country, however, did not favor long courses as the flood level extended over the flats along the river banks and struck along the face of the slope, which rises to the main plateau. The face of this slope is very broken by gullies and water courses, so that the contour

runs in and out in a very erratic fashion, as may be seen by reference to the plans. Two or three gullies were found in which the water will flood back for miles. There was a mingled feeling of curiosity, uncertainty and nervous apprehension every time the contour turned away from the river into a gully. We might be able to see across to where we would come out, but we never knew whether it would be in an hour, a day, or a couple of weeks. Our bench levels were verified by two very satisfactory checks. For the Ontario Hydro-Electric Commission Mr. McLennan ran a line of levels from the same reference point at Iroquois Falls to Abitibi Lake, checking on our bench mark at Twin Falls eleven miles en route. His elevation for this bench differed from ours by only 0.10 feet.

The elevation of the reference point at Iroquois had been fixed by the T. & N.O. engineers. We were informed that the maintenance of way staff during the previous summer had very carefully re-established the main line levels and the reference point had been referred to these. We therefore tied in our Black River levels at Matheson to a T. & N.O. bench mark, and later obtained their elevation for comparison. The coincidence was remarkable, the difference being only 0.05 feet. I hardly expect you to believe that this was our maximum error or theirs, and for myself think that these very close checks were to some extent accidental. It was very satisfactory, however, to have our levels checked so closely by independent engineers and at once relieved us from any worry on this score.

The transit parties consisted of an instrumentman, picketman, one axeman usually, and two good chainmen. They ran the river traverses, tied in the lot lines and traversed contour lines behind the levelling parties.

Starting from an arbitrary point station 0.0 near our main camp, traverse lines were run on the ice each side of the Abitibi River up to Twin Falls and down to Iroquois Falls with a single line up to the Black River to MacDougall Chutes and up the Driftwood, Shallow, and Wahtaybeg Rivers as far as necessary. On the Abitibi the lines on the opposite sides were tied across to each other every mile or so, but on the other streams no such check was possible, and special care was necessary to insure accuracy. Several observations of polaris were taken, and in this way the bearings were constantly checked. The ice traverse work was always kept well ahead of the contour traversing.

The pickets at the angle points of the contour survey were numbered by the levelling parties and planted in the tramped snow low enough so that the transits could be set up directly over them without removing. No permanent hubs with tack points were used at any time. These short pickets were also the backsights except in occasional special cases; no rear picketman was used. The chainman used 200 ft. x 5-8 in. Lufkin malleable steel tapes with the end feet graduated to tenths. Careful chaining was insisted upon and readily secured by methods indicated hereafter. At the check lines run by the levelling parties, the transit parties tied in their contour traverses to the ice traverse lines, making the check complete by chaining the tie and reading the closing angles at the point of intersection with the course of the river traverse. In this way the contour traverse consisted of a number of closed loops with no missing data, and it was therefore easy to discover and eliminate any accidental errors of transit or chainage. No special instructions were given transitmen at first regarding the method of reading angles, but our experience indicated that the method of setting the verniers at zero on the back picket and reading always to the right was the most satisfactory, and was adopted entirely throughout the latter part of the survey.

As plans were required of each individual parcel effected, the survey had to be tied in very accurately to the original township survey lines. The blind lines between the lots and division lines between north and south parts of lots were not run out on the ground, but all the information required was taken by traversing the various original lines and locating the different governing posts. It was found necessary to locate every such post as the correctness of the original surveys could not be depended upon. A great deal of the original township work was excellently done, but some was found to be very poor, with crooked and poorly blazed lines and chainage quite inaccurate. For example the following are given:

CONTOUR SURVEYS ON THE ABITIBI

Good Checks on Township Lines.

		By official plan	By us
The south limit of lot 5, con. 1, Teefy	.....	2,640 ft.	2,632.0 ft.
The south limit of lot 10, con 4, Carr	.....	2,640 ft.	2,641.4 ft.
The south limit of lot 5, con. 4, Walker	.....	2,640 ft.	2,644.4 ft.

		By official plan	By us
The west limit of lot	5, con. 4, Walker	.....5,292.5 ft.	5,298.1 ft.
The east limit of lot	1, con. 2, Calvert	.....5,280.0 ft.	5,286.5 ft.

and several others equally as good.

Poor Checks on Township Lines.

		By official plan	By us
The south limit of lot	9, con. 4	.....2,639.2 ft.	2,600.2 ft.
The west limit of lot	2, con. 2	.....5,239.7 ft.	5,073.1 ft.
The west limit of lot	8, con. 3	.....5,289.3 ft.	5,233.0 ft.
The south limit of lot	3, con. 3	.....2,653.2 ft.	2,619.6 ft.
The south limit of lot	8, con. 2	.....2,632.0 ft.	2,607.1 ft.

and several others equally incorrect.

NOTE—As no good purpose is likely to be served by showing precisely what lines are given incorrectly in the original returns I have left blank the names of the townships in the latter list. If the Committee think it advisable to leave out more of the particulars identifying these lines I have no objection.

In some places two or three lines had been run and blazed, causing difficulty and loss of time in determining which was the final or correct one.

About 33 miles of original township survey lines had to be traversed to locate the original posts governing the projection of the various division and side lines. The calculations for intersections of these projected lines with courses of the contour survey were made by latitudes and departures and checked by scaling.

We were somewhat hampered in making fast time throughout the whole contract. Men declined to go into the bush at the middle of December and stay during the Christmas holidays, and it was not until after the first week in January that field work was in full swing and going smoothly. The Abitibi River being open prevented us working to the best advantage at first. On the completion of the field work sufficient good draughtsmen could not be obtained on short time contracts to rush through and check the large number of plans in the time allotted.

Throughout the field work, especially on the Abitibi River, we had to be very careful to prevent accidents to our men.

The river is very treacherous as the current is swift and the ice is always thawing away underneath. On several occasions men were unable to cross at noon where they had crossed in the morning, and on one occasion a party had to go about two miles before a safe crossing could be made, passing several places that had been used frequently within two or three days previously. Several times men were seriously in danger of breaking through or by working along on shore ice beside open water and having a large section break off and float away with them. Every precaution was taken, however, and the men were warned not to imperil themselves unnecessarily, and we considered ourselves very fortunate that no accident worthy of note occurred during the contract. Of course the ice was covered for the most part with slush (snow and water) for a depth of four inches to one foot, and often more, as it always is on northern lakes and rivers. Towards the end of the work the slush on the Black River became so deep and loose that snowshoes could not be used at all and the men had a miserable time of it, the slush often reaching over the tops of their oil tan larrigans or long boots. We slept in tents, heated by sheet iron stoves about 3 ft. 6 in. long, and round except for a flat top in which are two holes. They are light and inexpensive, and we have found them most serviceable on survey work as they pack well on a sleigh, toboggan, or tump line. Three or four of the men had sleeping bags or feather blankets, but for the most part ordinary grey wool and Hudson Bay blankets were used. A pair of each was supplied to each man, and by doubling up they were quite comfortable. The men usually stripped to their underclothes, but wore their socks and toques. Beds were made in the usual way with spruce and balsam brush.

For a large part of the time most of the men worked from the main camp at the mouth of the Black River, and later at the junction of the Wahtaybeg and Black Rivers, and were looked after by a cook and chore boy, with assistance from the men in getting up wood.

Temporary camps for small parties were established at Iroquois Falls for finishing the lower Abitibi and the long gully of Meadow Creek; at Twin Falls for the upper Abitibi; at the mouth of the Shallow, and at Matheson. The field work was completed about the middle of March. Details of the cost of boarding and of the amounts of the various commodities used may be of assistance to some of the younger members of the profession in outfitting for similar work.

QUANTITY AND COST OF SUPPLIES USED PER DAY PER
MAN AT MAIN CAMP ABITIBI, 1912-1913.

Average number of men boarded, including cook, 18

Supplies.	Quantity per day.	Cost per day.
Apples	.035 lbs.	.341c.
Apricots	.025 lbs.	.435c.
Bacon Br.	.215 lbs.	5.436c.
Bacon L. C.	.475 lbs.	7.485c.
Bacon Pickled	.022 lbs.	.315c.
Baking Powder	.010 lbs.	.165c.
Barley	.005 lbs.	.017c.
Beans	.120 lbs.	.657c.
Butter	.154 lbs.	5.217c.
Beef	.813 lbs.	8.628c.
Candles	.378 Candles	.752c.
Cheese	.062 lbs.	.880c.
Coal Oil	.003 gals.	.077c.
Cocoa Nut	.002 lbs.	.067c.
Coffee	.017 lbs.	.490c.
Corn	.064 cans	.642c.
Corn Flakes	.098 lbs.	.862c.
Corn Starch	.004 pkgs.	.026c.
Cream	.200 cans	3.172c.
Currants	.052 lbs.	.284c.
Flavoring		.280c.
Flour	.825 lbs.	2.945c.
Jam	.015 lbs.	.112c.
Lard	.092 lbs.	1.815c.
Macaroni	.115 lbs.	.032c.
Matches	.006 boxes	.075c.
Onions	.005 lbs.	.199c.
Peaches	.025 lbs.	.300c.
Peas	.049 lbs.	.195c.
Pepper	.007 lbs.	.100c.
Pickles	.002 gals.	.200c.
Potatoes	.525 lbs.	.662c.
Potatoes des.	.028 tins	2.590c.
Prunes	.050 lbs.	.362c.
Raisins	.077 lbs.	.581c.
Rice	.037 lbs.	.176c.
Rolled Oats	.055 lbs.	.179c.

Supplies.	Quantity per day.	Cost per day.
Salt	.021 lbs.	.082c.
Soap	.041 cakes	.188c.
Spice		.062c.
Sugar Br.	.178 lbs.	.967c.
Sugar Gran.	.265 lbs.	1.398c.
Syrup	.007 gals.	.595c.
Tea	.036 lbs.	.848c.
Tomatoes	.073 cans	.820c.
Turnips	.075 lbs.	.055c.
Yeast Cakes	.007 boxes	.031c.
		<hr/>
		51.797c.

We have always believed in feeding our men what they liked, within reasonable limits, and it is quite interesting to note sometimes the difference in requisitions of different parties. The above table therefore must not be taken as final or standard. It is simply an analysis of actual quantities and costs on this particular contract. A change of cooks will often make a great difference in the comparative amounts of various items used, both men giving good satisfaction. In most of our northern work we used dessicated potatoes, but on this contract some of the ordinary tubers were used. These were frozen solid coming in, and it may be of interest to some of you to know that the best method of preparing frozen potatoes is not to thaw them with cold water, as is usually done, but to brush them clean, give them a quick rinse with hot water and plunge at once into a pot of boiling water, and cook with jackets on.

Field drafting was impossible for various reasons, but each day's work was entered on specially prepared and padded latitude and departure sheets at night. The angles were entered and totalled to the first tie station. The bearing of the course ending at the tie station was then calculated both by the angles of the contour survey and by the tie to the ice traverse. If the error did not exceed a few minutes for the loop it was distributed among the angles where, from the nature of the set up, the transitmen considered it was most likely to have occurred. The accumulated instrumental error in a loop rarely exceeded 10 minutes and average about 5, which shows that quite accurate results may be obtained by simply using pickets in place of hubs with tack centres for

transit points. If any gross error was found, the reductions were first checked over and the field notes carefully examined. As magnetic bearings were taken for all courses, they were first compared with the astronomic bearings and usually indicated the angle in error. Failing to find the error in this way it was usually located by plotting the loop, including the ice traverse portion and by taking a tracing, superimposing on the original and pivoting on the various angle points. The one at which the error occurred was then revealed. As this checking was always done immediately after supper each evening and the transit man had the day's work fresh in mind, he could generally verify the correction from memory. This class of error was usually an even 5 or 10 degrees, and as the connection could be made with almost absolute certainty in the office they were not rechecked as a rule, unless there appeared to be more than one possible solution.

Having deduced and corrected the bearings, the chainage was then entered and the amount of latitude and departure taken out for each course of the day's work. For this work we found Gurdens Traverse Tables invaluable. We have used these tables constantly for several years, and though they cost about \$6.00, and the books are rather bulky for long trips, we usually carry them even on mining claim work, if a number of claims are to be done at once. All latitudes and departures are taken out by inspection without multiplication. Long courses have to be taken in two or three parts and then added, but a great many courses can be taken out in an hour's sitting by two men once familiar with the tables. When the amount of the latitude and departure made by each course was entered, each loop was then checked by adding up the N. S. E. and W. columns and finding the total latitude and departure of the station from which the tie was run. By means of the tie the total latitude and departure of the same station was calculated from the ice traverse and compared. This was always done and the accuracy of each loop assured before extending the columns to find the total latitude and departure of the intermediate stations. Each loop was started fresh from the ice traverse and treated independently of the rest of the work, so that when an error was found in any loop, that loop could be passed over or isolated temporarily and the balance of the day's work checked up before attempting to investigate the error. A dropped tally or other gross error in the chainage was immediately evident, and from the amount of the closing error in latitude and departure the amount of

the actual chainage error and the approximate bearing of the course in which it occurred was quickly found. Generally the course in error could be picked out at once and correction verified, but sometimes two or more solutions seemed equally probable, and then the memory of the day's work being fresh in the minds of all the men, they were almost certain to be able to say which of the suspected courses was the one really in error. This was fortunate for the chainmen as they were able to check up the next day with a minimum of extra work. If the error was found where expected, well and good; if not, the loop was rechaind entirely. Occasionally an error in closure was not due to an error in chaining, but to a small angular error which had been assumed to be an accumulation of small errors and distributed. The chainmen, finding the suspected courses O. K., on the following day would chain the balance of the loop, and if they reported their original chainage correct it was then up to the transitman. The bearing and amount of the resultant error, together with the original error in closing angles, was then a clue for locating the trouble. In this case the error being small the magnetic bearings were not of much assistance. The method of plotting out the portion of the ice traverse and the loop of the contour on a fairly large scale and superimposing a tracing on the original was generally used. By pivoting on each station point the one was found that eliminated the error and closed the plot. Sometimes due to the accumulated small errors the plot would not close exactly, two or more solutions being equally probable. These were checked on the following day, and the error generally found where expected. If not, the angles of the entire loop were reread, and in any case the lesson that care and accuracy pays was impressed on every member of the party.

It must not be assumed that much time was spent in such check work. Almost invariably a few moments' checking proved the error to have been correctly located in the office, and once the parties got working smoothly, such errors were not very frequent. The men soon became enthusiastic and anxious to have their day's work "check up." Each party prided itself in the closeness of the checks at the end of each loop and felt satisfied with themselves with their transitman, chainmen, and the work in general, especially if they had made the day's record as well. Though little might be said, they would do their best to keep their lead and beat the other party again the next day. We were all satisfied when the angular error was not over 5 to 10 minutes, and the error by

latitudes and departures say 1 to 3 feet each, depending on the number of courses and the nature of the ground covered. Quite frequently in a day's work of 3 to 5 such loops these would be maximum errors, and the average was much less.

There was no temptation to "fudge" or "doctor" either transit or chainage work, as the inexorable latitudes and departures could not be satisfied that way, and were just as merciless in exposing fudged or careless work as accidental slips, though not so capable of correcting the same in the office. Hence everyone strove for a high degree of accuracy, for this made all the work lighter, easier and more satisfactory and avoided the necessity of going back and rerunning a piece of careless work, something always galling to the party. The instrumentmen and chainmen were put right on their mettle with the axemen of the party and with each other.

I cannot emphasize too strongly the advisability of using latitudes and departures for plotting such work and of keeping the calculations right up tight on the field work all the time. Very much better results can be had from a party when the checks on their day's work is known that night, or before going to work next morning. Any tendency to carelessness and any inaccuracy is exposed at once. A few trips back over their work is quite sufficient to breed a desire for accuracy not obtainable any other way. Herewith are given two picked examples, not because they are unusually accurate, but because they show what is obtainable by ordinary methods with a well trained party on regular work.

1. From a point on the ice traverse course 32-33 on the Black River, the original post at the south-east angle of Lot 12, Concession 6, in the Township of Carr was located by one of the parties. Then from the course 38-39 the same point was fixed by the other party traversing west along the south boundary of Lots 11 and 12, Concession 5, north along the west boundary of Lot 12, and east along its north boundary to the same post, giving a departure differing only by 0.7 feet, and latitude by feet.
2. The north-east and south-east angles of Lot 1, Concession 1, in Walker Township, were located by traversing from different points on the ice traverse of the Black River, with a difference in

departure for the two points of only 1.0 feet. Both points are on the Township outline which may be safely assumed as due north astronomic.

The plotting was done by locating the various station points on cross section paper and drawing in the courses. Plotting with even the best protractors and scales would have been very tedious, and could not have been as accurate with so many very short courses. Of course in plotting from latitude and departure tabulations to cross section sheets an occasional station may be plotted out of the place and the error pass unnoted. It does not effect in any way the correct plotting of any of the other stations, however, but only the two adjacent courses. Even for these the correct bearing and distance will be given and a large error in plotting will generally be noticed when putting this information on the plot. All plans were made on a scale of 400 feet to 1 inch, and the large general plan was made in three sections. Only the official copies of these large plans were made, but as the tinting was done with Kaolin coloring mixture the tracings are not shrunk, wrinkled or distorted in any way. Extra blueprints may be taken from these at any time as the coloring matter does not blur or effect them in any way—the prints come out the same as if the tracings were uncolored. Several copies of the large blueprints and a book giving the length and bearings of all courses were furnished to the company, together with several sets of the blueprints of each individual parcel booked together in townships.

In all 100 separate parcels of land were affected, and triplicate plans of each parcel were made. The total land area included amounted to 1,974.06 acres.

There were 278 ice traverse courses averaging 783.3 feet in length or a total of 217,769.6 feet, equal to 41.24 miles; the original estimate was 40 miles.

There were 2,831 land courses, averaging 273.5 feet in length, or a total of 629,232.9 feet, equal to 119.14 miles; the original estimate was 120 miles.

The cost to the company was \$13,265; the estimate \$13,500. The time limit, however, was exceeded by exactly one month.

Discussion.

Mr. Shaw—What did you find the difference in elevation from the foot of McDougal's Chutes to the foot of the river?

Mr. Routly—Not very much difference from just above Iroquois Falls to the Black River—in fact when we ran our bench levels first we had the river running uphill one tenth of a foot, and we found afterwards it was practically a dead level. And it is level on up past the junction for another two miles or more. I wasn't on much of the Black River section of the work personally, being sick at the time, and details of it are not very clear to my mind, but my memory of it is that the grade of the natural river is very flat. Last spring there was a tremendous flood and the water was backed up very high in the Black River. There is an interesting way of tracing the level of the river during the flood stage by noting where the ice has barked the trees. At Matheson the trees are marked about 17 or 18 feet above the level in the summer time. As you travel down stream a few miles the ice marks are only nine or ten feet above the summer level, and on further down the barking of the trees comes closer and closer to the summer level of the water.

Mr. Dempster—What was your method of putting in the bids?

Mr. Routly—One was a lump sum for the whole contract, and the other the actual cost plus a fixed sum for our fee, and the third the itemized prices, and that was made as simple as possible so that the directors could understand it readily.

Mr. Dempster—Do you mean you had a certain area and got so much acreage, or by the mileage of the river?

Mr. Routly—On the plan the shore line is traversed; you had to traverse the shore line of a river, because they were not paying for water area, they were only paying for the land they were going to take, so we ran a traverse line along the ice to locate the shoreline. This was used also as a base line for tying in the contour.

Mr. Dempster—Here is the proposition: We are going to compete against different bids; we don't know the area we have to go over. When you make your specification do you intimate in that so much to the acreage or shore line?

Mr. Routly—There are only 2,000 acres included in the whole thing.

Mr. Dempster—But when you have to go up the gulches for your contours it makes considerable difference.

Mr. Routly—The main difference is in the mileage. They wished to have a figure on the acreage basis, but that was something I couldn't give them.

The President—In making your descriptions what line did you use? Did you run a contour line so that you included all the land required by the company, or just run lines wherever convenient? Are the descriptions of the lands the company bought included entirely within the lines of your contour?

Mr. Routly—Yes: the descriptions and survey covered exactly what the company had to acquire on account of flooding, but in some cases they might buy the whole south or north half of a lot; they didn't necessarily buy from the farmers according to our descriptions, being free to buy more if they desired. We started in giving descriptions by metes and bounds, and in some cases it took three or four pages to recite the courses. The Department then consented to take the Plans without detailed descriptions, and in dealing with the lots deal with them "according to the Plan of Survey." That saved us typing out all the courses. We gave a Table of Courses for checking in the Department, so that if they were not able to make out any figure on the plan they could refer to the Table.

The President—Where there were a lot of irregular courses, supposing the company only wished to purchase the best land, and there was a lot of the land actually flooded, would your contour lines include everything.

Mr. Routly—Yes. The proposed flood level is Elevation 817.5; our instructions were to run the contour 820, and not to dip below, so that no case would occur later where they had failed to acquire all the land that was flooded.

The President—In establishing your flood level for the top of your dam did you make any allowance for spring freshets, or did they make any allowance in the land they purchased? For instance, last year there was a flood on the Abitibi River that was greater than any in the history of the country. You can trace the line of last year's flood all along the bank of the river by the wreckage that is piled up there, and it must have been a phenomenal flood all the way through there.

Mr. Rorke—The construction of the dam was supposed to take care of all that.

Mr. Routly—It was provided for in the scheme of the company. They are building a regulating dam at present at the outlet of Abitibi Lake. In case of serious flood, by closing the gates of this dam the lower Abitibi River will only have to accommodate the flood from the Black, which would not raise it very much. The level in Abitibi Lake would not raise materially before the flood had subsided in the Black River.

Mr. Dempster—I noticed in your bid for the work it caused you a month's work and labor more than you anticipated. On what items did you miscalculate for that month?

Mr. Routly—We miscalculated mostly on the matter of drafting; we couldn't get enough good draftsmen.

Mr. Dempster—It was not a difficulty in the country, but in labor?

Mr. Routly—Yes. Our estimates of the actual work involved struck it very close.

Mr. Dempster—I was wondering if you put in any specification of an area—specified by acreage.

The President—You couldn't estimate it by acreage at all?

Mr. Routly—No; the actual contract was cost plus a fixed sum, when our fees were added to the actual cost the company had to pay the total checked almost exactly with our original estimate. What I would like to hear is some discussion regarding the price which I gave them in the first place of \$30 a mile for running the ice traverse and running the line of bench levels and the other item of \$100 a mile for the completed contour line?

Mr. Lang—That was \$100 per mile for the completed contour line?

Mr. Routly—Yes. The land traverse included any stadia work we had to do or any offset lines or any trial lines for the tying in of the township lines and also the plans.

Mr. Dempster—In our section we have very few matters to compare it with. My experience has been in the west more than in the east, but unless I am greatly mistaken this map will be used for years by big corporations and for work carried on by engineers, and in an engineering way I think anyone doing such work should make an engineering profit. You mentioned \$30 a mile for traverse. That of course is a little

low in comparison with the West. Here you do not pay the same for labor. As to \$100 a mile, your experience of contours would be much greater than mine, and I would be unable to state now whether that is too low. I think for traverse on the ice that \$30 a mile is none too high. I don't know what the feeling of the men is here. That is of course for an engineering piece of work.

The President—You traversed both sides of the Abitibi with one traverse line?

Mr. Routly—No; we ran two lines, one on each side.

The President—I had a little experience in one of those contour surveys back of Port Arthur, and with my experience on that I think I would sooner run the ice traverse at \$30 a mile than the bush traverse in winter at \$100 a mile.

Mr. Routly—We didn't really keep the cost of running the ice traverse separate from the other. I can't tell you exactly how it came out on that. I figured the ice traverse very close; I knew the mileage was not great there and there would be no special difficulties, and I tried to get a fair figure for the bush contour, which was really the important part of the contract. The ice traverse would only amount to \$1,200 all told. The contract was not taken on those figures, and they are simply given as a method for comparison. The only way we miscalculated was that we had to cover an extra month of supervision on the drafting. We didn't get the work done in the time we expected to and could not ask the company to pay any extra.

Mr. Speight—What did you find it cost to board the men per day?

Mr. Routly—I have all the items here. (See paper for itemized list.) The cost of provisions would be different in different places and with different cooks.

A Member—Does that include the cost of freighting it in?

Mr. Routly—No; but this was not a very serious item in our case.

Member—How many miles had you to bring it in?

Mr. Routly—About six miles from Monteith to our main camp by sleigh. There was the cost of moving it in some cases up or down the river, but we didn't keep any data on that.

Mr. Ardagh—When you speak of discovering errors in angles at night time, I have always made a practice of doubling our angles on the field, and in that way the men discovered any error there was before they left that angle. Have you ever employed that method?

Mr. Routly—Yes; but we didn't find it as satisfactory as the other. There were not a great many errors of that kind. Sometimes it would be a slip of a straight ten degrees, but nearly always we found that in a few minutes by comparing with our magnetic bearings.

Mr. Ardagh—In doubling the angles you might read the wrong sides, whereas the magnetic bearing would show that up. You can't double an angle and make a mistake.

Mr. Routly—You can, because a transitman will sometimes get into a sort of mechanical method and knowing what the double should be will read his verniers wrong. For example, an angle of 89 deg. may be misread as 91 deg. on the first reading, and the mistake of reading 182 deg., instead of 178 deg., when doubling will be made mechanically. This, of course, will not occur when the plates are graduated from 0 deg. to 360 deg., but is quite liable when plates are graduated both ways from 0 deg. to 180 deg. as some of ours were.

Mr. Ardagh—I think in ordinary small work doubling the angle is a great thing. I don't mean regular long traverses, but in making ordinary surveys. I have found doubling the angles has saved me many a mistake, because if there is a mistake in the chainage you could easily find it out.

Mr. Speight—Mr. President and Gentlemen, I have listened with a great deal of interest to this paper of Mr. Routly's, and I am sure the Association is under a deep debt of obligation for this very interesting paper. I don't remember when I have heard a paper that has been of more interest to those who have had experience in that north country, and in reply to the last speaker I would say that in any extended traverse the only way is by using the azimuth angle, it is the only way or you will get all tangled up if you don't; and you have a check every evening and you have a check on your line, and there is no difficulty when you once get started on it, and when you know what it means you read with more care than if you are just making a few angles where you would double or treble. I remember the first summer Mr. Niven was in Temagami he told me the difficulty was to keep the notes

intelligible by measuring the angles and doubling in the way Mr. Ardagh says, and I said I have always used the azimuth angle, and I told him that I thought after a little while he would find it was the best method, and he was surprised he had not tried it before, and afterwards he would not use anything else.

It seems to me the price of \$30 for the ice traverse is a much better price than \$100 a mile for the contour. I would rather take that at \$15 than the other at \$100 if I was doing it by contract—running the line through the bush; that means a great deal of work chopping, and there must be a great difference in the speed.

I don't know whether it is in order now or not, but I move a vote of thanks be tendered Mr. Routly for this very valuable paper, and that it be printed in the annual report of the proceedings.

Mr. Dempster—I second the motion.

The President—I am sure that you will all agree with me that Mr. Routly must have gone to a very great deal of pains to prepare this paper. It is one of the most interesting I remember having heard read before this association. It has provided a good discussion, and that is one thing I hope all these papers will do.

One thing about these papers is that I think sometimes the discussions they bring out are more valuable than the papers themselves. I have very great pleasure in tendering the thanks of this association to you for your paper. (Applause)

Mr. Routly—In answer to what Mr. Ardagh says, there is this to say in connection with reading the azimuth angles, you always have a check. We made the practice of turning back to zero on the vernier, and then looking to see how it hit our pickets.

Mr. Ardagh—As a matter of fact I use the azimuth angles myself entirely. The azimuth is the proper way in triangulation. We made a system of skeleton triangles over the whole of the district we had to survey in the Georgian Bay, and all the traverse on our stadia work from one island to another was always done on the azimuth, and of course the stadia men took their bearings from the sides of the triangle which were always given astronomically.

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

WATER POWER DEVELOPMENT AND TRANSMISSION OF ELECTRIC POWER IN NORTHERN ONTARIO.

By E. W. Neelands.

The infinite wisdom shown in the distribution of the forces of nature by the Creator of the Universe, has attracted the attention and held the admiration of mankind since time immemorial.

Wherever man has existed he has in a more or less degree endeavored to harness some of the latent forces in his immediate vicinity and has made the wheels of commerce move at his will.

The great manufacturing centres of the present age are in close proximity to coal from which heat—a mode of motion is derived.

The greatness of such centres is augmented by the fact that they are close to large bodies of water or in some cases provided with large, sluggish rivers which form waterways through their centre, thereby affording cheap means of transportation.

With the discovery of electricity and the better understanding of this mysterious power whose quantity and uses appear unlimited, comes the endeavor by engineers the world over to develop this the greatest of all latent forces.

The warmer countries of the world have risen to their zenith and crumbled. The people of northern climes are today the most aggressive of the earth. With all the forces of this Canada of ours in harness, even of Northern Ontario, we have a picture of the waste places becoming the kingdoms of the future and the centres of the greatest activity.

If all the water in Northern Ontario that runs away from us, was held up and made to work its passage out, we could obtain 1-10 of H.P. per day per square mile, for every foot said square mile is above the boundaries of our province through which said water escapes; that is, if we had 100 square miles drained by a river with a drop at its lower extremity of 100 feet, and could control the total discharge, we would have on the average the year round $100 \times 1-10 \times 100 = 1,000$ H.P.

If all the water powers in Northern Ontario were turned into electric energy, they alone would produce sufficient power to change the whole face of our country. Within a radius of forty miles of Cobalt there is over three-fifths of the total power set aside at Niagara for Canadian use, and the manner in which the water powers of Northern Ontario are leased is a tribute to the foresight and wisdom of the custodians of our natural resources in the Department, whose every effort seems to be to preserve them from exploitation by wealthy speculators, for the immediate benefit and use of the whole people.

Many difficulties, however, are in the way of this development; the greatest being the demand. Furthermore, the time limit of this demand is a large factor to be reckoned with when installing a plant; this covers to a large extent cost of development. If the owner of a certain water power is assured that he will have sale for all his power for one hundred years, first cost does not enter into his consideration, as he will install a reinforced concrete plant equipped with the most modern wheels, generators, governors, etc., so that the minimum amount of labor is necessary and the cost of operation as small as possible.

The mining industry of Northern Ontario has to the present time consumed most of the developed power but there are at present two pulp-mills and one electric road using this power, and every day sees some new industry calling for more.

It is with the development of such that I wish to deal in a general way, inasmuch as it affects the Ontario Land Surveyor or Civil Engineer of Northern Ontario.

The average individual has a very poor conception of the amount of power available or the cost of developing or transmitting same, when he stands on the bank of some roaring, boiling waterfall—particularly in springtime when he is possibly more inclined to be imaginative.

We are often called upon to report on water powers; in fact our firm have reported on most of the powers in this northern section, even as far north as James Bay.

To obtain correct data we have used an electrically registering current meter which we keep in perfect adjustment. We endeavor as far as possible to obtain the minimum flow as this is what has to be reckoned on for cheap developments. Storage generally necessitates long and high dams and considerable flooded country, all of which is costly.

We have found this minimum flow to vary in different localities. For instance, a flat well timbered area containing several large lakes will discharge .4 cub. feet per second per square mile of area, at extreme low water. A well timbered country which is somewhat rocky and from which the water can get away quickly, will get about .35c.f.s. A burnt area or the Hudson Bay slope, will in dry seasons fall below .3 c.f.s. per square mile, while the maximum discharge during Spring freshets is often fifteen times as great as the minimum discharge.

This condition, as you will see, necessitates providing for wheels suitable for low water, and dams and headworks for high water. The plant is also affected as it has to be so situated that tail water will not flood or choke it.

Keen observation and experience, coupled with resourcefulness and plenty of common sense, are the essential qualities necessary for a successful hydro-electric engineer in the north, where natural conditions as well as initial cost are extreme, and where no two powers are developed in the same manner.

One quantity in power development which is often overlooked is transmission—a consideration of great importance. Where power has to be transmitted twenty or thirty miles over broken country through which scarcely any roads have previously been constructed, many things have to be taken into consideration. First of all, we wish to obtain the straightest possible line between the power plant and the distributing station. This may require crossing formidable rocky hills or marshy lakes, and besides being difficult to overcome, is hard to patrol. We consider it better to obtain a line which will afterwards make a first class government highway, for besides being easier to construct and patrol it may some day turn out like the proverbial calf trail—into one of the main arteries of commerce, and lucky is the owner of a power who has an electric tramway along his transmission line.

During the past autumn and winter our firm has been in charge of the development of a power at the town of Charlton for the Charlton-Englehart Power Company, to supply the gold mines at Kirkland Lake, as well as the towns of Charlton and Englehart, and I will briefly outline the method and character of this development trusting that some of our successes or failures may be of assistance to other engineers in charge of similar developments.

The drainage area is 500 square miles, from which there is a discharge of .35 cub. feet per second per square mile. It is proposed during the coming summer to construct a concrete dam to raise water on Long Lake five feet. The head of the flume is two feet below present level of water. The total storage on eight square miles of Long Lake, 7-feet deep, for four months, gives 477 H.P. with 35 feet of head. The head, however, will be 40 feet while water is at crest of dam, which will give a margin of safety.

The minimum of .35 cu. ft. per second per square mile with a 35-foot head, gives 556 H.P., so that with the help of the eight miles of storage replenished twice a year we have 1,033 H.P. daily. If we could conserve all the water over 2,000 H.P. would be available. However, the present equipment is for the development of 1,000 H.P. and consists of:

Two vertical units, each of the wheels having a diameter of 36 inches, velocity 300 R.P.M., 375 K.V., manufactured by the Wm. Hamilton Company of Peterboro, while the generators are 400 K.V.A., 2,300 volt, 60 cycle, 3 phase, 300 R.P.M., belted to 10 K.W., 110 volt, 1,070 R.P.M. Interpole, vertical shaft, belted type excitors supplied by the Burnham Engineering Company of Toronto.

The wheels are connected with two 6 feet flumes which diverge from a 7 foot flume, 248 feet in length. This flume terminates in reinforced concrete headworks, 94 feet long, 16 feet wide and 18 feet high, provided with gains for two sets of stop logs, one at each end; the ice racks being placed behind the first set.

The head-works widen out to 24 feet at the water as wing walls to hold the ballast of the T. & N. O. Railway spur line which crosses over the head-works. A centre abutment 3 feet in width and sufficiently long to carry two tracks was placed in the centre of head-works to carry load. The length of this head-works was rendered necessary on account of crossing under T. & N. O. tracks, and at the same time cost about the same as the 7-foot flume. All this work was on solid rock and placed during the month of December.

The power house is of reinforced concrete construction, 25 feet by 80 feet, inside dimensions, and 25 feet high. Twenty-five feet at one end is for the transformers and is separated from the generating room by a concrete wall 1 foot in diameter, rising through the roof to the metallic shingles.

In the transforming room is placed three H-60-250 K.V.A. 40 degrees 33,000-2,200 volt Core type, oil-cooled transformers, with two 5 per cent. high tension taps.

Concrete stalls 16 feet high are provided for these transformers, and all wiring, arresters, etc., are supported on "I" beams so as to ensure safety in case of accident. Directly above the transformers, openings are provided in the outside walls for high tension wires for the Kirkland Lake line. A Gothic window is placed in roof directly above these wires to prevent ice accumulating on wires.

A second set of transformers, 2,200-11,000 volt for the Englehart line, is also placed in same room.

At one end of the generating room, next the transforming room, is placed a white Italian marble switch-board connected with generators and transformers by conduits laid in the concrete floor, while the gearing for the hand operated butterfly valves on the two flumes is directly over same, close to the side wall under which they enter.

The transformer room is also provided with a 10 ton travelling crane.

The location of the power house being on solid rock at a point where two diversions of the White River meet, necessitated the removal of approximately 2,000 cubic yards of rock, as it was impossible to build over the stream, and still use the temporary plant supplying Charlton and Englehart with light, as one of the diversions mentioned above forms the tail-race from the temporary plant. We therefore put in a concrete coffer dam which carried this tail water past the works and excavated wheel pits to a depth of 8 feet below bottom of draft tubes. Seven feet would have been sufficient had the rock been of the proper character, but we encountered a large body of Schist which was so soft we floored bottom of pits with reinforced concrete, placing a cone of concrete directly under the draft tubes and also rounding bottom up against the sides of the pit to lessen impact of water against foundation walls. A mistake is frequently made in power development in not leaving sufficient space below bottom of draft tubes. This space should be great enough to form a cushion, and at the same time allow the water to get away at a velocity such that there will be no backing up.

We experienced some difficulty just before the "freeze up" last fall with high water, which came over both the coffer dam at the head-works and also around the wheel pits. A few more inches in the height of each would have removed the difficulty. Furthermore, we had some difficulty in removing the water and ice from the pits, as the weather turned cold and stormy; in fact, it was almost impossible to obtain a clean base without removing forms. We consider it advisable where foundation walls are placed below water to first place footings and then build forms for the walls on top of them. This will insure a good bond with the rock or piles below, and at the same time provide a sump from which water can be kept pumped from the forms while the walls are under construction.

When the walls of the superstructure were being erected the weather was quite cold, so we covered forms with tar paper and another ply of boards, and turned live steam through pipes running horizontally around the building; small holes were punched in this pipe to allow for circulation and thus keep pipes hot.

We also added to the concrete a 2 per cent. Ca Cl 2 and 9 per cent. Na Cl mixture, which gave splendid results as the concrete appears to be first class.

The roof of the power plant is constructed of steel trusses with purlins every 5 feet, on which is placed 2-inch plank dressed in such a manner that the inside presents the appearance of "V" joint.

The entrance to the generating room is 10-foot square, and provided with a Kinnear door in which is placed a smaller one for ordinary use. This arranged by swinging the small door on a pair of independent hinges, thereby allowing the big door to roll up.

The Charlton-Englehart transmission line is in operation, while the Kirkland Lake line will be complete May 1st, when the new plant will be started.

Considering the fact that only 1,000 H.P. is being developed, whereas three or four thousand could have been developed—if available—with very little additional expense, apart from the equipment; and that most of the construction work had to be done in the winter, the plant as far as we can ascertain is the cheapest permanent development per H.P. in the north country.

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

THE ONTARIO AND MANITOBA BOUNDARY.

L. B. Stewart, D.T.S.

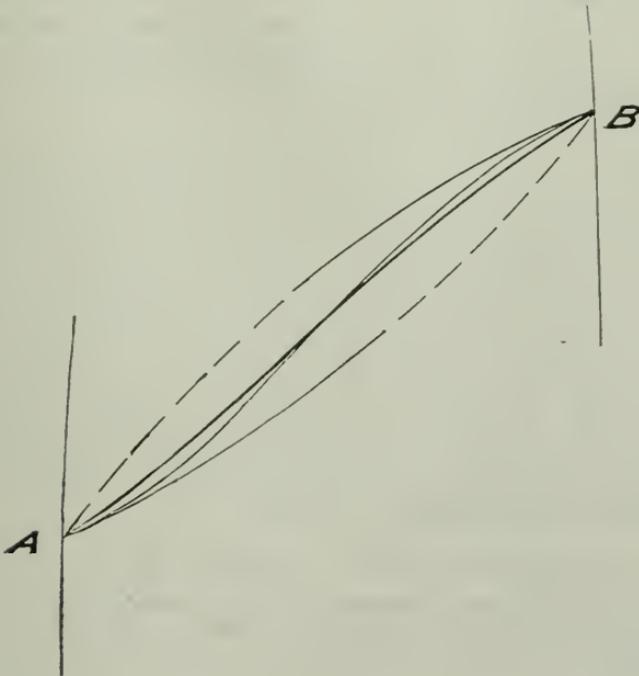
By an Act of the Parliament of Canada, passed in July, 1908, it was resolved that the boundaries of the Province of Ontario should be extended so as to include certain territories, which will be more particularly described below; and an act consenting to this extension was passed by the Legislative Assembly of the Province of Ontario in April, 1912.

The new territory thus added to the Province of Ontario is thus described in the above-mentioned Act of the Canadian Parliament: "The limits of the Province of Ontario are hereby increased so that the boundaries thereof shall include, in addition to the present territory of the said Province, the territory bounded and described as follows: Commencing at the most northerly point of the westerly boundary of the Province of Ontario as determined by the Canada (Ontario) Boundary Act, 1889, Chapter 28, of the Statutes of 1889 of the United Kingdom (the said westerly boundary being the easterly boundary of the Province of Manitoba); thence continuing due north along the same meridian to the intersection thereof with the centre of the road allowance on the twelfth base line of the system of Dominion Land Surveys; thence north-easterly in a right line to the most easterly point of Island Lake, as shown in approximate latitude 53 deg. 30 min., and longitude 93 deg. 40 min., on the Railway Map of the Dominion of Canada, published on the scale of thirty-five miles to one inch, in the year one thousand nine hundred and eight, by the authority of the Minister of the Interior; thence north-easterly in a right line to the point where the eighty-ninth meridian of west longitude intersects the southern shore of Hudson Bay; thence easterly and southerly following the shore of the said Bay to the point where the northerly boundary of the Province of Ontario, as established under the said Act, intersects the shore of James Bay; thence westward along the said boundary, as established by the said Act, to the place of commencement," etc.

The only portion of the boundary of the territory thus added to the Province of Ontario, which is of any special interest from a surveying and scientific standpoint, is that which is described as a right line extending from the most easterly point of Island Lake to the point where the 89th meridian of west longitude intersects the southern shore of Hudson Bay; and the interest attached to it is due to the fact that its establishment means connecting two fixed points on the earth's surface by a straight line of the unusual length of upwards of three hundred miles. It is proposed in this paper to examine some of the problems involved in the location of such a line.

If the earth were spherical in form the only additional difficulties to be met with in the establishment of a line of this length would be those due to the greater magnitude of the undertaking. The spheroidal form of the earth, however, introduces certain complications that would not exist if the earth were of the simpler form.

To a mathematical mind the term "right line" suggests several possibilities; though the mathematical straight line is not one of them.



To illustrate this statement, let us assume that there are two posts planted in the ground a few miles apart, but near enough to one another to be intervisible, and that the line joining them has a general north-easterly direction. Let us denote for convenience the south-westerly post by A, and the north-easterly one by B. If a transit now be set up at A, and the point B be sighted, and a row of stakes be then "lined in" between the two posts, the resulting line would be considered a straight line. If, however, the other point B be occupied, the point A sighted, and another row of points marked on the ground, these would also be considered to determine a straight line. It would not, however, coincide with the first, but the two lines would inclose a space. These two lines would be normal sections of the spheroid, and would therefore be plane curves.

If next a transit line be ranged out in the usual way, beginning at A, and using as the initial hub the nearest point established on the normal section located from A, the hubs being planted at a moderate distance apart, the line thus found will pass to the south of B. Also a similar line setting out from B will pass to the north of A. A transit line then that will start from either terminal point A or B and pass through the other must lie between the two normal sections; it must, moreover, trisect the angle between the two lines at either end, inclining at each extremity towards the normal section located from that point.

Another line whose claims to be considered a straight line should be briefly discussed, may be thus described: Let a number of points between A and B be determined which are subject to the condition that if a transit be set up at any one of them, its telescope, when pointed to A and then transited, will point to B. These points will lie on a curve known as the curve of alignment, which may therefore be defined as the locus of the points at which the azimuths of the terminal stations differ by 180 deg. It will not coincide with any of the lines above described, but will in general lie between the two plane curves and be tangent at either extremity to the plane curve located from that point.

A transit line run in the usual way approximates closely to a curve known as the geodetic line, which may be defined as the shortest line that can be drawn on a surface between two fixed points.

On the surface of a sphere all the curves above enumerated coincide; and for moderate distances on a spheroid of small eccentricity they will practically coincide. On the surface of the earth, however, when the distance becomes several hundred miles they all separate and become distinct curves. This, however, is not a matter of any practical importance, as no doubt the invention of the clause of the Act above quoted, in using the term "right line," is that it shall be a straight transit line.

The long line joining the eastern extremity of Island Lake to the point on Hudson Bay in which the 89th meridian intersects its southern shore must, on account of its length and direction, be treated as a geodetic line. Such a line is not a plane curve, but a tortuous curve, unless its extremities lie on the same meridian. The result of calculation shows, however, that even in the case of a line of this length the divergence among the lines that can be drawn between its extreme points is not very great; the mathematical theory and the resulting numerical computation are, however, much simpler in the case of the geodetic line than in those of the other curves, so that there is this additional advantage connected with its use.

The following are the results of some calculations with reference to the various lines that we have been discussing, assuming approximate values of the latitudes and longitudes of the two terminal points by scaling from a map. The lengths of all the lines are practically identical and equal to 1,557,935.01 ft., or a trifle over 295 miles. The greatest distance between the two normal sections is 1.16 ft. (the length corresponding to this in the case of the California-Nevada Boundary, to which further reference will be made below, is a little over 6 ft.). The angle between these two curves at either extremity is 0."66. The difference between the astronomical and the geodetic azimuth of B at A, or of A at B is 0."23, or one-third of the angle between the plane curves. The initial azimuth of the line at its south-westerly extremity is $36^{\circ} 23' 58''$, to the nearest second. These figures show that in discussing the differences between these lines we are dealing with very small quantities.

Before the location of the line on the ground can be begun, some preliminary astronomical work will be necessary. The Hudson Bay end of the line is an astronomical point, defined as the point in which a given meridian intersects the

shore of the bay. This point may be determined by establishing an observing station as nearly in the longitude of the given meridian as can be estimated, and determining its longitude by a series of observations with as high a degree of precision as the instrument and method used will permit. The latitude of the observing station should also be carefully determined. The precise position of the required meridian may then be found geodetically by measurements carried along the shore in an easterly or westerly direction.

Although the Island Lake end of the line is defined by reference to a natural feature of the country, its geographical position should also be determined as accurately as that of the other end, this being necessary in order to compute the initial direction of the line and its theoretic length. The positions of points in the unsurveyed regions of our country, as shown on our maps, are very unreliable, especially in longitude, so that it would not be safe to assume that the position of Island Lake is more than approximately known. The error in its assumed position would of course affect the direction of a random line ranged out from that point, and would result in a large closing error—possibly of several miles—at the farther end of the line.

An instrument well adapted for the astronomical work is the portable transit instrument, which, if provided with detachable or folding standards, is extremely portable. It should be provided with a filar micrometer and a latitude level, so that it may be used as a zenith telescope for determining latitude by Talcott's method, as well as to fulfil its primary purpose of finding time by meridian transits of stars. If the micrometer also permits of being turned through a right angle about the axis of the telescope, so that it may be used for measuring differences of azimuth as well as differences of zenith distance, it may then be used for determining with precision the azimuth of a mark near the meridian. Such an instrument may be regarded as a universal field astronomical instrument.

As above hinted, the best method of determining latitude is Talcott's method, using some form of zenith telescope. Methods of finding longitude depending upon the moon are inaccurate owing to the fact that the error of the quantity sought is a large multiple of that of the quantity directly observed, and also—which is more important—to the fact that the moon's position as tabulated in our ephemerides is subject

to large errors. Moon culminations and occultations of stars by the moon were used in locating the 141st meridian, the boundary line between Canada and Alaska, and the resulting values of the longitude were distributed over a range of about 18 sec., a fact that does not tend to inspire confidence in the mean result. Prof. Pierce estimated that the ultimate precision of moon culminations is represented by an error of 1 sec., which corresponds to 875 feet in latitude 55 deg.

The only method of determining longitude, that is sufficiently precise for geodetic purposes, is that by the exchange of telegraph signals. This method, of course, is not available in a country in which there are no telegraph lines, but a substitute for telegraphic signals has recently been found in wireless signals. This method has been employed successfully in Europe and Africa, but as far as I am aware it has not yet been used in America. There is no reason, however, why Canada should not take the lead in inaugurating the method on this continent.

The latitudes and longitudes of the two extremities of the line having thus been found by careful observation, its length and initial direction may then be computed. This initial azimuth is then to be laid off on the ground by observation at the initial point of the line, the location of which on the ground can then be carried forward.

As this work proceeds, the direction of the line should be checked from time to time by azimuth observations, and in order that the check may be applied it is necessary to compute the theoretic direction of the line at the point of observation. There is an important property of the geodetic line that holds a fundamental place in the development of its theory, and which may be made use of here. It may be thus stated: If A denote the azimuth of such a curve at any point, and u the reduced latitude of the point, then $\sin A \cos u = k$, a constant. The constant k then being known from the initial azimuth of the line and the reduced latitude of its initial point, the azimuth of the line at any other point readily follows when the reduced latitude of that point is known; and this may be computed in terms of the length of the line to that point and the initial latitude and azimuth. The required azimuth may also be computed without first finding the reduced latitude.

As the location of the line proceeds, a question that presents itself is, what is the probable amount of the closing error

at the terminal point of the line. Some time ago I attacked this problem by means of the principles of least squares, and arrived at the following expression, which gives the probable closing error, measured along the meridian at the terminal point, in terms of the probable errors of the latitudes and difference of longitude of the extreme points of the line, and of the initial azimuth:

$$r^2 = \left(\frac{\sin c}{\sin A_1} r_1 \right)^2 + \left(\frac{\cos \phi^1}{\tan A_1} r_2 \right)^2 + \left(\frac{\cos c \cos \phi^1}{\cos \phi} r_3 \right)^2 + r_4^2$$

r denotes the required probable closing error;

r_1, r_2, r_3, r_4 the probable errors of the initial azimuth, the difference of longitude, and the initial and terminal latitudes, respectively;

ϕ and ϕ_1 the initial and final latitudes;

A^1 the terminal azimuth; and

c the angle which the line subtends at the point in which the normal at A intersects the axis of rotation of the spheroid. The probable closing error in a direction perpendicular to the line is then equal to

$$r \sin A^1$$

By assuming $r_1 = \pm 0''.25$, $r_2 = \pm 1''$, $r_3 = r_4 = \pm 0''.05$ in the above expression we find $r \sin A_1 = 42.77$ ft.

This is the probable closing error due to the errors in the astronomical work, and takes no account of the errors in producing the line, which would probably be more serious than those considered, but more difficult to estimate owing to the many disturbing factors that must be taken into account, such as varying lengths of sights, and also to the fact that the direction of the line would be corrected at intervals by azimuth observations.

The most serious errors to be apprehended, however, are those due to abnormal deviations of the plumb line, due to irregularities in the density of the matter composing the earth's crust. These deviations may amount to as much as

10'', or even exceed 20'', in amount, and will affect all astronomical observations, whether for latitude, longitude, or azimuth, and also the production of a line, by amounts that cannot be estimated without making an extensive geodetic and astronomic survey of the surrounding region. In a mountainous country these disturbances in the direction of gravity, as is to be expected, have their greatest magnitudes; but a level country gives no guarantee that they do not exist.

It appears then that whatever amount of care and skill may be bestowed by the observer upon his astronomical work the resulting line will be affected by errors that are completely beyond his control, and whose amounts are likely to greatly exceed the errors of observation. Their combined effect will appear in the final closing error of the line.

Having completed the line its position will then be corrected by shifting the posts that have been planted on it at regular intervals, in a direction at right angles to it and so as to remove the closing error, and a new line will then be cleared out.

In the United States during recent years a problem similar to the one we have been considering occurred in the survey of the boundary between the States of California and Nevada. A portion of the territory ceded to that country in 1848 after the close of the Mexican war was formed into the State of California, and its limits in part are thus described in the State constitution:

"Commencing at the point of intersection of the 42nd degree of north latitude with the 120th degree of longitude west from Greenwich, and running south on the line of said 120th degree of west longitude until it intersects the 39th degree of north latitude; thence running in a straight line in a south-easterly direction to the river Colorado, at a point where it intersects the 35th degree of north latitude; etc."

The point in which the parallel of latitude 35° north intersects the middle of the channel of the Colorado river was found by observation to be in west longitude $114^{\circ} 37' 52''.02$ and the other extremity of the line being defined by its geographical co-ordinates, this completed the data required in order to compute the length and direction of the geodetic line joining the two end points. The westerly end of the line was found to be in Lake Tahoe, at a distance of several miles from

shore, so that it was necessary to establish an astronomical station on the shore of the lake, determine its geographical position, and then find by computation the position, relatively to it, of the point in which the boundary line intersects the shore of the lake. This gave the starting point of the line.

In the astronomical work latitude was determined by observations with the zenith telescope, and longitude by exchange of telegraphic signals, observations for time being taken with the transit instrument.

While the line was being ranged out a triangulation chain was carried along with it, to serve as a control, and to determine distances along the line. The total length of the line was thus found to be 651,676.4 metres, or about 405 miles, while its length computed from the astronomical data was 652,020.7 metres, or 344.3 metres longer, the difference being due almost entirely to deviations in the direction of the plumb line with reference to that of the normal to the spheroid. The closing error in the random line at the south-easterly end was found to be 150.5 metres. It was necessary then to correct the line, working backward from the terminal point.

All the work involved in the final establishment of this line was done between the years 1893 and 1899, about five seasons being spent in the field; and the total cost was \$30,860.30, exclusive of the cost of permanent monuments.

The above facts and figures relating to the survey of a boundary line similar in many respects to our own, furnish some data that may be useful in organizing the work in connection with the survey of our inter-provincial boundary; they also show the degree of precision that may be expected in carrying out such a survey.

Discussion.

The President—Gentlemen, I am sure you have listened with a great deal of pleasure to this paper by Professor Stewart. If there are any questions that any of the gentlemen would like to ask Professor Stewart, I am sure he would be only too pleased to answer them.

The Secretary—May I ask if you have made any computation at all, or can you, about what would be the error in this line in the actual running of it between the two points?

Professor Stewart—It would be necessary to make certain assumptions of course concerning the average length of sight and the amount of deflection of the line at each hub, and then it would be necessary to take account of the azimuth observations which would be used for correcting the direction of the line. After running say 20 miles an observation for azimuth could be taken; then the theoretical azimuth could be calculated and the difference would be the amount of correction. The observed azimuth would also be affected by a certain probable error, and the problem would be rather a complicated one. I have not a doubt that the probable error from that cause will be much greater than what I have found there, 42.77 feet, which results from the astronomical observations. I dare say that if one could come within 50 yards in running a line of that length, taking as many observations as possible, say every ten or twenty miles, one would do very well. In the line run in the United States, a portion of the California and Nevada boundary, the closing error was $150\frac{1}{2}$ metres, nearly 500 feet. There, however, the country through which the line ran was rather mountainous and no doubt there was a good deal of deflection of the plumb line. In fact, at one station it amounted I believe to about nine seconds by actual determination, comparing the astronomical longitude with the geodetic found by triangulation from another point. That shows the difficulties that have to be encountered from that cause. In the country through which our boundary will run I think it will be comparatively level on the whole, but even that will not guarantee that there is no abnormal deviation of the plumb line. In India I believe there was a very curious case; a central station was chosen to serve as a starting point for the geodetic determination of the positions of other points. The position of the central station was found by careful observation and it was assumed that because it was in the middle of a level plain there would not be any deviation of the plumb line, and a great deal of geodetic calculation was based upon that astronomical determination. It was found later, however, that all these positions were greatly in error, owing to a deviation of the plumb line at the astronomical station, but I would not venture to state from memory the amount of that error. This shows that even in the middle of a level plain these deviations may exist.

The President—Professor, in the actual running of such a line as that how would you proceed with the actual work? With a line of that kind would you run that line as a series of

small chords compensating for the convergence as you went along at regular intervals?

Professor Stewart—No. It would be best to run what is commonly called a straight line, which on account of the spheroidal form of the earth would be a tortuous curve, and would be practically a geodetic line. I think in running a long line like that the plan would be to use a large transit, with a seven or eight inch circle reading to five or ten seconds, and provided with a very good telescope, which could be used for putting in the hubs at as great distances apart as possible, a smaller instrument being used in clearing out the line.

Mr. E. Stewart—Do those figures represent correctly, no matter what, the direction from A to B; of course the nearer the situation was to due north the less the deflections would be?

Professor Stewart—Yes; those we will draw together.

Mr. E. Stewart—That is constant in any case, no matter what the direction was from A to B?

Professor Stewart—Yes, that expression I have written there is accurate, no matter what the direction may be. The direction comes in there. The sine of the azimuth and the tangent of the azimuth comes in in the two expressions. (Refers to expression set out on blackboard.)

Mr. E. Stewart—I remember running once along the 49th parallel; we ran as straight a line as we could, and of course it was a great circle, and in about 18 miles we were beyond the curve line of the 49th, almost a chain, I think. We ran into Dakota. I was wondering whether that expression you have there would hold good in any direction between A and B. As you approach those converging lines would be further apart?

Prof. Stewart—Yes, there is a certain azimuth for which the divergence between them is a maximum; in fact the distance between the two outside lines, that is, the two plane curves depends, if I remember rightly, on the sine of twice the azimuth.

Mr. E. Stewart—You were speaking of the deflection of the plumb line. Supposing it were a level surface, would there be a deflection of the plumb line then?

Prof. Stewart—There might be.

Mr. E. Stewart—What would cause that?

Prof. Stewart—It is no doubt caused by irregularities in the density of matter in the earth's crust. In India there is what has been compared with a submerged or underground mountain range extending through the country, which causes the deflection of the plumb line in one direction when to the south of it, and in the opposite direction when to the north of it.

Mr. E. Stewart—Greater density in one part than another?

Prof. Stewart—Greater density in the material.

Mr. H. A. Sewell—Isn't it true that the plains out in India are really a mountain top? When you start from Bombay and go about 35 miles to get up five. Poona is fully a mile up, and that really is a mountain top; and then I think I have heard that there was some claim that it being north of the Himalayas has an effect, although it was a considerable distance away from them; there being nothing but the sea to the south to balance it.

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COLONIZATION IN NORTHERN ONTARIO.

By J. F. Whitson.

I am going to make a few remarks. I have quite a number of slides and I intend putting them through as rapidly as possible and making a few passing remarks. I will first throw on the screen a map showing a portion of Northern Ontario. After that I will take you on a trip through a square timber camp in Northern Ontario and from there I will go north to the Transcontinental Railway, through the Clay belt.

(Mr. Whitson then had thrown on the screen a very large number of interesting slides and gave an explanation of each which was very much appreciated by those present.)

Mr. Whitson—That finishes the slides. I am very much obliged to you for the attention you have given. I would like to have had time to make a few remarks but the evening is late.

Voices—Go on.

Mr. Whitson—I would like to say this in connection with Northern Ontario, or the clay belt, where I have been constructing trunk roads for the last two years, that I can still voice the sentiments of the surveyors who addressed our Annual Meeting some two years ago. I have not changed my mind since. I am just as full of hope in the future of the clay belt as I was then. The settlement of that country will be slow for some time, the railroads have just been finished, and I hope to see more rapid settlement in the years to come. The west has still got the call and will have for some time, but I know of settlers who are to-day leaving old Ontario and going west into the Peace River country and the northern parts of Manitoba on to land in every respect similar to our land in the clay belt and going about 2,000 miles further away from a market. One of the drawbacks at the present time in the clay belt are the summer frosts: we will likely have summer frosts there until the land gets cleared up. They had them in

Old Ontario even in the hardwood country. I can remember when a boy over 40 years ago, that we were frozen out nearly every season. My early recollection of bread was black bread. I don't think conditions to-day in the clay belt are any worse than they were in the counties of Grey and Simcoe when I was a lad. I have never seen better crops of timothy, alfalfa and clover than we had the last two seasons in the north. They can grow, and there is no difficulty in growing over two tons to the acre, and quite a lot of money has been made this year in growing timothy and clover seed. There is a good market for that. I have seen as much as forty bushels of fall wheat grown to the acre near Matheson in the Rainy River Valley, the present conditions are much superior to those in the clay belt, they are not troubled with the summer frosts now as they were some years ago owing to the fact that the land has been cleared of timber. I don't think that any crops can be grown much better in Old Ontario than in the Rainy River Valley.

Mr. E. Stewart—What is the difference in latitude between Fort Frances and Cochrane.

Mr. Whitson—Cochrane is in latitude of 49.4; the 49th parallel passes I think about 30 miles north of Fort Frances; there is not more than 26 miles difference in latitude. The Rainy River Valley is practically in the same latitude as the clay belt.

Mr. E. Stewart—As far as latitude goes there should be no difference.

Mr. Whitson—Practically no difference. We are getting a great many settlers into Northern Ontario in the last two or three years. I had one of the officials in the Department prepare me a statement which I will quote briefly from:—"At Cochrane we have located 1,128 heads of families on 169,000 acres of land in the last three years. It is only about three years since settlement started up there. Around Matheson we have located over 900 settlers on an area of 143,000 acres within the last 6 years. North of Cobalt we have located 1,372 settlers on 311,000 acres. In the Englehart and New Liskeard sections 2,600 heads of families have been located on 474,000 acres. In the vicinity of Hearst the Department has located 78 families on 10,000 acres.

Mr. E. Stewart—Where are those settlers from principally?

Mr. Whitson—A good many of them from Quebec and from England. Around Cochrane there is quite a French settlement. In the section from Haileybury north, around New Liskeard and Englehart there is quite an English settlement from Old Ontario, but the country around Cochrane and along the Transcontinental has a big sparkling of lower Canadian French, and they are making good headway there, there are also quite a number of Swedes, Norwegians and Finlanders locating in different parts.

Mr. Ransom—Are they settling many of the veteran claims up there?

Mr. Whitson—No, not a great many.

The difficulty settlers were up against heretofore has been the cost of transportation. On the Transcontinental Railway under construction, they are paying contractors' rates, five cents a mile single fare, that is for passengers, and it cost \$100 a car to take a car from Cochrane to Hearst, 143 miles, a settler could not stand it, there was no accommodation or stations for loading and unloading of settlers' effects. Now that the road has been completed and the Government is constructing colonization roads in advance of settlement, I hope and expect to see great progress in the next few years.

The President—Have you got any data or can you give any idea as to what effect on the climate it has when a fire sweeps through some of those big muskegs and cleans it up?

Mr. Whitson—It has a great effect. I showed you some photos to-night from around Ground Hog. There is little difficulty in raising vegetables in that section of the country which has been swept by fire years ago or where there is little or no muskeg or moss, the same thing will apply around Cochrane; it has been cleared up for the last three years, on the high land well cultivated. Last season potatoes and other vegetables were not frozen where there was any considerable area of cleared up land.

Mr. Stewart—Do they raise any wheat?

Mr. Whitson—They raise fall wheat at Matheson and within 20 miles of Cochrane.

Mr. Stewart—I suppose the harvests there are not much later than here?

Mr. Whitson—No; vegetation is very rapid. Potatoes planted in good soil on the first of July will mature. It takes three months for spring wheat to mature. They have had some fairly good crops of spring and fall wheat in that country and it looks as if the country will be well adapted for fall wheat.

The President—Have you tried wintering cattle outside out there at all?

Mr. Whitson—No, the snow is too deep. The snow falls there to the depth of $2\frac{1}{2}$ and 3 feet.

Mr. Shaw—Don't you think when settlers quit talking about mining and go farming they will do better?

Mr. Whitson—The mines around Cobalt have retarded the settlement of the Timiskaming country very much, the young men prefer to prospect rather than clear up the land.

Mr. Rorke—Has it not created a good market for produce?

Mr. Whitson—Yes.

Mr. Aylsworth—Have you experienced there with apple trees?

Mr. Whitson—Very little yet, the winters have been too severe. There are a few small orchards around Englehart and Earlton; the most of them are crabapples, but they can raise any quantity of currants, raspberries and strawberries. Wild strawberries are to be found all over that country.

Mr. Stewart—Have you any information of the altitude of that country there, west of Cochrane say, above the sea, it is not so very high?

Mr. Whitson—No, seven hundred and some odd feet is the high land on the west of the Ground Hog.

Mr. Stewart—I don't wish to ask too many questions, but so many things occur. How about the summer? Is there a constant frost underneath in the summer, or does it thaw out in time.

Mr. Whitson—Mr. Speight has spent a great many more summers in that country than I have, and I would like him to answer that question.

Mr. Stewart—Is there perpetual frost underneath or does it thaw out entirely?

Mr. Speight—Certainly. In most cases the frost is all out by the 1st July. I have been up there very many summers and I think on the average there was not more than one or two frosts, except in the muskeg where it is covered over with moss, and even there in a dry spell it all goes.

Mr. Stewart—In connection with that there is one thing we have to think of and that is the greater amount of sunlight that we get up there. Now, a few years ago on my trip down the Maskenzie River, I remember we saw wheat at Fort Providence, which is on the Mackenzie River below Great Slave Lake, some 150 miles; I saw wheat there that was sown about the 20th May; we were there on the 15th July and it was in the milk. Some thought I had made a mistake in the month, but it was a positive fact. I was told it was put in about the 20th May. But when you come to consider there you have a constant moisture and almost perpetual sunlight during those months. It is hot-house growth, that is pretty high altitude there and consequently greater sunlight. That to a great extent is the reason for the rapid growth—hot-house growth from the moisture underneath and the great heat of the sun. I never saw hotter weather than we found in Lake Athabasca; it was about 100 in the shade for several days.

Mr. Shaw—My opinion of that, regarding the frost, is this, in its natural state the greater part of the sun's heat is absorbed chemically by the vegetation; then it is burned over, it is absorbed mechanically and is given out and prevents the frost from returning.

Mr. Speight—I think in the summer of 1911, the year I was down the Matagami River there were more frosts in Southern Ontario than up there, and we only had one or two there and those we got in September. On more than one occasion I have gone in the latter part of May. I remember on two occasions when they were putting potatoes in about the 24th of May at Brunswick Post, and when we came out in the latter part of August we got the very best of matured potatoes.

The President—With regard to your question, Mr. Stewart, about the perpetual frost line, I think the perpetual frost line is very much farther north than the old boundary of Ontario. I know in any part of the clay belt where I have been, take it

around Hearst, I subdivided a township there a year ago last summer, I started that work about the first week in June and for about the first two weeks we couldn't drive stakes into the muskeg on account of the frost, but by the middle of July there was no difficulty at all. We went back, the frost was all out, and there was no difficulty. The year before that I made some surveys for the Indian Department along the Albany, we went in there as soon as navigation was opened and we never had any difficulty in getting our stakes down into the ground. We didn't start to cut the line till about June, and even in that latitude at that early date we never had any difficulty in getting our stakes down into the ground on account of the frost and that convinced me the line of perpetual frost is very much further north than that country.

That brings our programme for the evening to a close. I am sure we have all enjoyed very much listening to Mr. Whitson's remarks and looking at the splendid set of slides he has had here; he must have taken a very great deal of trouble to prepare those slides, and I am sure everybody has enjoyed it very much. That brings us to the end of our official programme so I think probably we had better close until to-morrow morning at ten o'clock.

(This Association is not responsible as a body for the opinions expressed in its papers by Authors.)

QUESTIONS ARISING IN SURVEYS IN DOUBLE FRONT CONCESSION.

By A. G. Ardagh.

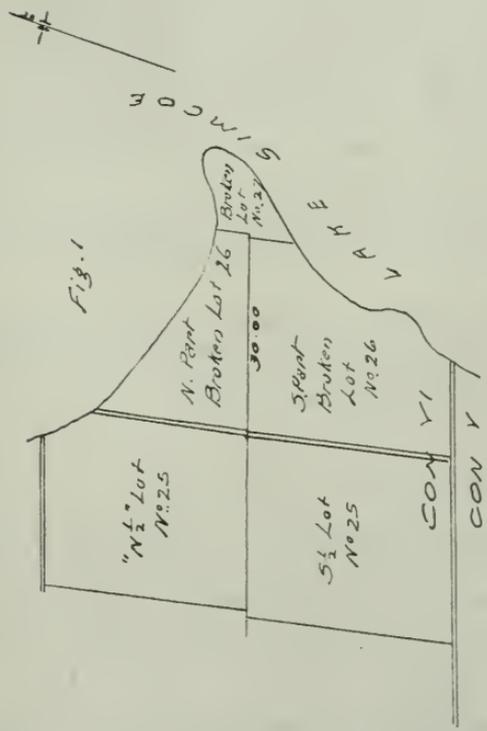
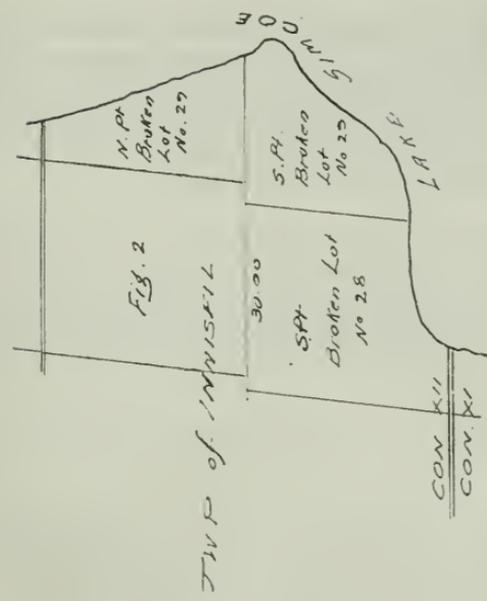
This paper consists of a few diagrams and questions about the problems they illustrate. Under ordinary circumstances they would have gone to the question box.

Take diagram No. 1.—According to the patent, the southerly limit of the northerly part of broken lot No. 26 is the centre line of the concession. Now before asking how you would run the centre line of the concession on this point of land, let me say that I made a sub-division on this part of lot No. 26 (and including lot 27), and when I took the plan to the Deputy Registrar he agreed to record it if I would endorse below this limit as follows:—"This line is the centre line of the concession as described in the patent to J. H. Wilson." I remonstrated, saying that I could not prove it was, although no one could prove that it was not. He was inexorable and the endorsement went on, while I felt I was being forced into committing an offence against my conscience. I also advised my clients to protect themselves by obtaining a quit claim, which they did, from their neighbour.

I might say that the said southerly limit was already laid out and posted many years ago, and the posts were in evidence. I endeavoured to find out how or on what principle the survey had been made, but could only come to the conclusion that the surveyor had endeavoured in some way to produce the blind line as found further west, but on what principle I could not tell. It seems to me that there should be explicit law to govern such cases, and I ask in how far other surveyors are interested, and is it too late to have a method clearly defined in the Act.

Then again if such legislation were enacted, how could it effect those cases where surveys had already been made according to the surveyor's own judgment, good, bad or indifferent, as it may have been.

Diagram No. 2 is another illustration of the same difficulty as to the centre line of the concession. There also it is not



clear in the Act (as applied to double front concessions), how to run the line between the southerly parts of 28 and 29. In 1912 the committee approved of my survey, conducted on the principle of sub. sec. 2, sec. 34 of the revised Act of 1911, but did not say specifically that the clause referred to was a legal basis for the survey. Is it so or not.

(Referring to the first diagram) I was under the obligation of putting a certificate on the plan that that limit was the centre line of the concession, and I said to the Registrar that there was no law by which I could run that centre line and call it the centre line of the concession according to the Act.

A Member—How did that line fit with the distance from the south.

Mr. Ardagh—I went to quite a lot of trouble. I tried to determine the northerly concession line first of all, but that was difficult. That line would have involved quite a survey, and then I couldn't be sure about it. Finally, after having located that line as well as I could, and chained across where the concession was unbroken, I found the fence was not quite in the centre between the two, but from calculations I found that this point was very nearly the centre between here and here, as far as I could make out.

Mr. Gaviller—The gentleman asked how the measurement on the side road agreed with the original.

Mr. Ardagh—The side road was not run originally. This post here was not an original post, but was put in by some surveyor twenty or thirty years ago.

Mr. Gaviller—Is that Cedar Point?

Mr. Ardagh—That is Cedar Point.

Are surveyors interested in questions of that kind, and is it too late to introduce any legislation to govern? Simcoe County has been pretty well fixed up by this time.

Mr. Gaviller—Did you attempt to define any line between the point and lot 26?

Mr. Ardagh—There was a line posted here and I found that whatever surveyor had run that line had run it at random.

Mr. Gaviller—How much did he give the lot going east?

Mr. Ardagh—He gave it something more than thirty chains, why I don't know, but I gave it thirty chains and ran my line down here accordingly (between lots 26 and 27).

How can the centre of the concession be determined? It can't be.

Mr. Gaviller—There is nothing in the Act to cover that.

Mr. Ardagh—Are surveyors sufficiently interested in cases of that kind to have legislation introduced by which we can make an accurate legal survey of such lands?

Mr. Gaviller—That occurs in a great many concessions on the east and west sides of Lake Simcoe, because when the townships were surveyed the only guide you have from the original field notes on record is the width of the broken lot on each concession line and only the concession lines were surveyed, and there is nothing to guide in a great many places where they are not shown unless they could see them with their eyes or looked out to see there was a point, they didn't show it. There are one or two cases I know of where there are two or three hundred acres on the point which is not actually shown in the plan at all.

Mr. Ardagh—After the townships survey was made a traverse was made all around the shore, but it was not connected with any of the lines that had been run out to the shore.

The Secretary—The original plan showed a lot 27.

Mr. Ardagh—Yes, because they made a traverse of this shore, that is on file, and it is not connected in any kind of way with these points.

Mr. Gaviller—All that any man could do is to settle the question between owners, but when it comes to giving a certificate in the Registry Office, I think you are perfectly right; you couldn't give a certificate that was under any rule or regulation, or according to any Statute.

Mr. Ardagh—They were all waiting for it; it had cost them \$760 to make that survey, and that was the only thing that was lacking. I did it, but I didn't like to do it, because technically I thought I should not have been obliged to do it. He wouldn't put the plan on file till I had specified that was the line

described in the patent. The Registrar was bound to know I was sub-dividing the land described in the patent, so of course he had to know that was the line described in the patent. I certified finally as follows:—"This line is the centre line of the concession as described in the patent to one J. H. Wilson."

Mr. Aylsworth—What did you describe that as?

Mr. Ardagh—I had put the following designations on the plan "the northerly part of broken lot No. 26" and "the southerly part of broken lot No. 26" and shown the line between them but he was not satisfied with that.

What would you think would be the best method, apart from there being no law to cover it, of running that line? Would you say to start from a point which you could determine and run from that point on the astronomic bearing shown in the field notes on which these concession lines were supposed to be run?

Mr. Gaviller—No, I think the fairest way would be to take the bearing of the concession line north and south and run your blind line on the mean bearing, and that is to divide evenly the north or south half of those lots. I would run on a mean bearing. I know a case in which Mr. John Flemming ran the concession lines right out on the ice in the winter and then measured between the extension of these two lines and made an equal divide and ran from his point established on the shore and established his blind line that way.

Mr. Ardagh—I did the same thing at Sandy Cove the other day on the ice, and I came within a foot of where the fence had been already located.

The other question I had to ask was this, the committee in 1912 decided I had run that line between southerly parts of broken lots Nos. 28 and 29 (on diagram 2), properly by running it parallel to this line and thirty chains distant from the same, treating this line (the blind line) as the rear line of the concession, and employing sub-section 2 of section 34, but that is not really the rear line of the concession, therefore it would be much better if the clause had been made clearly to apply to double front concessions as well as to alternate concessions.

Mr. Gaviller—I noticed that in the last year's proceedings, as far as I could make out the ruling, and I took that line as the

blind line of the concession. Of course to measure along that blind line and divide on that. I don't consider that would settle that question.

Ardagh—It doesn't settle it legally.

Mr. Gaviller—The question was, should there or should there not be a jog on the blind line?

Mr. Ardagh— We talked with Mr. Kirkpatrick before I asked the committee and he said that I had no law whatsoever to govern me, but it was a common sense way to apply that principle, that is, to treat this as the rear line of the concession (in principle though not in fact).

Mr. Gaviller—But it should never be treated as the rear line of the concession because that creates great confusion. There is no rear line to a double front concession.

Mr. Ardagh—This little bit of land in here was worth about a couple of thousand dollars at boom prices, so there was something at stake. I asked the committee whether legislation should not be considered to govern such a case as that, but they didn't answer.

Mr. Murphy—It would be hard to get legislation that would cover all those points. I don't see how you could get legislation that would cover every point.

Mr. Ardagh—The legislation I wanted was in that clause, speaking of the alternate concession, and to see this clause was applied to the double front concession.

Mr. Gaviller—The rear line of the south and north half in that case.

Mr. Ardagh—Yes, that it should be treated in the same manner as if it was a line between alternate concessions.

Mr. Gaviller—It would be on the same principle as a section survey.

Mr. Ardagh—Section 43 was introduced in 1911 (reads). Now I asked the question, does that refer to double front as well as alternate concessions? I didn't get any answer to that, and here is the illustration (See page 63 (fig. I.) Report 1912). I made a survey projecting that line across from a post here to a post here (pointing to westerly and easterly posts shown); that was about four miles. I wanted to run these lines in

between here (pointing to certain lines between certain northerly parts) and also the blind line. That is Strathallan. That is I divided the distance between the projected line and the southerly limit of the concession to get the blind line. The committee held I was wrong in doing that. They said this shore line is the front of the concession, and that 33 chains 33 links should be measured from this southerly limit of the concession to get that blind line.

Mr. Gaviller—I don't think it was brought out clearly that that line crosses part of the Bay, then strikes a point, and it shows up in another place down at Big Bay Point further east; it crosses it further east. There you have part of a line at the west end and part nearly towards the middle and another part at the east end, showing in the original field notes. The question that troubled us was to get that under the existing clause in the Act, to define definitely whether that line should be connected between those points that showed on the original plan and field notes and then divide on that to give you the fronts of your lots. I think it should be. You wouldn't go chaining along the concession line or the blind line to the south and then produce a line straight through. That same question came up on the Allan estate. I never would run that for that simple reason because that question at that time had not been defined.

Mr. Ardagh—In the original notes these points (the corners of the lots on the projected line) were entered as "in the bay" for each point, and they cross a small point of land here, that gave the idea that the line should be used for a division of the concession between nearest posts, but the committee held no, that this was not the front of the concession, and that 33 chains and 33 links should be measured from south limit.

Mr. Gaviller—The difficulty with the committee seemed to have been that they were not aware that that line showed after it came through, there is only 50 links of the west lot that is shown in the bay, then it crosses a point and goes into the water again and meets another point on which the old blaze can be found; I have found it myself and the chaining of the ground agrees with the original survey where it can be found. But that wouldn't put it under the clause where it is water at both ends of your concession.

Mr. Ardagh—They had the full field notes and the diagram before them.

Mr. Gaviller—I think the original survey was made years ago, and the surveyor must have chained that on the ice and he ran from the water front right to the south and made the jogs.

Mr. Ardagh—I chained that through on the ice and came within one foot of that corner (blind line at side road 20-21). In the same way with other places along here, I ran right into the fence, having run the lot lines on the proper astronomic bearing.

Mr. Gaviller—I was asked why I put jogs on that and didn't put it on the other; I said that road had been travelled for fifty years or more and I was not going to change the whole survey and wipe out these jogs on account of that.

Mr. Ardagh—That is with reference to the lot lines. In regard to the division of the concession, according to clause 43, you would measure in 33 chains 33 links; that is the depth shown on the original plan and field notes; but to my mind this clause refers to alternate concessions. The principle is the same, but it should be made clear that this clause can be referred to a double front where the blind line is the centre of the concession and not the rear.

Mr. Gaviller—If the whole thing ran into the water and then went on and had no other end on the land that would make it another case altogether.

Mr. Ardagh—I think it is quite a moot point as to whether the answer the committee gave is right or not.

Mr. van Nostrand—I would like to ask if the patents of that broken half lot indicate whether a broken area or otherwise?

Mr. Ardagh—Yes, I have seen the patents and they indicate a broken area.

Mr. van Nostrand—That is equivalent to considering it a broken lot and then you extend to the lake, and the lake then is not a part of the lot.

Mr. Ardagh—No, the lake is not a part of the lot. The principle in section 43 would govern in the absence of anything else.

Mr. Routly—I think that all this discussion we are having is one of the most valuable features of our meeting. Un-

fortunately, however, it appears to be crowding out a lot of the other work and these questions that have been discussed this morning, and this question this afternoon, are left very much in the air. I think the gentlemen who bring questions here expect to get some definite positive expression of opinion that they can use from us as an authority. There has been some talk among a number of the members of our committee on surveying that the committee should be furnished with these questions some little time ahead and that copies of them should, if possible, be sent to the members of the association along with the announcement of the meeting. I think to begin with a number of the questions have been brought up just before meeting here and that the committee on surveying have not had time to thoroughly digest and report on them; if they could all be left in the box and reported on next year and a report brought in after careful study it would be practically the expression of the most matured judgment of the association, and it would be very valuable. When the proper time comes I would like to have the association go into the question of seeing if we cannot find some way of having these questions brought in such a way that all the discussion will be after the people speaking have had a chance to think thoroughly on the questions.

Mr. Murphy—That is a very good idea, if they would submit those questions a long time in advance and send them in triplicate so that we could refer them to almost every member. We have had no time whatever to consider these questions. I think that is a very good idea to have them sent at least two months in advance.

The Secretary—I would like to draw the attention of the members that this is a little different from the question drawer. Mr. Ardagh was writing a paper here at my suggestion, and he wanted to know what to write about. It is very hard to get papers and to fill up our program, and Mr. Ardagh agreed to write this little paper. I think the questions have been fairly put before us and the members will see it in the report, and if there is any points that may arise they might be better prepared for that for the next meeting or to bring something before the Land Surveying Committee.

The President—I think Mr. Rorke's point and Mr. Routly's point are both very well taken. There is no question about it that Mr. Ardagh has gone to a great deal of trouble

in preparing these diagrams and this paper, and has submitted a lot of valuable information. I don't think Mr. Ardagh expects this association can give an authoritative decision on these matters. The Land Surveying Committee can only give their opinion of what should be the right thing to do on these questions. I think Mr. Ardagh's paper will be printed in the report together with the diagrams, and every member will have an opportunity to look them over. Then if there are any questions arising out of that they can be brought before the Land Surveying Committee at the proper time and I think in order to bring this matter forward I would suggest that some time to-morrow morning a motion be brought in.

Mr. Routly—I move a vote of thanks of the Association be tendered to Mr. Ardagh for the great care he has taken in preparing these diagrams and bringing these questions to it. While these questions do not concern me, they must concern quite a number of others, and I feel Mr. Ardagh is entitled to the thanks of the Association for preparing this paper and the diagrams in the way he has, and I would add to my motion that these be printed in the annual report.

Mr. Murphy—I second the motion.

The President put the motion which on a vote having been taken, was declared carried.

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A PLEA FOR PERMANENT LEVELS FOR CITIES, TOWNS AND VILLAGES.

By A. M. Jackson.

Permanent levels are those levels to which it is ultimately intended to improve streets. Here let me state in a general way the condition of affairs with regard to street levels, as such exist in many of our towns today. For example of an extreme case, a street which has never been improved, beyond being crowned and possibly gravelled or lightly macadamised, has a knoll in it giving a grade of seven per cent. Such is entirely undesirable. We all see examples of streets with such grades, which, from an engineering standpoint at least, are undesirable. If that grade is to be altered, where will the new one lie. Will the improvement be made by cutting at the top or by filling at the bottom, or by a measure of both methods? Who is to say? why the Town Engineer.

The engineer is asked by an owner about to build, "what height will the sidewalk be, in front of my property?" "I am going to build and I want to set my house about six inches above the sidewalk, so that my approach may have an easy grade, from the sidewalk to the house." The engineer will say "I have never considered that street, as it is not intended to put down walks on it, at present." The property owner says, "I want to build now, I do not want to have my house up in the air, and I do not want it below the walk, what am I to do?" If that engineer is wise he will not advise. It is asking him to assume an unfair responsibility. If he does not advise, the ratepayer assumes that responsibility himself, builds his house at any elevation which suits himself, entirely disregarding the interests of his neighbors and the street, and he does so with the very firm determination, to have that sidewalk, when it is built, set at a level that will suit him. Meanwhile all his neighbours on each side, and across the street, have done the same thing. Each has set his house at an elevation to suit himself, each has entirely disregarded

the needs of the adjacent properties, and each has made that firm determination to have the sidewalk built, at a level that will suit himself. Happy is the lot of the engineer who eventually comes along to lay out the sidewalks or the paving of that street.

He will find differences in extreme cases of two feet in the level of approach walks run out to meet the new sidewalk, and also radical differences in the floor levels of stores, built right up to the street line.

He can seldom do more, than take for his grade, a mean of these differences; or in other words, the line of least resistance, unless he is prepared to put in a switch back grade, or do a serious injury to some of the property. I may quote an instance. The owner of a low lying property in one of the large cities of Western Ontario, built his house at a level, convenient to the street as it existed at the time of building. It was necessary, the district is residential and growing rapidly, to improve the grades of the street. The improvement, and it is a real improvement to the approach to the whole neighbourhood, was made. The City Council now finds itself faced with an action for the recovery or damages to the abutting properties, occasioned by the carrying out of a work which was entirely necessary for the betterment of the whole suburb but which now leaves several houses some five feet below the street level.

In the case of the sidewalk which is set at such grades as will most nearly conform to the existing levels of the approach walks, or the floors, the street is ultimately paved, and the engineer again finds himself confronted with the necessity of striking a mean, or in other words, taking the line of least resistance. If the pavement extends from sidewalk to sidewalk, he must either put in a curb of varying heights, or one in steps. If the pavement is narrow, he is enabled possibly by the width of the boulevarding, to take up the discrepancies in the heights of the sidewalk and run his curb on an even grade with, and at a regular height above the pavement. In case, however, of the pavement extending from sidewalk to sidewalk, instances have arisen, in which the differences in level between the walks on opposite sides of the street, have necessitated the rebuilding of the sidewalk on one side or the other at very considerable expense.

Surely such difficulties might be entirely avoided in the case of new streets, by the legal establishment of permanent levels, for every street at the time when it becomes a street.

Surely such difficulties might be lessened, if permanent levels for all streets not already permanently improved, were universally adopted.

Were permanent levels legally established universally in Ontario, the engineer's answer to his inquiring friend the property owner about to build, would come with certainty and precision. That answer would be, "when a walk is built on your street it will be so many inches above the ground level at the centre of the lot." Moreover the intelligent consideration by a council, of such questions as the granting of a franchise for a railway to traverse streets under its jurisdiction, would be very greatly facilitated, and possibly relieved, altogether from undesirable pressure.

The permanent levels of all streets should be fixed at the incorporation of a village. At this stage in the development of a street, the minimum of hardship on property owners would be inflicted. A plan should be prepared showing every street for which the municipality is responsible, and this should be accompanied by a profile of each street, on which would be shown the existing surface, and the grades which are ultimately proposed to be established for the centre line of the street, and also for both sidewalks.

In establishing the permanent levels, the engineer appointed by the municipality for the purpose, would be enabled to prepare a comprehensive scheme of grades and levels, in which every street and its surroundings would be considered in its relationship to all other streets. Having all the streets under review would enable him to treat them in a comprehensive manner, which consistent with economy, would result in a system of grades suitable for traffic, providing for surface drainage, and conforming to the general contour of the country side.

A street duly established in a municipality and shown on its registered plan, can never be lost. Its position in plan is fixed, and the street cannot be anywhere but where the registered plan shows it to be. Should not its permanent

position in elevation be fixed? Has not every abutting property owner as much right to know whether that street is to be permanently improved, shall we say paved, at an elevation consistent with his rights, as he has to know that the street line is fourteen feet from his house, and that, save by legal process of expropriation it can never be more or less?

Should not the owner be enabled to fix when he builds, his relationship to the level of his street, as securely as he can fix his relationship to the position of that street in plan?

The disconnected manner in which the grades of streets are fixed, and more particularly the fact that property owners build on most of our streets before any grades are established at all, has led to the permanent disfigurement of many of our towns. I venture to say that every surveyor here present, can recall to mind in his own city or town, some case of disfigurement or damage to property, due to the fact that the grades of the streets have been practically fixed, by the levels at which buildings have been erected. I could point out a permanently paved street in the heart of one of the cities of Ontario on which the pavement lies between three and four feet above the entrances of the stores on each side of that street. Another case and this in an unusually flat part of the country, in which the sidewalks on opposite sides of the streets differ by as much as three feet for no other reason than that the walks were constructed to suit the levels of stores instead of the stores being built at such elevation as would have been provided by an engineer who fixed the permanent levels for the streets, and had the same duly legalised.

Permanent levels could be legally established by the provision of legislation on the subject in the shape of an addition to the Municipal Act.

Such an addition might embody the following:

That every city, town, or village municipality, shall cause to be made within three years, a map showing all the streets and private streets within its limits, with the levels thereof, as the same are, or are intended to be, or will be required to be, permanently constructed.

Thereafter all buildings erected within the municipality, and all private streets shall be constructed with reference to the levels shown upon the said map.

Any person who builds any house, or other buildings, abutting on a street, or private street, without regard to the level thereof as legally fixed, shall be liable to pay to the Council, any expenses which the council deem it necessary to incur, in altering the level or construction of such street.

After this enactment the municipalities would employ an engineer to fix the permanent levels of all their streets. The engineer would prepare the plans and profiles, and the council would view each street and see the changes of grade recommended by their engineer. They would then provisionally adopt the plans, and advertise them open for inspection at the Clerk's office, for reasonable period. A court of revision would then be held at which complaints against the proposed grade would be heard. Thereafter the council would adopt the permanent levels finally decided upon, by By-law. Copies of the plan and profile, would then be permanently filed in the office of the clerk for the use of the public at any time.

My object in bringing this plea for the establishment of permanent levels before the Association in the form of a paper, was to raise discussion, so that the views of the older and more experienced members, might be heard for the benefit of all, on a subject which I feel sure has given most engineers, in the lesser cities and towns at all events, many unnecessarily difficult problems. And also to bring before the Association, the fact that at the present time, individual owners to a large extent, fix the permanent levels of the streets on which they build instead of this being done for them, on sound engineering principles, wherein the permanent advantage of the community would be the first consideration, instead of the possible temporary convenience of individuals, and where the permanent levels of streets and sidewalks would be as rigidly fixed by municipal by-law, as are their alignment. The expanding city would then develop the levels and grades of its streets on an organised scheme, instead of piecemeal, and would be guided as undoubtedly it should be, by the members of this Association.

Discussion.

The President—You have all heard this very excellent paper on a very interesting subject. It is now open for discussion.

Mr. Maclean—Mr. President and gentlemen, I am sure that all who have heard the paper here to-day are in hearty accord with the views expressed. In my own experience throughout Ontario the facts that have been set forth in the paper have been only too apparent, and I am sure the neglect to establish the permanent grades is costing the Province every year hundreds and thousands of dollars, and at the same time it is making it impossible for engineers to secure the results that the people are asking for in their streets. We know that. The trouble is that the people of the country ought to know that, and one trouble is that the people of the country as I have come in contact with them are so eternally opposed to employing an engineer in any of their work. That is something which in a slight way I have tried to counteract, and it seems to me that before a matter of that kind can be put into the statute that the people of the country have to be educated. This paper will serve a purpose in that regard, and if such a proposal could only be put before the house in the form of a bill and discussed and talked of on the floor of the house that in itself would have an educative effect. I think that is the point on which all engineers and surveyors should use their best influence as far as possible to get the people of the country to understand its importance.

Mr. Speight—I might say that in Greater New York the Highway Commission, when they established the street line at the same time fixed the grades, and that is done in conjunction with the Assessment Commissioners and land owners conjoined.

Mr. Routly— Mr. President, I think that is one of the most valuable papers we have had. I don't think there would be as much difficulty in obtaining legislation on this question as might appear at first glance. Nearly every resident of a town or village is anxious to know the grade and when the thing is in the abstract he is in favor of it. Very often when you are asked to lay down the grade he may object to it, but until it is brought home to him in detail he will be in favor of

it in the abstract, and I think the bulk of the Councils in all the smaller towns would endorse a proposition of this kind. There is no question but what it will save money to the people in the long run to have it done; it would also give more work for the profession and cause the development of the towns to proceed along much better lines than at present. Another phase of it is when the engineer is called on to give grades on a street or building grades he very often has to go to an unnecessary amount of bother because the grades have not been laid down over the whole town and it is a very difficult question very often to solve just where a grade should be laid. I know of one or two instances in the north country in the town of Haileybury, where grades were laid down by engineers passing through, largely as a favor to the people who lived on the street; they were anxious to build and the Council wanted an engineer passing through to give a grade, but he gave the grade without reference to the general lay of the town, and the result is that the whole main street has got to be tipped over; it is about either two or three feet higher on one side than on the other for a couple of blocks, then it straightens itself out at both ends in another block or two. But, it was very difficult proposition to figure out any kind of grade that could be laid down and that would look ordinarily decent and would not bring a whole crop of damage suits for changing the grade.

I have much pleasure in moving that this paper be published in our proceedings and I think it would be well to refer the question to the committee on legislation. I believe there is some movement on foot by which the debentures being issued by small towns for waterworks and sewers and sidewalks and the like of that will have to be submitted to some central organization. I don't think that is in effect yet but there is a motion towards that end. In a case of that kind, if this governing body were established they would probably have authority to say before you lay down your sidewalks or take this money you must know where you are going to lay them; in other words the grades must be fixed.

Mr. Jackson—I may say that permanent levels along the lines outlined in that paper are established in Australia, New Zealand and South Africa, and in connection with an engineer who established the permanent levels for a borough or suburb in one of the towns in New Zealand that I know, the engineer's name was Baker Mason, and the municipality appointed him

to fix the permanent levels for the suburb, and in doing so he went around and took preliminary levels, establishing the bench marks on the sidewalks; wherever he put a bench mark he painted a broad arrow and put the letters B. M., and during the progress of the work there was a Council meeting, and one of the Councillors with just about the same standard of intelligence we have in many of our Councils here, got up and said he didn't see why this infernal engineer should go around the town putting his initials on the sidewalks.

The motion was seconded by Mr. Bolton.

The President put the motion, which, on a vote having been taken, was declared carried.

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

THE DITCHES AND WATERCOURSES ACT.

By E. D. Bolton.

The Ditches and Watercourses Act and amendments thereto passed last in 1912, coming into force in July.

The Ditches and Watercourses Act is intended to be made use of in and to afford the necessary authority for the construction of a comparatively short and inexpensive drain which will carry the surplus water to sufficient outlet so that no injury to neighboring lands will result from their operation, it does not authorize the construction of drain which will affect large areas of land nor such as will involve the expenditure of large sums of money and as a result necessitate the levying of a special tax on the lands to be drained and the issuing of debentures to defray the cost. I will not attempt in this paper to cover every section of the Act, but will take those sections which are most important.

The meaning of the word owner under the Act was not fully defined in any of the Acts in force until this Act was passed in 1894, which is fully defined and includes a Municipal Corporation and also a Railway Company holding an Ontario Charter.

The word Engineer under this Act shall mean Civil Engineer, O. L. Surveyor or such other person as any Municipality may deem competent, and appoint to carry out the provisions of this Act. Just here I would like to say that I am acquainted with two Engineers under this Act who are farmers and are not capable of making a proper Profile, yet the Municipalities consider them competent to carry out the provisions of the Act. Under the Municipal Drainage Act, the proposed drainage work must be located and planned by a qualified Engineer, or Ontario Land Surveyor, that is to say by a professional man, presumably qualified to carry out the work.

Section 5.—Every Municipal Council shall name and appoint by By-law Form 1, one person to be the Engineer to carry out the Act and such Engineer shall be and continue an officer of such Corporation until his appointment is revoked

by By-Law (of which he shall have notice). With regard to one person as Engineer to carry out the Act I would say that I know of two cases where Townships have appointed two Engineers, also I know of a number of cases where a new Engineer was appointed to Act and no By-Law passed revoking the appointment of the former Engineer (who has until this day never been notified). The Act in this respect differs from the Municipal Drainage Act, which contains no express condition that the Engineer shall be appointed by By-Law.

Section 6.—Every ditch constructed under this Act shall be continued to a sufficient outlet, the Act does not define sufficient outlet, but the Municipal Drainage Act defines it as the safe discharge of the water at a point where it will do no injury to lands or roads. It has been decided in certain cases (which have arisen regarding sufficient outlet) that this point is usually left to the judgment of the Engineer, but the question is one of fact. One Judge gives a running stream with sufficient banks to contain the water as sufficient outlet. The drain shall also not pass through or into more than seven original township lots, exclusive of any parts of the ditch on or across a road allowance unless the council of any Municipality upon the petition of a majority of the owners of the land to be drained passes a resolution authorizing the extension thereof through or into any other lots within such Municipality or adjoining Municipality and upon passing such resolution the proposed ditch may be subject to sub-section 2 extended in pursuance of such resolution. Sub. (2)—No ditch, the cost of which shall according to the estimate of the Engineer or the agreement of the parties exceed the sum of \$1,500.00 shall be constructed under the provisions of this Act.

Section 7.—The land, the owners of which may be made liable for the construction of a ditch, shall be that lying within 150 rods from the sides and point of commencement of the ditch, but land through or onto which the ditch does not pass and which also adjoins any road allowance traversed by the ditch shall not be liable except when directly benefited. The old Act used to be 75 rods instead of 150.

Section 8.—The owner of any parcel of land who requires the construction of a ditch thereon shall before filing the requisition required by section 13, serve upon the owners or occupants of the other lands affected, a notice in writing form 2, signed by him and naming a day and hour and also a place

convenient to the site of the ditch at which all the owners are to meet and estimate the cost of the ditch and agree if possible upon the apportionment of the work, etc., and the notices shall be served not less than 12 clear days before the time named therein for the meeting.

Section 9.—If an agreement is arrived at by the owners at the friendly meeting it shall be reduced to writing form (3) and signed by all the owners and shall within 6 days after the signing thereof be filed with the Clerk of the Municipality in which the proposed ditch is situate, but if the lands lie in two or more Municipalities the agreement shall be in as many numbers as there are Municipalities, and filed with their respective Clerks, and the agreement may be enforced in like manner as an Award. With regard to this section I would mention that the Act is somewhat defective, this agreement may be entered into without the services of an Engineer. I have known a number of these agreements being entered into where the description, course of the ditch, depth and care very indefinite quantities, everything runs smooth and lovely until some owner wishes to inforce the Agreement when he finds that he is facing an impossibility. We will suppose for instance there are three owners, parties to an Agreement, one owner wishes to enforce the Agreement and the other two do not, after the time is up for the completion of the drain there is no provision in the Act for its inforcement, since the amendment was passed making it compulsory for the Engineer to examine the drain after the time limit for completion, this applies to an Award but not an Agreement as I understand the Act. I may say that I have had considerable experience regarding these Agreements and they generally end up by calling on the Engineer to make an Award.

Section 13.—In case an Agreement is not arrived at by the owners at the friendly meeting or within 5 days thereafter then the owner requiring the ditch may file with the Clerk of the Municipality a Requisition form 4, requesting the Engineer to appoint a time and place in the locality of the proposed ditch at which the said Engineer will attend and make an examination as hereinafter provided and the Clerk upon receiving the Requisition sends a copy thereof to the Engineer who on receipt of the same sends a notification in writing to the Clerk appointing a day and place at which he will attend, etc., the Clerk then files the Requisition with the notice and forthwith sends by registered post a copy of the

notice of appointment to the owner making the Requisition who shall at least 4 clear days before the time appointed by the Engineer serve upon the other owners named in the Requisition a notice form 5, requiring their attendance at the time and manner of service and leave the same with the Engineer not later than the day before the time fixed by the Engineer. My experience is that this last clause is seldom carried out as the owner is ignorant of the law and the Clerk neglects to inform him what to do.

Section 15.—Notices under the provisions of this Act are to be served personally or by leaving the same at the place of abode of the owner or occupant with a grown up person residing thereat, in case of non-resident then upon the agent of the owner or by registered letter to the owner at the Post Office nearest his last known place of residence and where that is not known he may be served as the Judge may direct, and it is the duty of the occupant not the owner to immediately notify the owner.

Section 16.—The Engineer shall attend at the time and place appointed by him in answer to said Requisition and shall examine the locality, etc., and if he deems it advisable any interested owner not receiving the 4 days notice may be notified and he adjourns the proceedings accordingly, he then returns to the locality on the adjourned date finishes the examination survey, etc., and makes his Award. Within 30 days from the date of the first meeting, unless railway lands are connected with the scheme when extra time is allowed for approval of the Board of Railway Commissioners where necessary. With regard to the time of 30 days for making the Award I would say that this time in many cases is too short, there have been a number of appeals to set aside Awards on this ground but the decisions were given sustaining the Awards.

With regard to form 6, Award of Engineer, according to this form every owner interested together with description of land owned by him shall make and complete (here fix the point of commencement and ending of his portion) and shall furnish the material (state what material) all of which according to my estimate will amount in value to \$... and I fix the time for the performance of such work and providing such material on the day of A.D. 19 at furthest, and so on for each owner, party to the Award. This last summer the

writer had two Awards to make in a town; there were about 80 interested in one and about 50 in the other. Now to divide a drain up into 80 parts would be almost an impossibility. What the writer did was this, the Municipality was awarded the work and the others were assessed in the following manner. The owner with descriptions of land affected shall in lieu of doing the work and providing the material pay to the parties as here shown for their respective portions of said work the amounts set opposite their respective names said amounts to be paid as soon as the certificate of the Engineer as to the completion of the work has been filed with the Clerk of the Municipality. The schedule states to whom the different amounts are to be paid. In making an Award this way I have always tried to give accurate descriptions of lands and also make it plain what Municipality is assessed for. In regard to the maintenance of the drain I have always awarded that part to the parties who own the lands through which the ditch passes. In an Award where the drain is a tile or covered drain and only a few parties interested I have generally followed this course: I award the owner to do the work on his own land and then ask him to pay the owner down stream for increased size of tile necessary or whatever I think is his just portion. As regards the maintenance of the drain I have nearly always awarded that portion of the work to the owner of the land through which the ditch passes.

Section 21.—This provided for an appeal against the Award of the Engineer and the County Judge may set aside or alter an Award on the following grounds. If the party who initiated the proceedings is not an owner within the meaning of the Act. If the ditch is not carried to a sufficient outlet, or if it should pass through more than 7 original farm lots (unless the proceedings according to the Act are taken). Should it exceed the limit of cost prescribed by Section 5. Where the Engineer has not been properly appointed to office, or where he has never taken the prescribed oath of office. If the Award should assess or project the ditch across the lands of a Railway Company operating under a Dominion Charter unless an Agreement has been first reached with such company or if the Award should be defective in any of the following respects. In not sufficiently defining the course and termini of the ditch. In not sufficiently defining the parcels of land liable for construction and maintenance. If it does not limit a time within which the ditch is to be completed or if the Award is not based upon a personal and accurate ex-

amination by the Engineer. If the appellant has not been served with notice of meeting called by the Engineer and has not been present at such meeting. If the ditch, when constructed, will be of no benefit to the lands of the appellant or of less benefit than is found by the Engineer, the Award should be amended in this respect, the Appeal must be made within 15 days, etc., and after this time has elapsed the Award may be held good and binding upon all parties interested.

Section 26, subject to section 27, the Municipality or Municipalities shall after the time is up for appeal or after appeal as the case may be, pay the Engineer and Judge and others their charges and fees, my experience with Municipalities has been that this section is seldom complied with.

Section 28.—The Engineer at the expiration of the time limited by the Award for the completion of the ditch shall inspect the same and if he finds the ditch or any part thereof not completed according to the Award he may let the work and supply of material to the lowest bidder giving security in favor of the Municipality by which he was appointed. (2) If, however, the Engineer is satisfied. If the good faith of the person failing in the performance of the Award and there is good reason for the non-performance of the work he may, in his discretion, and upon payment of his fees and charges, extend the time for such performance. I might here say that this section provides for the payment of the Engineer where the work is not completed, but where the Engineer comes on and finds the work fully completed in accordance with the Award, there is no provision in the Act for the payment of his fees. I have in some cases added this fee to the costs in the Award, but there is always an objection to this, one of which is charging for work before it is done, and in the case of a long drain one does not know what the cost will be until the work is done. However, the writer's experience has been that no Award yet made by him has been completed within the time limit. As you will see this section now enacts that the Engineer after the time is up for the completion of the work shall inspect the same. As it stood in the Revised Statute the Engineer was obliged only to do this work after required in writing so to do, by any of the parties to the Award. This clause was struck out in 1902, so that the duty to inspect is now obligatory in all cases, and without notice.

Section 30.—Owners desiring to avail themselves of the use of a ditch after construction must proceed in the usual

way according to the provisions of the Act, and have an Award or Agreement made to cover the case.

Section 31.—This Act shall apply to the deepening and widening or covering of a drain already or hereafter constructed, and the proceedings to be taken for procuring such shall be the same as for the construction of a ditch but in no case shall a ditch be covered unless it will provide sufficient capacity for all the surface and other water from lands and roads draining naturally towards and into it as well as for the water from all the lands made liable for the construction thereof. Most of the Awards under this Act are started under this section, but the system does not mention anything about an improved or better outlet nor of otherwise improving the drain.

Section 34 provides for the construction of a drain whether or not a drain has been previously constructed under this Act or any other Act.

Section 35.—Subject to the provisions of sub. sec. 2, an owner, party to an Agreement or Award whose land is affected by a ditch constructed under this Act or any other Act respecting ditches and watercourses at any time after the expiration of two years, or in case of a covered drain one year from the completion thereof may take proceedings for the reconsideration of the Agreement or Award under which it was constructed and the proceedings shall be the same as are hereinbefore provided in the case of the construction of a ditch. Sub. 2, if a ditch after the construction proves insufficient for the purpose for which it was constructed, so as to cause an overflow of water upon any land along the ditch and damage to the same any owner, party to the Agreement or Award, may at any time after the expiration of six months from the completion of the ditch, take proceedings for the reconsideration of Agreement or Award, under which it was constructed for the purpose of remedying the defect. This section says nothing about a reconsideration where the drain is not completed according to an Award, and if the Engineer neglects to perform his duties as set out in the Act, sometimes two or three years elapse before there is any relief obtained, and the Engineer often does not go on and advertise and let the work unless the work is urged by an interested party. This, in many cases, is not done, as a neighbor will sometimes

put up with a lot of inconvenience sooner than be at outs with another.

Section 36.—An Engineer who wilfully neglects to make an inspection provided by this Act for 30 days after he has received written notice to inspect, shall incur a penalty of not less than \$5.00 and not more than \$10.00, recoverable under the Ontario Summary Convictions Act, and every such penalty when recovered shall be paid over to the Treasurer of the Municipality in which the inspection should have been made. This section is important. I know a number of Engineers who are certainly very careless in the performance of their duty under this Act. I was called upon this summer to make a number of inspections of Awards made by a former Engineer who had for some months neglected to do his work. In conclusion, I would beg leave to say that in some of the surrounding townships here the Municipal Councils are advising farmers to proceed for drainage under the Municipal Drainage Act, in preference to this Act, as there is too much machinery to set in motion for the results obtained, one could quite well compare the two Acts to articles of commerce: a cheap article is often dear at any price, and a good article is always worth the additional cost. Of course in the case of a Municipal drain the printing of the By-laws, and Engineers and Clerks' fees is a considerable item. The maintenance of a drain under the D. & W. Act is a perplexing proposition, especially so in case of a long drain, one party keeps his drain in good shape while his neighbor does not, and in consequence the drain soon becomes filled up, and has to be done over again and very little benefit is derived therefrom, whereas under the Municipal Drainage Act the whole drain is completed from end to end at the one time. There is one point which is this, in some cases where I go on to make the inspection I find that the owner has not done his portion of the work, for the reason that he says he cannot do it at the price for which the Engineer has estimated. In suit cases the writer always informs such owner that the Act only calls for an estimate and nothing more.

Discussion.

The President—Is there any discussion gentlemen on this paper?

Mr. Webster—There is one point about the paper that struck me forcibly. I have thought of it a great many times

but never had an opportunity of voicing it, and that is the fact that a municipal council can appoint any farmer to carry out the provisions of the Drainage Act. The Ontario Land Surveyors pass an examination, rather original at that, in the Drainage Acts. I think we should make some protest against the fact that it does not carry any weight with it, that nobody can enforce the provisions of the Drainage Act. Out in the western provinces there is a provision which says no man can act as a drainage engineer unless he is a Provincial Land Surveyor or Associate Engineer. I should like to have a committee appointed or something done towards looking into that phase of the matter.

Mr. McCubbin—It may be that very thing amongst others is one cause of bringing the Ditches and Watercourses Act into disrepute; down in south-western Ontario it is looked on as a cheap and poor thing, and there is not one drain out of twenty constructed under the Ditches and Watercourses Act that is carried through successfully and gives satisfaction to the owner. Perhaps it might be as well to let everybody continue having a hand in it and it may be the means sooner of wiping it off the statute.

The President—Give them enough rope and they will hang themselves? Is that the idea?

Mr. McCubbin—That is the idea.

Mr. Jackson—I would like also to move that this association request the legislation committee to investigate the matter of incompetence and to report to this association at its next meeting its recommendation.

Mr. Webster—I second that.

Mr. Ardagh—As to that question Mr. Bolton brought up about getting paid for inspection. The first one I made I put nothing in for inspection and I never got anything. I made an award the other day and I charged for a day and a half inspection. It took me a little longer. I have always wondered why the Act did not have a clause enabling the engineer to charge for inspection. Mr. Gaviller does a great deal of engineering. What do you do about charging for inspection?

Mr. Gaviller—Of course when that clause was put in the Act it was noticed directly there was no provision for the pay of the engineer and a good many put their heads together

and they came to the conclusion that in those cases where it could be done they would simply put on a day or a couple of days' pay for it besides the work and enough to cover expenses in the award. But there is one thing, of course, we have to keep that thing quiet so as to show it in the lump expenses and not put it down definitely for that purpose. The last time I did that—there was no appeal in this case of course—I put down my expense and I have never been called upon to inspect that ditch, but I look at it in this way, let that question alone altogether and if there is any fuss about the working of the ditch or anybody does not complete their work you are pretty sure to have a demand come in, and I tell them to put it plainly in writing that they request the presence of the engineer to inspect that ditch. I do inspect it and I assess the cost and send it in and I have always succeeded in getting paid for it. I think that is about the principal point in Mr. Bolton's paper that we find any difficulty in. As to the outlet and the ditch not carrying out what it is intended to, the six months clause covers that, and that I think is intended to include, if possible, the spring flood which will test that ditch, and all parties have their relief by applying to have the award reconsidered, and no engineer wants to do that if they can help it.

Mr. Bolton—Under the Act a ditch must be completed before you can go on and get reconsideration. As far as fees are concerned, you can always get your fees out of it because the drain is not finished.

Mr. Ardagh—Supposing there is only one owner in default he is supposed to pay the cost of that inspection?

Mr. Gaviller—Yes.

Mr. Ardagh—Do you get him to give that out of his pocket?

Mr. Bolton—You tell him what your charges are, and if he cannot pay them at the time he pays them to the Township Clerk.

Mr. Ardagh—You cannot collect it under the Act?

Mr. Bolton—No.

Mr. Gaviller—I simply go and make an inspection upon getting a note, and I send in that inspection to the Township Clerk, and I never fail to get my fee.

Mr. Newman—I have listened to this paper and there are one or two points in it I do not quite understand. The discussion has turned on the question of fees. So far as that question is concerned I don't see how it is possible or reasonable that the men making the award can put in his fees for the inspection. For instance I am township engineer to-day and I make an award that has to be completed next fall; in May somebody else may step in and take my place. I have made the collection. Where does he come in? I think the statute is drawn so that if you make the inspection you can collect it off the people whether in default or not. In fact I have never had any difficulty in that respect. There is another point to be mentioned and that is the assessing against owners, where the amount of work is very small, the cost of the relative parts of the work rather than assessing it on the work itself; with the exception of rock cutting and blasting, I fail to be able to connect the responsibility of doing that in compliance with the statute; I think the full intention of the statute was that each party must have first privilege of doing the work, and I don't think it is at all possible that an engineer could make an award that would stand law by awarding somebody else to do the work and make the men pay the cost with the possible exception of rock blasting.

I move that Mr. Bolton's paper be accepted and be printed in the proceedings of this society.

Mr. McCubbin—I am quite in accord with Mr. Newman's remarks, and I have much pleasure in seconding his motion.

The President—Before we put that motion there is a motion before the meeting now that I think had better be put first. It is moved that this association request the legislative committee to investigate the matter of incompetent persons making awards under the Ditches and Watercourses Act and to report to this association at its next annual meeting regarding the changes or otherwise of the Act on this point.

The President put the motion, which, on the vote having been taken, was carried.

Mr. Newman—Before putting my motion I might couple with that that the association tender a vote of thanks to Mr. Bolton for his paper on the subject.

Mr. McCubbin—That was in my mind in seconding Mr. Newman's motion. There was another point in connection

with that paper. Sometimes awards are made and they are not set aside by the county judge, but still they are of no effect; awards illegally made are no good whether they are set aside or not. For instance if the engineer has no jurisdiction—supposing the appointment of his predecessor has not been revoked by by-law, and the engineer who makes the award has not been properly appointed, his award is no good whether it is set aside or not. Any person who resisted carrying out the provisions of that award would be perfectly justified in doing so, and would win out in a case of any proceedings against them. Again the Act requires that a ditch constructed under the Act shall be carried to a sufficient outlet. If the engineer does not do that his award is illegally made; he has no jurisdiction to make it unless he does carry it to a sufficient outlet. If it is a clear case that that has not been done, then again the award is no good, and any person, even without appealing against it, could resist carrying out the provisions of that award. Again supposing the engineer carried his drain through more than seven township lots his award is made without jurisdiction, and it is no good. I second Mr. Newman's motion.

The President put the motion that Mr. Bolton's paper be printed in the proceedings, and that a vote of thanks be tendered to him for his care in preparing the paper. The motion was carried.

LIST OF MEMBERS

1914

The names of those members granted commissions since January 1st, 1914, are marked*. See Section 44, Ontario Land Surveyors Act.

Name and P.O. Address.	Date of Admission by Board
Abrey, George Spencer, 606 Indian Rd., Toronto	6th April, 1906
Allan, John Richard, Renfrew	6th Nov., 1894
	Grad. S.P.S.
Allison, Calvin Bruce, South Woodslee	22nd Feb., 1911
	D.L.S., Grad. S.P.S.
Anderson, Frederick John, Niagara Falls	1st May, 1910
Anderson, Herbert McEwan, North Bay	18th April, 1910
Anderson, Ralph Mackenzie, Toronto, 16 St. Vincent St.	2nd May, 1911
	Grad. S.P.S.
Angus, George Page, North Bay	18th April, 1911
Ardagh, Arthur Gowan Barrie	18th Feb., 1908
	Grad. S.P.S.
Attwood, Charles Hartley, Hamilton, 88 King Street W.	22nd Feb., 1911
Aylesworth, John Sydney, Sharp's Corners, Ont	9th Jan., 1871
	D.L.S.
Aylsworth, Charles Fraser, Madoc	8th Jan., 1886
	D.L.S.
Baird, Alexander, Leamington	7th July, 1877
	C.E.
Baird, John Ainslie, Leamington	2nd May, 1913
Baird, Wilmot Johnston, Scarborough	22nd Feb., 1912
Baker, Mason Herman, St. Thomas	16th Feb., 1909
	D.L.S.
Barrow, Ernest George, Hamilton, 26 John Street South	4th Oct., 1877
	D.L.S., Mem. Can. Soc. C.E., City Engineer.
Bazett, Edward, Huntsville	8th July, 1881
	D.L.S.
Beatty, David, Parry Sound	12th July, 1869
	D.L.S.

Name and P.O. Address.	Date of Admission by Board
Beatty, Herbert John, Pembroke.	8th Nov., 1893
Grad. S.P.S.	
Bell, James Anthony, St. Thomas.	11th Oct., 1875
D.L.S., Co. Engineer, Elgin; City Engineer, St. Thomas.	
Benner, Frederick James King, Port Arthur. . .	13th Feb., 1913
Bigger, Charles Albert, Ottawa, 145 Gloucester Street	6th Jan., 1882
D.L.S., A.M. Can. Soc. C.E., B.C.S., Astronomer, Dept. Interior.	
Bingham, Edwin Ralph, Fort William.	17th Feb., 1906
D.L.S.	
Blake, Frank Lever, Toronto, Meteorological Office.	13th April, 1875
D.L.S.	
Blair, William John, New Liskeard.	13th Feb., 1904
Grad. S.P.S.	
Blandy, Oliver Roland, Provident & Loan Chambers, Hamilton.	22nd Feb., 1912
Bolton, Ellsworth Doan, Listowel.	7th Nov., 1899
B.A.Sc (McGill).	
Boswell, Elias John, C.P.R., Montreal.	7th Nov., 1896
Grad. S.P.S., D.L.S.	
Bowman, Clemens Dersteine, West Montrose. .	10th July, 1879
Bowman, Herbert Joseph, Berlin.	7th Jan., 1887
D.L.S., Grad. S.P.S., Treasurer County Waterloo, Assoc. Mem. Can. Soc. C.E.	
Bowman, Edgar Peterson, West Montrose. . . .	17th April, 1907
D.L.S.	
Bray, Harry Freeman, Oakville.	10th July, 1882
D.L.S.	
Bray, Lennox Thompson, Amherstburg.	17th Feb., 1902
D.L.S.	
Bray, Samuel, Ottawa, Dept. of Indian Affairs. .	6th Jan., 1877
D.L.S., C.E.	
Brian, Michael Edward, Windsor City Hall. . . .	17th Feb., 1906
B.A.Sc.	
Brown, George Laing, Morrisburg.	19th Feb., 1898
Grad. S.P.S.	
Brown, John Alexander, Sarnia, 233 South Brock Street.	22nd Feb., 1911
Grad. S.P.S.	
Browne, Harry John, Toronto, 203 Albany Ave. .	6th July, 1872
C.E.	
Browne, Wm. Herbert, Toronto, 18 Toronto St..	18th April, 1910
Burd, James Henry, Saskatoon, Sask.	2nd Oct., 1905
D.L.S., Grad. S.P.S.	

Name and P.O. Address.	Date of Admission by Board
Burwash, Nathaniel Alfred, Toronto, 26 Alvin Ave.....	6th May, 1905 D.L.S., Grad. S.P.S.
Bush, Clayton Elgin, Edmonton, Alta.....	15th May, 1908 Grad. S.P.S., B.A.Sc., D.L.S.
Byrne, Thos. Henry, Ottawa, 71½ Sparks Street.....	24th Feb., 1910
Caddy, John St. Vincent, Ottawa, 327 Laurier Ave.	6th Oct., 1866 D.L.S.
Campbell, Alexander Stuart, cor. King & Brock Street, Kingston.....	24th Feb., 1910
Campbell, Archibald William, Ottawa, Deputy Minister of Railways and Canals..	10th April, 1885 C.E.
Carre, Henry, 276 Albert St., Belleville, Box 203..	8th Nov., 1861 M.O. & Georgian Bay Canal, B.A. and C.E. (Trin. Coll. Dublin), D.L.S.
Cavell, Edwin, 182 Sunnyside Ave., Toronto	
Casgrain, Joseph Phillippe Baby, 180 St. James St., Montreal.....	5th Jan., 1887 D.L.S., P.L.S. (Que.), C.E., Assoc. Mem. Can. Soc. C.E., Chief Eng. M. & P. J. Ry., Senator.
Cavana, Allan George, Orillia.....	8th July, 1876 D.L.S.
Chase, Albert Victor, Orillia, Box 762.....	21st April, 1909 A.M.C.Sec., Grad. S.P.S., D.L.S.
Chipman, Willis, Toronto, Mail Bldg.....	4th Oct., 1881 D.L.S., B.A.Sc. (McGill), Mem. Am. Soc. C.E., Mem. Can. Soc. C.E.
Christie, Uriah Wesley, Orangeville.....	1st March, 1905
Clarke, Fred Fieldhouse, 75 Sheldrake Bldg., Toronto, Ont.....	31st March, 1905 Grad. S.P.S.
Clarke, Leonard Oswald, North Bay.....	14th Feb., 1903
Code, Abraham Silas, Alvinston.....	14th April, 1896
Code, Samuel Barber, Smith's Falls.....	1st May, 1905
Code, Thomas George, Box 330, Cobalt.....	17th April, 1907
Code, Robert Wilmot, Windsor.....	April, 1911
Code, Richard Stanley, Box 330 Cobalt,....	17th April, 1907
Coltham, George William, Aurora.....	1st May, 1912 D.L.S.
Coltham, Jas. T., Aurora, Ont.....	18th April, 1911
Cook, William Albert McMichael, Architect Dept., City Hall, Toronto.....	19th April, 1910

Name and P.O. Address.	Date of Admission by Board
Cotton, Arthur Frederick, New Westminster, B.C.	11th July, 1874
D.L.S.	
Crerar, Samuel Rutherford, Toronto, School of Science.....	1st March, 1906
D.L.S., B.A.Sc., Toronto.	
*Crouch, Milton Edwin, 14 Algoma St. N., Port Arthur.....	11th Jan., 1878
D.L.S.	
Dalton, John Joseph, Weston, Ont.....	11th Jan., 1878
D.L.S., D.T.S.	
Davidson, Alexander, not known.....	11th Oct., 1858
D.L.S.	
DeMorest, Richard Watson, Ottawa.....	9th April, 1889
77 Metcalf St.....	
M.E.	
Dempster, Herbert Orville, Grananoque.....	24th Feb., 1910
Dickson, James, Fenelon Falls.....	6th April, 1867
D.L.S.	
Dixon, Howard, not known.....	14th Feb., 1903
Grad. S.P.S.	
Dobie, James Samuel, Thessalon.....	21st Feb., 1898
B.A.Sc. (Toronto Univ.), D.L.S.	
Dunn, Thomas Hamilton, Dept. of Interior, Ottawa	14th May, 1906
Grad. S.P.S.	
Dynes, Richard Fforde, New Liskeard.....	27th May, 1913
Eadie, Louis Francis, cor. Dundas and Humberside, Toronto.....	2nd May, 1913
Eagleson, Francis Merwin, Winchester, Ont....	11th May, 1909
Grad. S.P.S., D.L.S.	
Earle, Wallace Sinclair, Vancouver 525 Vancouver Blk.....	22nd Feb., 1912
Ellis, Douglas Stewart, Kingston 209 Albert St.....	12th Feb., 1913
D.L.S.	
Esten, Henry Lionel, Toronto, 157 Bay St.....	7th Jan., 1887
Evans, John Dunlop, Trenton.....	8th July, 1864
D.L.S., Mem. Can. Soc. C.E., Chief Eng. Cent. Ont. Ry.	
Fair, John, Brantford, 165 Colborne St.....	13th April, 1875
Fairbairn, Richard Purdon, Toronto, 452 Markham St.....	7th Oct., 1876
Deputy Minister Dept. of Pub. Works, Ontario.	
Fairchild, Charles Court, Brantford.....	9th April, 1894
Grad. S.P.S., D.L.S.	

Name and P.O. Address.	Date of Admission by Board
Fairchild, William Howard, Brantford.	17th Feb., 1900
Farley, Sidney Edward, 362 Rideau St., Ottawa, Road Engineer, Co. Carleton.	21st April, 1909
P.L.S., Que.	
Farncomb, Alfred Ernest, Red Deer, Alberta.	9th April, 1895
D.L.S.	
Farncomb, Frederick William, London, 213 Dundas St.	6th Nov., 1889
Fawcett, Thomas, 50 Emmett St., Ottawa.	6th Jan., 1881
D.L.S., Dom. Topographical Surveyor.	
Fitton, Charles Edward, Orillia, Box 142.	10th April, 1879
D.L.S.	
FITZGERALD, JAMES WILLIAM, Peterborough	13th Feb., 1904
Flater, Frederick William, Chatham.	9th April, 1888
Flook, Samuel Evert, Port Arthur.	13th Feb., 1913
Francis, John James, Sarnia P.O., Box 304.	16th Oct., 1861
D.L.S.	
Fuce, Edward Oliver, 115 Seventh Ave., Calgary.	17th Feb., 1906
Fullerton, Charles Herbert, New Liskeard.	7th May, 1906
D.L.S., Grad. S.P.S.	
Galbraith, William, Bracebridge.	4th April, 1883
D.L.S.	
Gardiner, Edward, St. Catherines.	6th Jan., 1866
D.L.S.	
Gaviller, Maurice, Collingwood, Box 164.	6th Jan., 1866
C.E. (McGill), D.L.S.	
Gibson, Colin William George, Govt. House, Toronto.	13th Feb., 1913
Gibson, Morton Milne, Willowdale.	22nd Feb., 1912
Gibson Peter Silas, Willowdale.	19th July, 1858
C.E.M.S. (Mich. Univ.), D.L.S., Mem. Can. Soc. C.E.	
Gibson, Wilbert Silas, 1835 Yonge St., Toronto.	21st Feb., 1898
Gill, James Richard, Sudbury.	13th Feb., 1913
B.A.Sc. (Toronto Univ.)	
Gillon, Douglas John, Fort Frances.	9th Nov., 1895
Grad. R.I.E. Coll.	
Gourlay, Robert Murray, Toronto, 28 Close Ave.	22nd Feb., 1912
Grant, Russell Reeve, Toronto, 961½ Gerrard St. E.	23rd March, 1911
Grad. S.P.S.	
Green, Thomas Daniel, Prescott, Ont.	7th Jan., 1885
D.L.S.	

Name and P.O. Address.	Date of Admission by Board
Greenlees, Alexander Hunter, North Bay	21st April, 1909
Griffin, Albert Dyke, B.A., Elk Lake	11th Nov., 1890
Halford, Abraham Joseph Bartholomew, Engineer Public Works, Ontario, Parliament Bldgs., 11 Lowther Ave., Toronto	10th April, 1885
Hanes, George Samuel, North Vancouver, B.C. . .	6th May, 1905
City Engineer, Grad. S.P.S.	
Hart, Milner, Toronto, 51 Yonge St.	11th July, 1863
D.L.S.	
Hellferth, John Benedictus, 703 Temple Bldg. Toronto	13th Feb., 1913
Henry, Frederick, London, Albion Bldg.	7th April, 1887
Hogarth, George, Assistant Engineer Dept. of Public Works, Parliament Bldgs., 126 Wells St., Toronto. .	22nd Feb., 1912
Holcroft, Herbert Spencer, 182 Bloor St. W., Toronto	17th Feb., 1902
D.L.S., B.A.Sc. (Toronto Univ.)	
Hopkins, Marshall Willard, Edmonton, Alta. . . .	13th Nov., 1893
D.L.S., B.A.Sc. (McGill), Asso. Mem. Can. Soc. C.E.	
*Huffman, Karl, 409 Indian Road, Toronto . . .	11th Feb., 1914
P.L.S.	
Hutcheon, James, Parliament Bldgs., Toronto .	10th Nov., 1891
Inspector of Surveys, Grad. S.P.S.	
Jackson, Alan Mair, Temple Bldg., Brantford . .	15th April, 1912
Jackson, John Edwin, Temple Bldg., Brantford..	22nd Feb., 1911
Grad. S.P.S.	
Jackson, John Herbert, Queen Victoria Park Com., Niagara Falls	16th Feb., 1901
*Jackson, Percival Anthony, 45 Central Ave., Toronto	11th Feb., 1914
James, Darrell Denman, Toronto, 227 George St..	3rd Nov., 1891
D.L.S., B.A., B.A.Sc. (Toronto Univ.)	
Johnson, Herbert, Berlin	21st Feb., 1905
Grad. S.P.S.	
Johnson Sydney Munnings, Stratford	9th Nov., 1895
Johnston, Wm. James, 73 Exchange Bldg., Vancouver, B.C.	10th May, 1910
D.L.S.	
Jones, Charles Albert, Petrolea	8th April, 1881
D.L.S.	
Jones, John Henry, Sarnia, Box 194	10th Oct., 1886
D.L.S.	
Jones, Thomas Henry, Brantford	10th Oct., 1878
B.A.Sc. (McGill), D.L.S., City Engineer.	

Name and P.O. Address.	Date of Admission by Board
Jupp, Albert Ernest, Toronto, 47 Sparkhall Ave.....	22nd Feb., 1911 Grad. S.P.S.
Keefer, Thomas Coltrin, Rockliffe Manor House, Ottawa.....	14th Aug., 1840 D.L.S., C.E.
Kinnear, Louis Arthur, Port Colborne.....	2nd May, 1913
Kirkpatrick, George Brownly, Toronto, Dept. of Lands, Forests and Mines.....	13th April, 1863 D.L.S., Director of Surveys.
Laird, James Stewart, Essex.....	6th April, 1867 D.L.S.
Laird, Robert, Haileybury.....	11th Nov., 1887 Grad. S.P.S.
Lane, Frederick Carleton, Sudbury.....	22nd Feb., 1912
Lang, John Leiper, Sault Ste. Marie.....	2nd May, 1908
Lee, Roger Melville, Galt.....	19th April, 1910 D.L.S., S.L.S.
Le May, Tracy Deavin, Toronto, City Hall....	1st May, 1909 City Surveyor.
Lewis, John Bower, Ottawa, Brunswick House..	4th Oct., 1883 D.L.S., P.L.S. (Quebec), C.E.
Lloyd, Norval Clarence, 18 Toronto St., Toronto	22nd Feb., 1912
Lougheed, Aaron, Port Arthur.....	12th Nov., 1888 D.L.S.
Low, Edward Hamilton, Sudbury.....	17th Feb., 1902 Grad. R.M.C. (Kingston).
Lumsden, Hugh David, Orillia.....	4th Jan., 1866 C.E., D.L.S., M.I.C.E., Mem. Can. Soc. C.E.
MacKay, James John, Hamilton, Bank of Hamilton Chambers.....	24th Feb., 1899
MacKay, Ernest George, Bank of Hamilton Chambers, Hamilton.....	13th Feb., 1913 D.L.S.
MacKenzie, William, Sarnia.....	11th April, 1896 Grad. R.M.C (Kingston).
MacKenzie, William Lyon, Can. Nor. Ry., Winnipeg, Engineer's Office.....	7th April, 1887 C.E.
*MacRostie, Norman Barry, 251 Sussex, Ottawa.....	11th Feb., 1914 D.L.S.
McAuslan, Herbert James, North Bay.....	19th Feb., 1906 D.L.S., B.A.Sc., Toronto.

Name and P.O. Address.	Date of Admission by Board
McCaw, Robert Daniel, Sidney, Vancouver Island, B.C.....	D.L.S. 16th Feb., 1907
McColl, Charles Ross, Walkerville.....	Grad. S.P.S. 4th May, 1909
McCubbin, George Albert, Chatham, Box 389..	Assistant City Engineer. 9th Nov., 1895
*McDougall, Samuel Gladstone, 47 Vittoria, Ottawa.....	D.L.S. 11th Feb., 1914
McDowall, Robert, Owen Sound.....	Grad. S.P.S., Town Engineer. 11th Nov., 1890
McEvoy, Henry Robinson, St. Mary's.....	D.L.S. 10th July, 1875
McFarlen, George Walter, Toronto, City Hall, City Engineer's Office.....	Grad. S.P.S. 11th Nov., 1858
McGeorge, William Graham, Chatham, 135 King St.....	Grad. S.P.S., D.L.S. 22nd Feb., 1911
McGregor, James Martin, Chatham.....	22nd Feb., 1912
McKay, Owen, Walkerville, Ont., Box 324.....	M.C.S.C.E., Grad. S.P.S. 7th Jan., 1887
McLean, William Arthur, Toronto, Parliament Bldgs.....	A.M. Can. Soc. C.E., Highways Commission. 21st Feb., 1898
McLennan, Murdoch John, Williamstown.....	B.A.Sc. (McGill), D.L.S. 13th Nov., 1893
McMeekin, Albert, Kenora.....	B.A.Sc. (McGill), D.L.S. 22nd Feb., 1911
McMullen, William Ernest, 508 Lumsden Bldg., Toronto.....	11th Nov., 1892
McNaughton, Alexander Lorne, Cornwall.....	D.L.S. May, 1905
Malcolm, William Lindsay, School of Mining, Kingston.....	22nd Feb., 1912
Malcolmson, Walter S., 163 Havelock St., Toronto.....	2nd May, 1913
Manigault, William Mazyek, Strathroy, P.O. Box 300.....	8th July, 1876
Miller, Frederick Frazer, Napanee.....	D.L.S. 8th Jan., 1885
Moore, John MacKenzie, London, Albion Bldg...	9th Oct., 1879
Moore, John Harrison, Smith's Falls.....	Grad. S.P.S. 11th Nov., 1889

Name and P.O. Address.	Date of Admission by Board
Rainboth, Edward Joseph, Ottawa, 488 Mac-Laren St.,	11th Nov., 1887
D.L.S.	
Ramsey, Guy Lawrence, Sault Ste. Marie.	13th Feb., 1913
Ransom, John Thomas, Toronto, 205 Keele St.	22nd Feb., 1911
D.L.S., B.A.Sc.	
Reinhardt, Carl, Box 303, Cobalt.	25th Feb., 1899
B.A.Sc., McGill.	
Robertson, James, 1170 Yonge St., Toronto.	11th July, 1885
Grad. S.P.S.	
Roger, Alec, Ottawa South, 36 Seneca St.	22nd Feb. 1911
Roger, John, Mitchell.	10th Nov., 1888
Grad. S.P.S.	
Rorke, Louis Valentine, Toronto, Department of Lands, Forests and Mines.	14th April, 1890
D.L.S.	
Ross, George, Welland.	10th July, 1879
A.M. Can. Soc. C.E., B.A.Sc. (McGill), D.L.S.	
Ross, Kenneth George, Sault Ste. Marie.	15th May, 1909
Grad. S.P.S.	
Routly, Herbert Thomas, Toronto, 47 Ben Lamond Ave.	1st May, 1907
Grad. S.P.S., D.L.S., A.M.C.E.	
Rubidge, Walter Frederick Brendon, Orillia.	15th April, 1912
Russell, Alexander Lord, Port Arthur.	16th April, 1873
D.L.S., P.L.S. (Que.).	
Rutherford. F. N., St. Catharines, Ont., 24 Queen St.	18th May, 1906
Seager, Edmund, Kenora.	8th July, 1861
D.L.S.	
Sewell. Henry De Quincy, Toronto, 34 Yonge St.	9th July, 1885
D.L.S., A.M.I.C.E.	
Sewell, Henry Charles DeQuincy, 79 Adelaide St. E., Toronto.	2nd May, 1913
Seymour, Horace Llewellyn, not known.	2nd May, 1908
D.L.S.	
Shaw, John Henry, North Bay.	17th Feb., 1900
Grad. S.P.S.	
Seibert, Frederick Victor, Southampton.	22nd Feb., 1912
Sibbett. William Algernon, C.P.Ry., North Bay.	6th May, 1912
Silvester, George Ernest, Copper Cliff.	12th Nov., 1892
Engineer Canadian Copper Co., Grad. S.P.S.	

Name and P.O. Address.	Date of Admission by Board
Sing, Josiah Gershom, Toronto, Confederation Life Building.....	9th Jan., 1879
<small>D.L.S., C.E., Public Works Dept.</small>	
Slater, Nicholas James, Ottawa, 10 Sparks Chambers.....	22nd Feb., 1911
Smith, Charles Campbell, 518 Hastings St. W., Vancouver, B.C.....	16th Feb., 1907
<small>D.L.S.</small>	
Smith, George, Box 25, Lindsay.....	7th April, 1881
<small>Engineer for Co. Victoria and four Townships.</small>	
Smith, James Herbert, not known.....	27th Dec., 1904
Smith, Walter, Sudbury.....	16th Feb., 1907
Snow, Ernest Arthur, Berlin.....	18th April, 1910
Speight, Thomas Bailey, Toronto, 703 Temple Building.....	6th Jan., 1882
<small>D.L.S.</small>	
Steel, Ira John, Ottawa, 18 Rideau Terrace....	18th April, 1910
<small>D.L.S.</small>	
Stewart, Lionel Douglas Noble, 84 King St. E., Toronto.....	24th Feb., 1910
Stewart, Walter Edgar, Aylmer.....	12th April, 1892
Street, James Cunard, Ottawa, 81 McKay St. .	11th May, 1912
Stull, William Walter, Sudbury.....	17th Feb., 1900
<small>B.A.Sc. (Toronto Univ.).</small>	
Summers, Gordon Foster, Haileybury.....	11th May, 1908
<small>Grad. S.P.S., Toronto.</small>	
Sutcliffe, Homer Wilson, New Liskeard, Ont. .	11th May, 1908
<small>Grad. S.P.S., Toronto.</small>	
Tate, Harry William, Toronto, 224 Wright Ave.	30th April, 1911
<small>Grad. S.P.S.</small>	
Taylor, William Emerson, Toronto, 438 Clinton St.....	22nd Feb., 1911
<small>D.L.S.</small>	
Taylor, William Verner, not known.....	7th Nov., 1896
<small>Grad. S.P.S.</small>	
Tench, William Eastwood, 210 John R. St., Detriot, Mich.....	11th Jan., 1878
Townsend, David Thomas, C.P.R. Land Dept., Calgary.....	17th Feb., 1906
<small>D.L.S., B.A.Sc., Toronto.</small>	
Traynor, Isaac, Dundalk.....	16th April, 1873
<small>D.L.S.</small>	
Turnbull, Thomas, Winnipeg, Man., C.N.R. Eng. Office.....	6th July, 1878
<small>D.L.S., C.E. (Toronto Univ.).</small>	

Name and P.O. Address.	Date of Admission by Board
Tyrrell, James Williams, Hamilton, Ont., Prov. & Loan Chambers, 7 Hughson St. S. C.E. (Toronto Univ.) D.L.S., Co. Eng. for Wentworth.	8th April, 1885
Unwin, Charles, Toronto, 126 Seaton St. D.L.S.	12th April, 1852
Ure, Frederick John, Woodstock. D.L.S.	7th April, 1887
van Nostrand, Arthur J., Toronto, 703 Temple Bldg. D.L.S.	30th Oct., 1882
van Nostrand, John, Toronto, 703 Temple Bldg.	1st May, 1910
Waddell, William Henry, not known. D.L.S.	6th May, 1905
Wadsworth, Vernon Bayley, Toronto, 51 Yonge St. D.L.S.	9th April, 1864
Walker, Alfred Paverley, Toronto, Room 606 Union Station, C. P. Ry. Div. Surveyor. D.L.S., Mem. Can. Soc. C.E.	6th Jan., 1882
Ward, Archeson Thomas, Toronto 703 Temple Bldg.	10th April, 1897
Warren, James, Walkerton, P.O. Box 190. D.L.S.	7th Oct., 1864
Watson, John McCormack, Orillia, P.O. Box 224.	13th April, 1892
Webster, William Gourlay, Bank of Hamilton Chambers, Hamilton.	22nd Feb., 1912
Wetherald, Thomas, 210 Delatre St., Woodstock. D.L.S., C.E.	12th Jan., 1856
Weekes, Melville Bell, Regina. B.A.Sc. (Toronto Univ.), D.L.S.	17th Feb., 1900
West, Robert Francis, Grand Valley.	7th April, 1881
Wheelock, Charles Richard, Orangeville. Treasurer County of Dufferin.	7th Jan., 1886
White, Walter Russell, Dept. Indian Affairs, Ottawa. D.L.S.	13th April, 1913
Whitson, James Francis, Toronto, Dept. of Lands, Forests and Mines. Commissioner Northern Development.	9th Jan., 1886
Wilde, John Absalom, Sault Ste. Marie.	9th April, 1893

Name and P.O. Address.	Date of Admission by Board
Wilkie, Edward Thomson, 56 Marmaduke St., Toronto.....	11th April, 1891 D.L.S.
Wilkins, Frederick William, Norwood, Ont....	6th Jan., 1877 D.T.S.
Williams, David, Port Arthur.....	9th April, 1864 D.L.S.
Wilson, Norman Douglas, 76 Adelaide St. W., Toronto.....	24th Feb., 1910 B.A.Sc., D.L.S., A.M. Can. Soc. C.E.
Winter, Henry, Thornyhurst.....	11th July, 1853 D.L.S., C.E.
Yarnold, William Edward, Port Perry, P.O. Box 44.....	7th April, 1854 D.L.S.
Young, Alex. Campbell, Swastika.....	15th April, 1912

REGISTERED AND WITHDRAWN FROM PRACTICE.

Name and P.O. Address.	Date of Admission by Board
Anderson, John Drummond, Trail, B.C.....	13th April, 1892
Anderson, William Beaumont, Halifax, N.S... Grad. R.M.C., B.A.Sc. (McGill), M. Can. Soc. C.E., D.L.S., R.C.E.	14th Feb., 1903
Apsey, John Fletcher (not known)..... Grad. S.P.S.	6th Jan., 1886
Booth, Charles Edward Stewart (not known)	6th April, 1882
Bowman, Arthur Meyer, Mahan, Beaver Co., Pa.....	11th Nov., 1887
Grad. S.P.S., Staff of U. S. Engineers.	
Bowman, Franklin Meyer, Bellevue, 1234 North Highland Ave., Pittsburg; Pa.....	11th April, 1892
Grad. S.P.S., Engineer Structural Iron Works.	
Brady, James, Victoria, B.C., P.O. 815..... M.E.	15th July, 1862
Brown, John Smith (not known)..... D.L.S.	8th July, 1852
Burgess, Edward LeRoy, Ottawa, 21 First Ave D.L.S.	6th May, 1905
Burnet, Hugh, Victoria, B.C..... D.L.S., P.L.S. (B.C.).	5th April, 1887
Burt, Frederick Percy, President "The American Architect," Times Bldg., New York	
Butler, Matthew Joseph, President Iron & Steel Co., Sidney, C.B.....	11th Jan., 1878
C.E., LL.B., C.M.G., M.I.C.E., Mem. Can Soc. C.E., Mem. Am. Soc. C.E.	
Cambie, Henry John, Vancouver, B.C.....	8th July, 1861
D.L.S., P.L.S. (B.C.).	
Carbert, J. Alfred, Medicine Hat.....	7th April, 1876
D.L.S., Dist. Eng. and Surveyor.	
Carpenter, Henry Stanley, Regina, Parliament Bldgs.....	25th Feb., 1899
D.L.S., B.A.Sc., Toronto.	
Carroll, Cyrus (not known).....	10th Jan., 1860
Mem. Can. Soc. C.E., D.L.S., District Surveyor and Engineer.	

Name and P.O. Address.	Date of Admission by Board
Chalmers, John, Edmonton, Alta. Structural Engineer, Dept. Pub. Works.	11th April, 1896
Charlesworth, Lionel Clare, Edmonton, Alta. Grad. S.P.S., Director of Surveys, Alberta, D.L.S.	14th April, 1896
Coleman, Richard Herbert, 1170 Yonge St., Toronto.	6th Oct., 1877
Davis, A. R. 146 Cottingham St., Toronto.	
Davis, William Mahlon, Vancouver, B.C. Grad. R.M. Coll. (Kingston), City Engineer.	11th April, 1885
Deacon, Thomas Russ, Winnipeg. Grad. S.P.S.	12th Nov., 1892
Deans, William James, Brandon, Man. D.L.S.	11th July, 1884
Drewry, William Stewart, Ottawa, Dept. of the Interior.	5th April, 1883
Ducker, William A., Winnipeg, Man. D.L.S., P.L.S. (Man), Swamp Lands Comm'r.	6th April, 1882
Edwards, George, Thurso, P.Q. D.L.S.	6th Jan., 1866
Ellis, Henry Disney, Kuching, Sarawak, Borneo.	7th April, 1877
D.L.S., Commissioner of Pub. Works and Surveys.	
Empey, J. M., Drawer 2081, Calagry. B.A.Sc., D.L.S.	16th Feb., 1907
Ford, Wm. Butterton, Wabana, Nfld.	21st Feb., 1898
Galbraith, John, Toronto, School of Prac. Science.	13th April, 1875
M.A., D.L.S., Prof. Engineering S.P.S.	
Gibbons, James, Ottawa, Dept. of the Int. Grad. S.P.S., Dominion Topographical Surveyor.	15th April, 1890
Gibson, George, St. Catherines. D.L.S.	10th April, 1860
Gibson, H. H. Willowdale, Ont.	8th Sept., 1891
Harris, John Walter, Winnipeg, Man. P.L.S. (Man.) D.L.S., Assessment Com.	6th Oct., 1866
Harvey, Thomas Alexander, 239 Vernon Ave., Long Island, New York City.	13th Nov., 1893
Heaman, J. A., Eng. Dept., G.T.P. Ry., Winnipeg D.L.S.	
Henderson, Eder Eli, Henderson P.O., Maine. Grad. S.P.S.	7th April, 1887
Hermon, Ernest Bolton, Vancouver, B.C. P.L.S. (B.C.), D.L.S.	7th Oct., 1885

Name and P.O. Address.	Date of Admission by Board
Hobson, Joseph, Hamilton, 343 Bay St. S.....	3rd Oct., 1855
D.L.S.	
Innes, William Livingstone, Simcoe.....	14th April, 1892
C.E. (Toronto Univ.)	
James, Silas, 227 George St., Toronto.....	19th July, 1858
D.L.S.	
Jephson, Richard Jermy (not known).....	7th April, 1877
P.L.S. (B.C.), D.L.S.	
Johnston, Robert Thornton, 15 Union Hall St., Jamaica, New York City.....	9th April, 1889
Jones, George Samuel (not known).....	21st April, 1909
Grad. S.P.S.	
Kennedy, James Henry, Keremeos, B.C.....	7th April, 1887
C.E. (Toronto Univ.) Chief Engineer V. V. & E. R. & N. Co.	
Kippax, Hargreaves, Huron, South Dakota....	6th July, 1877
C.E. (Toronto Univ.), Assistant to Surveyor-General.	
Kirk, John Albert, Revelstoke, B.C.....	6th July, 1877
D.L.S., P.L.S. (B.C.).	
Klotz, Otto, 437 Albert St., Ottawa.....	6th Jan., 1867
Dom. Top. Surveyor, C.E. (Mich. Univ.), LL.D.	
Lane, Andrew, Sparrow's Point, Md.....	4th April, 1895
Grad. S.P.S., Draftsman Maryland Steel Co.	
Lendrum, Robert Watt, Strathcona, Alta.....	8th Jan., 1874
D.L.S.	
Livingstone, Thomas Chisholm (not known) ...	10th Jan., 1859
D.L.S.	
MacLeod, Henry Augustus F., Ottawa, 340 Cooper St.....	11th Oct., 1856
D.L.S., C.E.	
MacPherson, Duncan, Montreal.....	9th Jan., 1884
Grad. R.M.C., M.I.C.E., Mem. Can. Soc. C.E., Div. Eng., East Div. C.P.R., D.L.S.	
McCulloch, Andrew, Lake Nelson, B.C.	
Grad. S.P.S., Assoc. Mem. Can. Soc. C.E., City Engineer.	
McFadden, Moses (not known).....	13th April, 1858
D.L.S., P.L.S., (Man.)	
McGrandle, Hugh, Wetaskawin, Alta.....	5th Jan., 1883
D.L.S.	
McNab, John Duncan (not known).....	9th Oct., 1879
Grad. S.P.S.	
McNaughton, Findlay Donald, Strathmore, Alta.....	25th Feb., 1899
McPherson, Charles Wilfred, Dawson, N.W.T. .	21st Feb., 1899
Director of Surveys, Yukon, D.L.S.	
Magrath, Charles Alexander, Highways Com- mission, Toronto.....	1st Nov., 1881
B.A.Sc. (McGill), D.L.S., P.L.S. (B.C.).	

Name and P.O. Address.	Date of Admission by Board
Marshall, James Blyth.....	6th Oct., 1866
D.L.S.	
Meadows, William Walter, c/o Director of Surveys, Regina.....	21st Feb., 1898
D.L.S., Grad. S.P.S.	
Miles, Charles Falconer, 268 Triangle St., Buffalo, N.Y.....	13th Jan., 1862
D.L.S.	
Moore, Thos. Alexander (not known).....	12th Nov., 1892
Montgomery, Royal Harp, Prince Albert, Sask...	6th May, 1905
D.L.S.	
Mountain, George Alphonse, Ottawa.....	9th Jan. 1884
Mem. Can. Soc. C.E., D.L.S., P.L.S. (Que.), Engineer for Railway Commission.	
Munro, John Vicar, New York, N.Y., 359 West 31st St.....	9th April, 1895
Paterson, James Allison.....	5th April, 1878
C.E., Mem. Can. Soc. C.E.	
Pearce, William, Calgary, Alta.....	12th Oct., 1872
D.L.S., P.L.S. (B.C.) Asst. B.C. Land Com. for C.P.R.	
Parsons, Johnston Lindsey Rowlett, Regina, Sask., Box 1004.....	6th May, 1905
D.L.S., Grad. S.P.S.	
Paulin, Frederick William, Bank of Hamilton Chambers, Hamilton.....	11th May, 1908
Ponton, Archibald William, Macleod, Alta....	9th April, 1880
D.L.S.	
Purvis, Frank (not known).....	7th April, 1875
Reid, John Lestock, Prince Alberta, Sask.....	8th April, 1870
D.L.S.	
Reiffenstein, James Henry, Ottawa, Dept. of the Interior.....	16th April, 1873
D.L.S.	
Reilly, William Robinson (not known).....	7th April, 1881
D.L.S., P.L.S. (Man.).	
Reynolds, Samuel Henry (not known).....	17th July, 1880
Ritchie, Nelson Thomas, Kipiegan, Man.....	9th Nov., 1888
P.L.S. (Man.).	
Roberts, Vaughan Maurice, St. Catharines....	5th April, 1887
D.L.S.	
Robinson, Franklin Joseph, Regina.....	21st Feb., 1898
Grad. S.P.S., D.L.S., Dep. Min. Pub. Works.	
Rogers, Richard Birdsall, Peterborough,....	9th Jan., 1879
B.A.Sc. (McGill), D.L.S.	
Ross, Joseph Edmund (not known).....	11th Nov., 1890
D.L.S., P.L.S. (B.C.).	

Name and P.O. Address.	Date of Admission by Board
Sanderson, Daniel Leavens, Coral, Mich.....	4th Oct., 1892
Saunders, Bryce Johnston, Edmonton, Alta....	7th Jan., 1885
B.A.Sc. (McGill), D.L.S.	
Shaw, Charles Aeneas, Greenwood, B.C.....	6th Oct., 1877
P.L.S. (B.C.).	
Sherman, Ruyter Stinson (not known).....	12th April, 1890
P.L.S. (B.C.).	
Smith, Angus, Regina.....	14th April, 1896
Grad. S.P.S., City Engineer.	
Smith, Henry, Toronto, cor. Oxford and Bellvue Sts., Toronto.....	8th Nov., 1861
D.L.S., Mem. Can. Soc. C.E.	
Stewart, Elihu, Toronto, 84 King St. E.....	8th April, 1872
Canada Timber and Lands, D.L.S.	
Stewart, George Alexander.....	8th July, 1852
D.L.S.	
Stewart, Louis Beaufort, Toronto, School of Practical Science.....	6th April, 1882
Dom. Top. Surveyor, Professor of Surveying.	
Stewart, John (not known).....	11th Nov., 1878
D.L.S.	
Tracey, Thomas Henry (not known).....	8th April, 1870
C.E., P.L.S. (B.C.), D.L.S.	
Vicars, John Richard Odlum, Kamloops, B.C....	5th Jan., 1887
P.L.S. (B.C.), D.L.S.	
Wallace, James Nevil, Calgary, Alta.....	21st Feb., 1898
D.L.S., B.A., B.E. (Trin. Coll., Dublin).	
Weekes, Abel Seneca, Glencoe.....	12th April, 1890
D.L.S.	
Wheeler, Arthur Oliver, Calgary, Alta.....	8th July, 1881
P.L.S. (B.C.), D.L.S., Topographer, Dept. of Interior.	
Wicksteed, Henry King, Cobourg.....	7th Jan., 1886
D.L.S., C.E.	
Wiggins, Thomas, Henry, 212 25th St. E., Saskatoon.....	10th Nov., 1891
D.L.S.	
Wells, Frederick Arthur, Confederation Life Bldg., Toronto.....	17th Feb., 1906

DECEASED MEMBERS

NAME	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION.	DIED.
Abrey, George Brockitt.	Toronto Junction.	10th January, 1860.	1892	25th June, 1906
Aylsworth, Charles Fraser	Madoc	2 April, 1861	1892	27th June, 1911
Aylsworth, William R.	Belleville	8th Nov., 1861	1882	22nd April, 1909
Barrett, Russell H.	Pembroke		14th February, 1903	30th January, 1905
Beatty, Walter	Delta	19th July, 1858	1892	1911
Bell, Andrew	Almonte	14th Oct., 1866		12th October, 1912
Bigger, Samuel Howell.	Ottawa		30th January, 1904	7th July, 1906
Bolger, Francis	Lindsay	10th October, 1863	1892	3rd November, 1895
Bolger, Thomas Oliver	Kingston	6th July, 1865	1892	
Bolton, Jesse Nunn	Toronto	6th April, 1867		
Bolton, Lewis	Listowel	9th July, 1864	1892	1901
Bowman, Leander Meyer	Toronto	14th April, 1892	1892	18th July, 1910
Bray, Edgar	Oakville	6th October, 1866	1892	20th September, 1895
Brown, David Rose	Cornwall	10th October, 1850	1892	1908
Brown, David Benjamin.	Manado, S. America	23rd February, 1904		1900
Browne, William Albert.	Toronto	10th April, 1876		1912
Burke, William Robert.	Ingersoll	5th April, 1878	1892	30th July, 1897
Byrne, Thomas	Sault Ste. Marie	15th July, 1862	1892	10th June, 1897
Caddy, Cyprian F.	Campbellford	10th July, 1860	1892	August, 1905
Caddy, Edward C.	Cobourg	18th December, 1846	1892	26th September, 1897
Cameron, Alfred John	Peterborough	9th April, 1889	1892	12th January, 1912
Cheeseaman, Thos.	Mitchell	11th July, 1856	1892	1905
Coad, Richard	Glencoe	8th October, 1879	1892	17th May, 1897
Cozens, Joseph	Sault Ste. Marie.	7th July, 1875	1892	29th November, 1913
Creswicke, Henry	Barrie	8th July, 1864	1892	22nd January, 1898
Cromwell, Joseph M. O.	Perth	1st October, 1846	1892	19th October, 1897
Davidson, Walter Stanley	Sarnia	9th April, 1884	1882	December, 1900
Davis, John	Ailton	5th April, 1878	1892	8th November, 1907
Deane, Michael	Windsor	26th May, 1848	1852	3rd April, 1897

DeGurse, Joseph.....	Windsor.....	5th April, 1883.....	1892.....	.....	22nd March,	1898
Dobbie, Thos. Wm.....	Tillsonburg.....	11th July, 1856.....	1892.....	.....	.....	1908
Doupe, Joseph.....	Winnipeg.....	13th January, 1863.....	1892.....	.....	.....	1910
Filmore, Stanley H.....	St. Thomas.....	.....	.....	February, 1902	.....	1904
Fitzgerald, James William	Peterborough.....	13th July, 1857.....	1892.....	.....	16th June,	1901
Foster, Frederick Lucas.....	Toronto.....	9th April, 1863.....	1892.....	.....	27th July,	1899
Fowle, Albert.....	Orillia.....	13th January, 1863.....	1892.....	.....	April,	1898
Fraser, Charles.....	Wallaceburg.....	5th August, 1847.....	1892.....	.....	.....	1905
Gibbs, Thomas Fraser.....	Adolphustown.....	31st May, 1841.....	1892.....	.....	17th April,	1893
Gamble, Killaly.....	Toronto.....	6th April, 1888.....	.....	.....	17th June,	1912
Gibson, James Alex.....	Oshawa.....	7th April, 1855.....	1892.....	.....	.....	1908
Gilliland, Thomas Brown.....	Eugenia.....	11th July, 1868.....	1892.....	.....	14th December,	1898
Gilmour, Robert.....	Toronto.....	11th April, 1856.....	1892.....	.....	29th December,	1903
Graydon, Aquila Ormsby.....	London.....	8th July, 1880.....	1892.....	.....	February,	1913
Hanning, Clement George.....	Preston.....	19th July, 1858.....	1892.....	.....	7th May,	1905
Haskins, William.....	Hamilton.....	5th July, 1855.....	1892.....	.....	5th July,	1896
Hermion, Royal Wilkinson	Rednersville.....	13th July, 1857.....	1892.....	.....	9th February,	1907
Hewson, Thomas Ringwood	Hamilton.....	6th July, 1877.....	1892.....	.....	21st October,	1898
Holland, Wm. Hugh.....	Toronto.....	.....	1907, 1st May	.....	.....	1908
Howitt, Alfred.....	Gourock.....	12th January, 1856.....	1892.....	.....	6th May,	1896
Irwin, James Moore.....	Kenora.....	13th January, 1863.....	1892.....	.....	.....	1908
Kains, Tom.....	Victoria.....	11th July, 1873.....	.....	.....	.....	1901
Kirk, Joseph Green.....	Stratford.....	.....	.....	.....	22nd January,	1900
Lowe, Henry.....	Ottawa.....	6th October, 1860.....	1892.....	.....	.....	.....
Low, Nathaniel Edward.....	Sarnia.....	11th July, 1856.....	.....	.....	.....	.....
Lynch-Staunton, Francis.....	Hamilton.....	11th October, 1856.....	1892.....	.....	11th June,	1899
MacDougall, Allan Hay.....	Port Arthur.....	4th April, 1859.....	1892.....	.....	February,	1906
MacMillan, James Alex.....	Calgary.....	6th January, 1877.....	4th December, 1894	.....	.....	1898
MacNab, John Chisholm.....	Hamilton.....	8th January, 1880.....	1894.....	.....	16th October,	1897
McAree, John.....	Toronto.....	6th April, 1867.....	1894.....	.....	12th December,	1903
McCallum, James.....	Fort Francis.....	30th March, 1849.....	1894.....	.....	July,	1900
McDonel, Augustine.....	Chatham.....	11th July, 1863.....	1892.....	.....	.....	1908
McGeorge, Wm. Graham.....	Chatham.....	8th January, 1866.....	1892.....	.....	1st July,	1906
McKenna, John Joseph.....	Dublin.....	9th July, 1860.....	1892.....	.....	22nd September,	1910
McLatchie, John.....	Nelson, B.C.....	9th January, 1864.....	1892.....	.....	3rd February,	1908
McLean, James Keachie.....	Ottawa.....	8th April, 1876.....	1892.....	.....	25th May,	1913

DECEASED MEMBERS—Continued

NAME	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION.	DIED.
McLennan, Roderick.....	Toronto	20th June, 1846	1892	25th November, 1913
McPhillips, George.....	Winnipeg	9th July, 1885	1892	13th January, 1899
Malcolm, Sherman Morgan	Bienheim	18th October, 1858	1894	7th May, 1911
Niven, Alexander.....	Toronto	3rd July, 1859	1892	21st September, 1898
Ogilvie, John Henry	Kenora.....	11th April, 1876	24th April, 1894 .....	.....
Ogilvie, William.....	Paris, Texas	12th July, 1869 .....	.....	.....
Pedder, James Robert.....	Doon	10th November, 1891	23rd December, 1892	17th January, 1897
Peterson, Peter Alexander	Montreal	16th July, 1863 .....	.....	21st November, 1913
Pope, Robert Tyndal.....	Ireland	13th April, 1875 .....	.....	.....
Reid, James Hales.....	Saskatoon, Sask.	6th May, 1905 .....	.....	31st March, 1906
Robinson, William.....	Bowmanville	6th October, 1866	1892	22nd December, 1899
Rombough, William A.....	London	—May, 1846	1892	11th October, 1894
Rubidge, Tom S.....	Napanee	14th November, 1848 .....	.....	19th September, 1912
Sankey, Villiers.....	Cornwall	9th February, 1849	1892	June, 1904
Scane, Thomas.....	Toronto	11th January, 1878	1892	10th July, 1905
Schofield, Milton C.....	Ridgetown	7th January, 1865	1892 .....	.....
Selby, Henry Walter.....	Guelph	28th September, 1843	1892 .....	.....
Schwitzer, John Edward.....	Toronto	8th January, 1876	1892	19th February, 1908
Simpson, George Albert.....	Winnipeg	16th November, 1896	1896	23rd August, 1910
Spry, W.....	Toronto	7th October, 1864	1892 .....	.....
Squire, Richard Herbert.....	Brantford	19th July, 1858	1892	8th January, 1905
Stacey, Albert George.....	.....	14th April, 1896	1896 .....	.....
Steele, David Layton.....	Meaford .....	.....	1908, 30th March .....	.....
Steele, Edward Chas.....	Sault Ste. Marie	9th April, 1889	1892	12th January, 1912
Strange, Henry.....	Rockwood	30th November, 1838	1892 .....	.....
Strathern, John.....	B. C.	5th October, 1876	1892	March, 1908
Tiernan, Joseph Martin.....	Tilbury Centre	7th January, 1886	1892 .....	.....
Thomson, Augustus C.....	Chicago	14th January, 1861	1892	December, 1900
				December, 1896

Van Buskirk, Wm. Fraser	Stratford	7th April, 1883	1892	30th January,	1905
Wagner, William	Ossowo	13th April, 1858	1892	29th March,	1912
Wallace, Charles Hugh	Castlederg, Co. Tyrone, Ireland	9th November, 1889		14th March,	1895
Walsh, Thomas William	Simcoe	25th April, 1842	1892	4th July,	1897
Wheelock, Charles John	Orangeville	—, 1856	1892	20th May,	1906
Willson, Alfred	Toronto	6th October, 1866	1892	8th June,	1908
Wood, Henry O.	Billings Bridge	10th October, 1855	1892	—, —,	1901

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No. 30

Annual Report
of the
Association of Ontario
Land Surveyors

Organized 1886

Incorporated 1892



And Proceedings of the Twenty-Third Annual Meeting
Since Incorporation. Held at Toronto, Feb. 16th to 18th, 1915

NOTICES

The Annual Meeting of the Association is fixed by statutes and is held on the third Tuesday in February.

Copies of Annual Reports for the past years can be supplied by applying to the Secretary. Price, 50 cents.

Members will please look up names of chairmen of various committees and inform them of any interesting matter pertaining to that branch of the profession which may come to their notice or write to the Secretary.

Our library is now located at the Toronto Engineers' Club, 96 King St. West, and has been consolidated with the libraries of other associations in that building. Members have free and full access to all books in the consolidated library.

Published by Association of Ontario Land Surveyors.
This edition 1,350 copies; price, \$1.00.

PREFACE

To the members of the Association of Ontario Land Surveyors :

The Proceedings of the Association at its Twenty-third Annual Meeting are herewith presented.

Respectfully submitted on behalf of the Council.

L. V. RORKE,
Secretary.

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Association of Ontario Land Surveyors

Organized 23rd February, 1886. Incorporated 1892.

PAST PRESIDENTS

1886. George B. Kirkpatrick	1901. James Dickson
1887. George B. Kirkpatrick	1902. W. R. Aylsworth
1888. Alex. Niven	1903. W. R. Aylsworth
1889. Alex. Niven	1904. C. A. Jones
1890. Villiers Sankey	1905. J. W. Tyrrell
1891. Villiers Sankey	1906. O. J. Klotz
1892. Elihu Stewart	1907. Thomas Fawcett
1893. Elihu Stewart	1908. A. J. van Nostrand
1894. M. J. Butler	1909. Lewis Bolton
1895. M. Gaviller	1910. H. W. Selby
1896. Willis Chipman	1911. J. F. Whitson
1897. T. Harry Jones	1912. T. B. Speight
1898. P. S. Gibson	1913. J. S. Dobie
1899. H. J. Bowman	1914. J. W. Fitzgerald
1900. George Ross	

OFFICERS FOR 1915-16

PRESIDENT

E. T. WILKIE.....Toronto

VICE-PRESIDENT

C. J. MURPHYToronto

CHAIRMAN OF COUNCIL

G. B. KIRKPATRICK.....Toronto

SECRETARY-TREASURER

L. V. RORKE.....Toronto

MEMBERS OF COUNCIL

HON. G. H. FERGUSON, Minister of Lands, Forests and
Mines

T. B. SPEIGHT, Toronto
JAMES S. DOBIE, Thessalon } For term ending April, 1918.

G. B. KIRKPATRICK, Toronto
J. J. MACKAY, Hamilton } For term ending April 1917

A. T. WARD, Toronto
C. H. FULLERTON,
New Liskeard } For term ending April, 1916

AUDITORS.

A. E. JUPPToronto
R. M. ANDERSONToronto

BANKERS

Imperial Bank of Canada (Yonge St. Branch).....Toronto

BOARD OF EXAMINERS

G. B. KIRKPATRICK (Chairman)

THOS. FAWCETT, Ottawa |
T. B. SPEIGHT, Toronto | For 3 years

G. B. KIRKPATRICK, Toronto |
OWEN McKAY, Walkerville | For 2 years

H. J. BEATTY, Pembroke |
J. F. WHITSON, Toronto | For 1 year

L. V. RORKE, Secretary of the Board.

Note.—Board meets at Department of Lands, Forests and Mines, Parliament Buildings, first Monday in February, 1916.

COMMITTEES, 1915-16

STANDING

LAND SURVEYING—C. J. Murphy (Chairman), E. T. Wilkie, H. J. Beatty, C. E. Fitton, J. W. Fitzgerald, T. B. Speight, J. M. Watson, J. H. Shaw.

DRAINAGE—G. A. McCubbin (Chairman), S. B. Code, E. D. Bolton, John Roger, Geo. Smith, A. S. Ccue, F. J. Ure, A. M. Jackson.

ENGINEERING—N. D. Wilson (Chairman), Owen McKay, Jas. Hutcheon, F. N. Rutherford, J. J. MacKay, R. T. Laird, J. A. Bell, E. W. Neelands.

TOPOGRAPHICAL SURVEY—Thomas Fawcett (Chairman), Otto J. Klotz, Geo. Ross, L. B. Stewart, J. J. Dalton.

PUBLICATION—L. V. Rorke (Chairman), T. D. LeMay, A. J. van Nostrand, J. F. Whitson.

ENTERTAINMENT—T. D. Le May (Chairman), A. T. Ward, G. S. Abrey, R. M. Anderson, John van Nostrand.

SPECIAL

LEGISLATION—G. B. Kirkpatrick (Chairman), J. W. Fitzgerald, C. H. Fullerton, T. B. Speight, J. M. Watson, J. F. Whitson, C. J. Murphy, T. D. LeMay.

REPOSITORY AND BIOGRAPHY—Willis Chipman (Chairman), H. L. Esten, M. Gaviller, A. E. Jupp, L. V. Rorke, A. L. Russell, Jas. Dickson, J. D. Evans, G. B. Kirkpatrick.

EXPLORATION—L. B. Stewart (Chairman), J. F. Whitson, J. S. Dobie, T. J. Patten, E. R. Bingham.

ROADS AND PAVEMENTS—J. S. Dobie (Chairman), H. T. Routly, J. F. Whitson, W. A. McLean, A. M. Jackson, J. H. Jackson, J. L. Lang.

Programme of the
Association of Ontario Land Surveyors
(INCORPORATED)

At Its Twenty-Third Annual Meeting Held at Toronto,
February 16th, 17th and 18th, 1915.

PROGRAMME

Tuesday, 16th February — Morning, 10 o'clock.

In the Engineers' Club

Meeting of Council of Management.
Meeting of Standing and Special Committees.

Afternoon, 2 o'clock.

Reading of Minutes of previous meeting.
Correspondence.
President's Address. J. W. Fitzgerald.
Report of Council of Management.
Report of Secretary-Treasurer and Auditors.
Report of Board of Examiners. G. B. Kirkpatrick, Chairman.
Report of Committee on Publication. L. V. Rorke, Chairman.
Report of Committee on Topographical Survey, Thos. Fawcett, Chairman.
Report of Committee on Exploration, L. B. Stewart, Chairman.
Paper.—“Possessory Titles.” F. N. Rutherford, O.L.S.
Paper.—“City and Suburbs Plans Act.” T. W. Le May, O.L.S.
Paper.—“Reminiscences.” A. L. Russell, O.L.S.

Evening, 8 o'clock.

Paper.—“A Modern Crushing Plant.” J. S. Dobie, O.L.S.
Paper.—“The Land Surveyor of Ancient Rome.” J. S. Lang, O.L.S.
Address.—Aviation. J. D. A. McCurdy.

Wednesday, 17th February — Morning, 10 o'clock.

Report of Committee on Land Surveying. C. J. Murphy, Chairman.
Paper.—“ Surveys in the Double Front Concessions of the Early Thirties.”
M. Gaviller, O.L.S.

Afternoon, 2 o'clock.

Report of Committee on Engineering. N. D. Wilson, Chairman.
Report of Committee on Drainage. G. A. McCubbin, Chairman.
Report of Committee on Roads and Pavements. J. S. Dobie, Chairman.
Paper.—“ Some Comments on Case Home Bank vs. Might Directories Ltd.”
J. W. Fitzgerald, O.L.S.
Report of Committee on Repository and Biography.
Willis Chipman, Chairman.

Evening, 7.30 o'clock.

Dinner at Engineers' Club Dining Room.

Thursday, 18th February — Morning, 10 o'clock.

Report of Committee on Legislation. G. B. Kirkpatrick, Chairman.
Report of Committee on Entertainment. T. D. Le May, Chairman.
Nomination of Officers:—

President, Vice-President, Secretary-Treasurer, two members of
Council, Auditors.

Unfinished Business.

New Business.

Adjournment.



J. W. FITZGERALD (Peterborough, Ont.)

President Ontario Land Surveyors Association
1914-15.

Minutes of the Twenty-Third Annual Meeting

— OF THE —

Association of Ontario Land Surveyors

HELD AT THE ENGINEERS' CLUB, 96 KING STREET WEST, ON THE 16TH, 17TH AND 18TH FEBRUARY, 1915.

The following members were present:

Name	Address	Name	Address
Abrey, G. S.....	Toronto.	Jupp, A. E.....	Toronto.
Anderson, R. M....	Toronto.	James, D. D.....	Toronto.
Anderson, F. J.....	Niagara Falls.	Jackson, A. M....	Brantford.
Attwood, C. H.....	Hamilton.	LeMay, T. D.....	Toronto.
Ardagh, A. G.....	Barrie.	Lloyd, N. C.....	Toronto.
Bell, J. A.....	St. Thomas.	Lang, J. L.....	Sault Ste. Marie.
Burwash, N. A.....	Toronto.	McCubbin, G. A....	Chatham.
Bolton, E. D.....	Listowel	McLean, W. A.....	Toronto.
Benner, J. K.....	Port Arthur.	McMullen, W. E....	Toronto.
Burd, J. H.....	Sudbury.	MacKay, J. J.....	Hamilton.
Beatty, H. J.....	Pembroke.	Niven, D. A.....	St. Catharines.
Campbell, A. S.....	Kingston.	Rutherford, N.....	St. Catharines.
Christie, U. W.....	Orangeville.	Routly, H. T.....	Toronto.
Code, S. B.....	Smiths Falls.	Robertson James...	Toronto.
Chipman, W.....	Toronto.	Rorke, L. V.....	Toronto.
Dobie, J. S.....	Thessalon.	Ransom, J. T.....	Toronto.
Fickson, James.....	Fenelon Falls.	Speight, T. B.....	Toronto.
Fitzgerald, J. W....	Peterborough.	Sewell, H. D.....	Toronto.
Fitton, C. E.....	Orillia.	Stewart, L. B.....	Toronto.
Fullerton, C. H....	New Liskeard.	van Nostrand, A. J.	Toronto.
Fairchild, W. H ...	Brantford.	van Nostrand, John.	Toronto.
Grant, R. R.....	Toronto.	Ward, A. T.....	Toronto.
Gill, J. R.....	Sudbury.	Winters, W. F.....	Toronto.
Gaviller, M.....	Collingwood.	Wilson, N. D.....	Toronto.
Hutcheon, James...	Toronto.	Wilkie, E. T.....	Toronto.
Hellferth, J. B....	Toronto.	Watson, J. M.....	Orillia.

On Tuesday, February 16th, at 2 o'clock p.m., the President, Mr. J. W. Fitzgerald, called the meeting to order and said:

Gentlemen, the first business will be the reading of the minutes of the previous meeting.

On motion of Mr. Dobie, seconded by Mr. Bolton, the minutes were taken as read and ordered to be printed in the proceedings.

The President—The next order of business is correspondence.

The Secretary—There is no correspondence requiring consideration except one letter from the Honorable the Provincial Secretary which will properly come up under the Drainage Committee's report.

The President—Gentlemen, the next order of business is the President's address.

The President then read the annual address which was received with applause.

The President—The next is the report of the Council of Management.

The Secretary read the report which, on motion of Mr. Kirkpatrick, seconded by Mr. Bolton, was adopted unanimously.

The President—The next is the report of the Secretary-treasurer and the report of the Auditors.

The Secretary presented and read the report, and after doing so remarked that the figures show the receipts for the past year are \$222 over and above the expenditure. I would move Mr. President, that the report which has been approved of by the Council be confirmed. I have also the auditors' report here. (Reads same.)

The President—Gentlemen, you have heard the report of the Secretary-Treasurer and the Auditors' report. I think they are both satisfactory. Will somebody move that they be adopted.

On motion of Mr. J. J. Mackay, seconded by Mr. A. M. Jackson the reports were adopted.

The President—The next business is the report of the Board of Examiners, Mr. George B. Kirkpatrick, Chairman.

Mr. Kirkpatrick presented and read the report of the Board of Examiners and moved its adoption.

The President—Gentlemen, you see there is evidently going to be no shortage of surveyors; twelve have passed the preliminary and fourteen the final examination. As my friend Ex-President Dobie, said to me the other day, it was quite a bunch to throw into the ranks of the unemployed. Will somebody second the adoption of the report?

On the motion being seconded by Mr. Dobie, the report was adopted.

The President—The report of the Committee on Publication is the next thing.

The Secretary—As Chairman of that Committee, I was unable to get the committee together this morning owing to the fact that members of this Committee were principally engaged on other committees and I would suggest that the report be either taken as read or that it be deferred to a later time at this meeting.

The President—I think we had better take it as read.

On the motion of Mr. Speight, seconded by Mr. Dobie, the report of the Committee on Publication was taken as read.

The President—The next is the report of the Committee on Topographical Survey, by Mr. Thomas Fawcett. Is he here?

Mr. Dalton—I will read the report. (Reads same.)

The President—Gentlemen, you have heard this very valuable report. What is your pleasure?

Voices—Carried.

The President—Gentlemen, I think a motion of thanks would be in order to Mr. Tobey.

On the motion of Mr. Dobie seconded by Mr. Dickson a vote of thanks was tendered to Mr. Tobey.

The President—Gentlemen, before we go any further I would like to remind you that we are going to have our annual dinner to-morrow evening and I think any member of the Association who wants to show his loyalty should attend that dinner. It is his duty as well as his pleasure.

The next is the report of the Committee on Exploration, by Mr. L. B. Stewart. I understand Mr. Dobie is going to read that.

Mr. Dobie—Mr. Stewart is Chairman of that Committee and I saw him here this morning, he told me he had been in correspondence with the other members of the committee, but until he had met them all it was difficult to formulate a report. He was unable to attend this afternoon as he had to attend the session of the Dominion Land Surveyors' Examination, but he expects to be here to-morrow afternoon and he asked me to request that you have the report laid over until such time as he could be here.

The President—I think that will be satisfactory.

The President—The next is a paper on Possessory Titles, by Mr. F. N. Rutherford.

Mr. Rutherford—Mr. President and Gentlemen, I am taking the President's advice who says the younger members should take part in writing papers. Possessory Title is more a question for the legal profession than for the surveyor, but I am going to try in a very short paper to call attention to some small facts that may influence the surveyor's decisions in making surveys where possessory title is concerned.

Mr. Rutherford then read his paper.

The President—The next is a paper by Mr. T. D. Le May on "City and Suburbs Plans Act."

Mr. Le May—Mr. President and Gentlemen, I have endeavored in a short paper to show you how the City and Suburbs Plans Act has been worked out in Toronto. Our methods may not be the very best methods, but this is a short sketch of how we have endeavored here to do it.

The President—The next paper is "Reminiscences" by Mr. A. L. Russell. Is he here?

The Secretary—I had a letter from Mr. Russell forwarding his paper and stating he was very sorry it would be impossible for him to be here, and he also stated it would take

about 45 minutes to read the paper, but he crossed out some of the pages and with those left out he said it would only take 35 minutes. I think it is a very valuable paper, both humorous, instructive and interesting.

The President—Is it your pleasure that this paper be read? I think that any of us who know Mr. Russell would like to hear it read.

The Secretary read the paper which was received with applause.

The President—That finishes the program for this afternoon. Do not forget we have two very interesting papers this evening, one by Mr. Lang which I know will be splendid, and one by Mr. Dobie and also a talk on aeroplanes by Mr. McCurdy.

At 4.20 p.m. the meeting adjourned.

EVENING SESSION.

8 o'clock p.m.

The President—Gentlemen, before we open the regular business of the evening I have a motion here moved by George A. McCubbin, seconded by James Robertson, that Mr. George F. Henderson, the Drainage Referee for Ontario, be invited to address this Association on Wednesday afternoon on the subject of the Drainage Law.

Mr. McCubbin—We all have our own difficulties in working out the provisions of the Drainage Act; my difficulties may be different from those of the other members. The discussion on the Drainage report is on to-morrow afternoon and the Drainage Referee is in town attending court and I have pretty reliable information that we could get him to address us here to-morrow afternoon on some points of general interest showing the difficulties that are most commonly met with by engineers; and not only that but we might bring up for discussion any points any of the members chose to bring up. For that reason I have much pleasure in moving this resolution inviting the Drainage Referee to address us.

Mr. Robertson—I have much pleasure in seconding that.

The President put the motion which was adopted.

The President—The next order of business is a paper by Mr. J. S. Dobie on stone crushing.

Mr. Dobie—Mr. President and gentlemen, the title of the paper as it appears on the paper is stone crushing. At the time Mr. Rorke wrote to me I replied to him stating I would give a paper and I mentioned I would like to give something on the subject of stone crushing which would be more or less a description of a particular plant and of the methods employed at that plant.

The President—I am sure you are in for another very good paper from my friend Mr. Lang, entitled "The Land Surveyors of Ancient Rome."

Mr. Lang—I feel Mr. President I owe the meeting almost an apology for writing a paper which is not of any technical interest, merely literary interest, but, perhaps, in view of the remarks made by a member this afternoon, referring to the progress made by the Association in the last twenty-five years, it may be of some interest. I think perhaps we have some distance to go yet before the status of the profession is as high as it was in the early part of the Christian era.

Mr. Lang then read his paper which was received with applause.

The President then called upon Mr. McCurdy to address the meeting on aviation.

At 10.15 p.m. the meeting adjourned.

WEDNESDAY, FEBRUARY 17th, 1915.

10 o'clock a.m., resumed.

The Vice-President, Mr. Wilkie, took the chair and called the meeting to order and said: The President, Mr. Fitzgerald, has sent word he is not very well and asked me if I would take the chair, therefore if you come to order we will proceed with the business. The first item on the programme

is the report of the Committee on Land Surveying of which Mr. Murphy is the Chairman.

Mr. Murphy then presented the report.

AFTERNOON SESSION.

At 2.30 p.m. the Vice-President, Mr. Wilkie, took the Chair, and called the meeting to order, and said: The first item on the programme is the report of the Committee on Engineering. Is Mr. Wilson present?

Mr. Wilson—Mr. Chairman and Gentlemen, before I give this report I would like to say that we have never yet been able to get a quorum of the Committee. Perhaps that is the usual thing. But if the Association are not in sympathy with the conclusions we draw you are not to blame the Committee so much as the people who appointed them. (Mr. Wilson read reports illustrated by charts.)

The Vice-President—You have heard this report of the Committee on Engineering. What is your pleasure?

Mr. Rutherford—I have much pleasure in moving the adoption of the report. It seems to me Mr. Wilson has spent a good deal of time in compiling statistics and a good deal of interest in setting out those details. I know when they were sent to me some time ago it was quite an interesting thing to study out the different classifications and I think it is one that should govern to a certain extent the trend of the Association.

On the motion being seconded by Mr. Dickson that the report be received and printed in the proceedings, the same was voted upon and adopted.

The Vice-President—The next item is the report of the Committee on Drainage and Mr. McCubbin is the Chairman.

Mr. McCubbin presented and read the report of the Drainage Committee together with three questions asked and answers thereto.

Mr. Jackson—At the time when the case came up mentioned in the third question, I got advice as to whether the

Council could proceed to lay out a municipal drain and assess the people who were going to drain into an award ditch, the construction of which they had never paid for, and my answer in one direction was that the only relief they could get was to sue for damages, they had not recourse under the Act, because assessment could not be made for bringing them through a ditch that these people who were going to be assessed had no right to drain into.

Mr. McCubbin—Suppose that award ditch wasn't there at all. The fact that an award ditch was put there and they are part of the owners assessed by the award, does not affect their liability to assessment on the Municipal scheme. The owners of the lower area have two courses open to them, they can sue for damages if they wish, or they may take proceedings to construct a drain locally. That is a feasible method as a general thing to construct a drain.

The Vice-President—Any discussion regarding this report is now in order.

Mr. MacKay—I have much pleasure in moving the adoption of this report.

Mr. Geo. Smith—I second that.

The Vice-President put the motion, which on a vote having been taken, was declared carried, and the report adopted.

The Secretary—Mr. Vice-President, I would like to say. It has occurred to me that if these sketches are to be printed in our report is it advisable that a specific case should be laid down as they are? These are special cases under way and is it advisable that they should come in the report in that shape?

Mr. McCubbin—Take the large blue print which has been prepared for actual report to the municipality, perhaps it should not go on the record as something being discussed here by an Association; it should be something more in the nature of questions which have been submitted to the surveying committee. The essential points of each of these questions could be laid down in a very simple black and white sketch which would reproduce these all for circulation.

The Secretary—I suppose it would be satisfactory if these sketches were made the basis and altered so as not to designate a specific case, which is before the people.

Mr. Murphy—It would be better if the party who gave the question would make the sketch.

Mr. McCubbin—Surely, that is the intention.

Mr. van Nostrand—I would suggest it is inadvisable unless it is to gain some great object that any large plans that must be folded should go into the reports. These reports, as a rule, are bound later and the inserts that require more than one page inside are found very inconvenient and rather mar the whole effect. If it can be kept to the size of one page it would be better.

Mr. Smith—I would like to move this resolution.

Moved by Mr. Geo. Smith, seconded by Mr. Fitton, that the Secretary be instructed to forward a copy of clauses 1 to 6 inclusive of the Drainage Committee's report to the Hon. W. J. Hanna, Provincial Secretary, in reply to his letter which was read.

The Vice-President put the motion, which on a vote having been taken, was declared carried.

The Vice-President—If there is nothing further on this report we will take up the report of the next committee, the Committee of Roads and Pavements. Mr. Dobie is the Chairman.

Mr. Dobie—Mr. Vice-President and Gentlemen, I will read you a draft of a short report the Committee have prepared on the road question during the past year. (Reads same.)

The Vice-President—We will now call upon Mr. Gaviller to give us his paper on "Double Front Concessions in the Early Thirties."

Mr. Gaviller—Mr. Chairman and Gentlemen, in introducing to you this paper I think it is rather on different lines to those we usually have up, but having been asked a good many questions not only by your young surveyors, but by those who are proposing to go up for their preliminary examination on the subject, it struck me I might write a simple paper on this particular subject giving actual work which would be useful to them not only in getting up their examination but after they had passed it.

Mr. Gaviller then read his paper.

The Vice-President—As Mr. Henderson, of Ottawa, is present we would be very glad to have him speak to us now with reference to the Municipal Drainage Act.

Mr. Henderson then addressed the meeting.

The Vice-President—On the programme I find that there was an item, namely the report of the Committee of Exploration, by Mr. L. B. Stewart as Chairman, which was down for yesterday. He was not able to be present yesterday, but is here now, and, perhaps, he would like to give his report.

Mr. Stewart—I was unable to hold a meeting of the Committee yesterday and Mr. Dobie and myself held an informal meeting and talked over what we thought should go into the report. I have endeavoured since then to put a few of our ideas in writing, although I feel that they are subject to enlargement. (Reads report.)

The Vice-President—We still have another paper on the programme for this afternoon, entitled "Amendments to the Local Improvement Act," by Mr. George Smith.

Mr. Smith—I feel this is rather out of the ordinary run of business for this Association, but we are in for anything that improves the Association and makes ourselves useful to the public. There is a little bit of an opening here, and I thought I would submit the paper. The paper is entitled, "A Suggested Amendment to the Local Improvement Act, Being Part of the Municipal Act." (Reads paper.)

The Vice-President—The next item on the programme is the report of the Committee on Repository and Biography, by Mr. Willis Chipman. Mr. Chipman, I do not think is here but we might have it read.

Secretary reads report.

The Vice-President—Gentlemen, that is all on the programme for this afternoon. We will now adjourn to meet in the dining hall downstairs at half past seven this evening.

MORNING SESSION.

Thursday, February 18th, 10.30 a.m.

The President took the chair, called the meeting to order, and read his paper, entitled, "Some Comments on the Case of Home Bank versus Might Directories, Limited."

The President called for the report of the Committee on Legislation.

Mr. Rorke—I don't know whether Mr. Kirkpatrick, the Chairman of the Committee, succeeded in having a meeting of his Committee the other day. I am not on the Committee. In the matter of legislation last year there were two or three small amendments to the Survey Act. These were printed in the circular sent to the members. That was all that was done last year. Then the matter of the Special Committee with reference to standardizing of governing lines by monuments—the Council of Management approved of that report, see page 63 of the last annual report, and the matter was referred to the Legislation Committee. In the Council the other day it was recommended that this report of the Special Committee be referred to the Master of Titles and also to the Inspector of Registry Offices for their opinion as to the adding of the said clause in the Land Titles Act or the Registry Act; it was a question of which Act that amendment should go under and I suppose after their opinion is received legislation will be applied for. That is all the legislation that has come up before the Committee last year. Of course there are several motions now for amendments to the different Acts before this Committee and it will be for the Council of Management and Committee on Legislation to take up these matters and see what can be done.

Mr. McMullen—May I ask what the standardization of monuments was?

The Secretary—This is found on pages 62 and 63 annual report, 1914.

The President—There is a small amendment here which I suggested as a member of the Legislation Committee in connection with the Ontario Land Surveyors' Act. The Legislation Committee recommended amending section 40 of the above Act by adding after the word "court," "and such surveyor before giving evidence shall produce to the court his current annual certificate." I did that for the purpose more of making surveyors pay up their dues. That is the amendment, almost word for word, taken from the Medical Act. When a surveyor appears in court to give evidence he can be first asked for his current annual certificate before he is allowed to take the witness stand. I don't know whether you would all be in favor of that or not.

Mr. Fullerton—As the Chairman of the Legislation Committee is not here, we had a meeting the other day and I would, as a member of that Committee, move the adoption of the report of the Legislation Committee. That includes the amendment our President has spoken of and includes the suggestion to have that amendment placed in the Registry Act or the Land Titles Act as might be thought advisable on reply from the Inspector of Registry Offices and the other official to whom the Secretary was directed to write.

Mr. Routly—As to the question of putting surveyors in the position in which they will be forced to pay their fees, it was pointed out the other day that very few surveyors have much court experience, consequently this amendment would have very little effect. Now, we could get the proper effect in another way, if we could get an amendment to the Registry and Land Titles Act so that a surveyor must produce evidence to the Master of Titles or the Registrar in filing a plan that he is in good standing in the Association by filing his annual certificate; that would get nearly all of us.

Mr. Ransom—I would second the motion, but before doing so I would like the amendment to be read out so that we can pass on it intelligently; I think there are some members here who do not know just how the amendment reads that is being presented.

The President—The amendment I might say, gentlemen, is an amendment that I brought in myself.

Mr. van Nostrand—I would like to ask the mover and seconder if they would mind adding to their motion authority to the Legislation Committee to apply for the correction of certain typographical errors that appear in the Statute. They appear to be small matter and I think we might safely leave it with the Committee.

Mr. Fullerton—As mover of the motion I would agree that that be included.

Mr. Ransom—As seconder I agree to that.

Mr. Rutherford—There is one matter, that is the amendment to the Cities and Suburbs Plans Act bringing towns of 2,000 or upwards, or some such size, under that Act. There are towns all over the country being laid out to-day without any regard to the future, and in a great many cases in the townships surrounding the small cities the city people know nothing whatever about it. I think if there was some amendment including towns of that size it would be a good idea. I

know in the case of two small cities the Railway Board have adopted that principle already in referring subdivisions to the township councils. I would move that that be brought to the attention of the Legislative Committee and decided on by them to bring in an amendment to the Cities and Suburbs Plans Act, including towns of say 2,000 and up.

Mr. Jackson—I would second that. It would appear to me that the relative amount of damage being done is more in the case of small towns than it is in large ones. If the Cities and Suburbs Plans Act does not apply until the city reaches 50,000, a relatively greater amount of damage is being done than if it applies to cities over 50,000. I have much pleasure in seconding Mr. Rutherford's motion.

Mr. Lang—I would like to move in amendment that this matter be referred to the Legislative Committee for discussion and that it be brought up at a further meeting. It is rather short notice to put a thing through like that.

Mr. Rutherford—That was the intention of the motion.

Mr. Lang—Then I withdraw the amendment in view of Mr. Rutherford's statement.

The President put the motion, which, on a vote having been taken, was declared carried.

The President put the motion to adopt the report of the Legislative Committee, which, on a vote having been taken, was declared carried.

The President called for the report of the Committee on Entertainment.

Mr. Le May—In regard to the Entertainment Committee they have not yet had a meeting to prepare this report. I ask that they be granted time to prepare the report and hand it to the Secretary. I am in a position, Sir, to state that there was a dinner last night, that is as far as we got.

Mr. Wilkie—I beg to move, seconded by Mr. Fitton, that the report of the Committee on Entertainment be taken as read and printed in the proceedings.

(Motion adopted.)

The President—The Association owes a debt of gratitude to Mr. Le May and the Entertainment Committee for their

services. There are very few who know how much trouble is entailed in getting up a dinner such as we had last night. I am sure we all appreciate their services very highly.

The next business, Gentlemen, is the nomination of officers.

(An adjournment of fifteen minutes was taken.)

(After adjournment.)

The President—I would call for nominations for the office of President.

Mr. A. J. van Nostrand—I beg to nominate Mr. E. T. Wilkie as President.

Mr. Sewell—I second that.

The President put the motion which was carried, and Mr. E. T. Wilkie declared elected to the office of President.

Mr. Dickson—I should like to submit the name of Mr. C. J. Murphy as Vice-President.

Mr. Speight—I have great pleasure in seconding that.

The President put the motion which was carried and Mr. C. J. Murphy declared elected to the office of Vice-President.

The President called for nominations for the office of Secretary-Treasurer.

Mr. Gaviller moved, seconded by Mr. Bolton, that the present Secretary-Treasurer Mr. L. V. Rorke be re-elected.

The President put the motion, which, on a vote having been taken was declared carried.

The President called for nominations for two members of the Council.

Mr. Dickson—I nominate Mr. H. J. Beatty.

Mr. Gaviller—I would like to nominate Mr. Charles E. Fitton.

Mr. Wilkie—I beg to nominate Mr. H. T. Routly.

Mr. Ward—I beg to nominate Mr. J. S. Dobie.

Mr. Wilson—I beg to nominate Mr. F. N. Rutherford.

Mr. Dobie—I would like to nominate Mr. G. A. McCubbin.

Mr. Fullerton—I would like to nominate Mr. John L. Lang.

Mr. Ransom—I would like to nominate Mr. T. B. Speight.

Mr. Fullerton—I move, seconded by Mr. Dickson, that the nominations be closed.

Mr. Jackson—Are the members of the Council still open to be nominated as Chairmen of Committees?

Mr. Dobie—I think so.

The President—That would not come into question. I have the privilege as President of nominating the scrutineers. I will appoint Mr. Esten and Mr. Le May.

Nominations are open for auditors.

Mr. John van Nostrand nominated, seconded by Mr. Sewell, Mr. A. E. Jupp and Mr. R. M. Anderson as auditors.

(Adopted.)

UNFINISHED BUSINESS.

The President—In my address I mentioned I thought it would be a good idea if you would form a committee or name some of the standing committees to take up the work of compiling the various cases that have been decided in court, and also to watch the cases as they come through so that we will have them right up to date in our report every year. There has been a large list of those cases compiled away back by Mr. Esten, and I would respectfully suggest he be the Chairman of that Committee, if it is your wish to appoint a new one, or if it is your wish to put this work on some of the standing committees. I would like to hear the opinion of the Association on the matter. I think we should have printed in our annual report a full report of the cases as they come through. Only yesterday I noticed in the paper a case with which Mr. Le May was connected in the city here. We would like to have the evidence of that case printed in the next report.

Mr. Le May—It was a case of an encroachment on Simcoe Street. It was one of the original streets laid out on the plan of the town of York. About a year and a half ago there were three stores erected which appeared to us to encroach upon the street, and upon measuring, taking 66 feet for Simcoe Street, and the line that had generally been adopted by other surveyors we found there was an encroachment of 5 feet 6¾ inches, and we proceeded to take action to have the encroachment moved. When the case was tried we sought to bring such evidence to show first of all, the original fence at Simcoe street, and secondly, the width at Simcoe Street. The judge, however, ruled that secondary evidence was inadmissible. The only evidence that had any bearing on those two points was direct evidence, the original plan of the town of York and the original monuments planted. We were unable to produce these things. The result of his decision, as far as the surveys under that town plan of York is concerned, is this, that we have a block bounded on the north by Queen Street, on the east by Sherbourne Street and on the west by Peter Street. Within that block we have got streets and blocks of buildings and everything erected, but we have no metes and bounds for any of those streets or blocks. Our streets are virtually in the position of trespass roads. We have followed out what we understood to be the intention of the plan and those lots were laid out as acre blocks, and the streets were 66 feet or one chain wide. All that is upset and we have no basis to go on any further. The old occupation governs. I have not seen his judgment, but from a short sketch of it I saw he also raised a point that was raised in the *Might* Directory case, that the best evidence as to the position of the street line would be shown by the fences. The fences in this particular case were traced back by witnesses to 1847. It was held by the judge to constitute evidence as to the position of the original stakes, but in my opinion he overlooked that 1847 was itself 50 years after the original plan was staked in, and it was too long to imagine any direct connection between the fence that existed at that time and the stakes, because they would hardly last for that length of time.

The President—We will leave this matter to the Council. There will be a meeting of the Council immediately after the adjournment and they will decide whether a committee is to be appointed or not.

Mr. van Nostrand—My suggestion was that the motion go through now authorizing or instructing the Council to ap-

point such committee, but that the striking of the committee itself be done at the time the other committees are struck. I would move that.

Mr. Lang—I second that.

The President put the motion, which, on a vote having been taken, was declared carried.

NEW BUSINESS.

Mr. McMullen—I have much pleasure in moving that five dollars each be granted to the auditors for the past year.

On the motion being seconded by Mr. Ardagh, the same was carried.

It was moved by Mr. James Dickson, seconded by Mr. E. T. Wilkie that this Association regards with deep regret the death of John Galbraith, T. C. Keefer and Archie W. Ponton, and that the Secretary be requested to convey to the relatives of the deceased the sympathy of the members of the Association in the loss sustained.

The President put the motion, which, on a vote having been taken was declared carried.

It is moved by Mr. James Dickson, seconded by Mr. Gávilier, that this Association desire to extend to Peter S. Gibson its sympathy on account of his illness and his inability to attend this meeting, as his advice and genial companionship was always to be had in past years, and that the Secretary forward to him a copy of this resolution.

The President put the motion, which, on a vote having been taken, was declared carried.

Mr. Dobie—It is moved by myself, seconded by Mr. Lang, that the sum of \$400 be granted to the Secretary-Treasurer in recognition of his services during the past year. I may say, Gentlemen, that one reason why the affairs of this Association are in such a prosperous condition to-day is on account of the indefatigable efforts of our Secretary, Mr. Rorke. I believe there are few of you here who realize the amount of work there is in looking after the affairs of this Association

which is entailed upon the Secretary, and the manner in which he has responded to this work and has served the Association, is worthy of the recognition which we propose and a great deal more. While this sum is voted to Mr. Rorke he does not get the whole of it, because there are little things that come out of it. For instance, there is the deficit in connection with the annual dinner and which, perhaps, now falls upon the Secretary. I therefore take pleasure in moving this resolution. In the old days when I first became a member of this Association when our Secretary-Treasurer's emolument was being fixed upon I think it was the rule when he came around next year he had to show his tongue to show how many stamps he had licked, but I understand from Mr. Rorke's statement he has written some 500 letters and will probably write more next year and we will let him off on that.

The President—I am entirely in accord with what Mr. Dobie has said. There are very few of us that realize the large amount of work that is being done by Mr. Rorke and I think you will all be heartily in favor of this motion. (The motion was carried with applause.)

Mr. Rorke—Mr. Chairman and Gentlemen, I thank you very much for your all too flattering remarks. I sometimes think that my failings are very considerable and I only hope that you will overlook them for the coming year as you have in the past, and I will endeavor to do my best to serve the Association for another year.

Mr. Rutherford—Would it be possible for this Association to have published in pamphlet form the reports of all these committees and a copy forwarded to each member say one month in advance of the annual meeting. That is something that is done in the Canadian Society of Civil Engineers, and it gives every member of the Association a chance to digest what is being done and see the possible amendments that are being brought forward, and to discuss them intelligently at the annual meeting. I would like to hear an expression of opinion.

The President—That would necessitate the convening of those various committees at Toronto or some other central point and involve considerable expense. What do you think about it, Mr. Rorke?

Mr. Rorke—It would mean a meeting of the committees to make their report in some way. I don't see how the com-

mittees could make a full report without a meeting, and I think that was Mr. Rutherford's idea that the committees should meet, perhaps, two months previous to the annual meeting and frame their reports and these reports be sent out to the members the same as we are now doing with the question drawer. It would certainly mean a meeting of the committees before the annual meeting.

The President—I don't see any objection to it except the question of expense.

Mr. Rutherford—As it is now we have committees appointed, certain members are on those committees, and as a matter of fact there are no meetings held except for five or ten minutes on the morning of the first day of our annual meeting, and these questions are brought up and formulated practically by the Chairman without any meeting of the committee and no person takes any interest with the exception possibly of the Chairman and one or two members. If this thing is worth doing at all it is worth having a meeting. The whole thing might as well be done by one or two men as to have no meeting and have no discussion on these reports after they are brought in.

Mr. Wilkie—Mr. President, the idea is possibly all right, but I hardly think it would be workable as it is in the Canadian Society of Civil Engineers. That society is a very much larger body. I think their membership together with the associates is probably nearly two thousand. The work of the committees there is pretty largely done by correspondence and they hold regular monthly meetings and members go from different places to the monthly meeting, and large numbers of the committees meet at these monthly meetings at the parent house and reports are discussed and prepared before the end of the year and circulated among the members. I doubt if it is workable in this association.

Mr. Routly—I think, perhaps, this might be done with some committees if not with all, especially the Surveying Committee. We either go forward or downward and we should make every attempt to keep going forward, and it seems to me our committee work this year is better than any year since I have been connected with the Association. I think this meeting has been a very valuable meeting all round.

Mr. Rutherford—I would move, seconded by Mr. Routly, that the matter be left to the Council of Management with the

idea and the suggestion of publishing and submitting to the members a report from each of the committees or as many as possible, and that those reports be submitted to all the members at a certain date before the annual meeting. If the scheme is feasible let them adopt it and carry it out.

The President put the motion, which, on a vote having been taken, was declared carried.

Mr. Lang—The Engineers' Club have accorded us their courtesy and kindness, and I would like to move that we convey our thanks to them for their very great kindness to us on this, as on previous occasions.

Mr. Dobie—I take very great pleasure in seconding that vote of thanks.

The motion was carried with applause.

Mr. Dickson—If that is all the business, I think, Mr President, you have been long enough in that Chair and I therefore move that you leave it and that Mr. A. J. van Nostrand take the same.

Mr. van Nostrand—(In the Chair) I am taking it for granted this motion has been seconded and carried.

Mr. Gaviller—I have great pleasure in moving a vote of thanks to our retiring President for the courtesy and able manner in which he has occupied the Chair and the evident great interest he has taken in any movement that will create a more successful meeting and good feeling amongst all the members, and also to increase our interest in all matters for the benefit of the Association.

Mr. Dickson—I don't think, Mr. Chairman, that I could say anything in addition to what Mr. Gaviller has said. I am in sympathy with every word he has said. Mr. Fitzgerald has taken a very keen interest in the Association ever since it was formed and I think I have never seen the matters of the Association brought before the meeting in a more genial and systematic manner. I have therefore much pleasure in seconding the motion.

The Chairman put the motion, which was carried with applause.

The Chairman—I have much pleasure, Mr. President, in tending to you the thanks of the Association for the manner

in which you have conducted the affairs of your office as President.

Mr. Fitzgerald—I have to thank you sincerely for your great kindness. I am very sorry I was not able to do better. I was absent yesterday, but through no fault of my own. I am sure since I have become a surveyor and long before that time—it is over 40 years now since I first held a chain—as soon as this Association was organized I took an interest in it at once and I will always do everything I can to promote the interests of the Association. I think every surveyor in the Province should be thoroughly loyal to the Association and should do his best to bring the surveyors together. We all know very well that in the olden days Surveyors were like muskrats, they all had their own hole and corner. We have got to pull together in this 20th century; men who are working together in the same or kindred occupations have got to pull together. If we don't we are going to go to pieces. I have always done all I could for the Association and always will, to the best of my ability.

On motion of Mr. Dobie, seconded by Mr. van Nostrand, the meeting adjourned at 12.30 a.m.

GOD SAVE THE KING.

PRESIDENT'S ADDRESS.

J. W. Fitzgerald.

Gentlemen of the Association of Ontario Land Surveyors:—

In opening this the 23rd annual meeting of our Association let us thank God for all he has done for us during the past year and fervently pray that peace will reign supreme throughout the world at the close of this year of our Lord 1915.

It is with the deepest regret that I have to record the loss by the hand of death during the past year of the following members of our profession and Association.

Dean Galbraith, of Toronto University.

Thos. C. Keefer, of Ottawa.

Arch. W. Ponton, of Edmonton.

We have to thank God that we are living in a free and glorious Country as part and parcel of the greatest Empire the world has ever seen, and which with the help of its valiant sons the world over will remain the greatest Empire the world has ever seen.

I wish most sincerely to thank the members of this Association for the honor they have conferred upon me in electing me to the President's chair, an honor, gentlemen, which I fully appreciate. I must, however, ask your indulgence for the many mistakes I am sure to make as I am more than fully aware of my many shortcomings and inability to fill the important office to which you have elected me.

No one more fully realizes than I do the great benefit this Association has been for the advancement of our profession and I trust it will not be long before every surveyor in the Province will realize the fact that it is absolutely necessary that he should attend the annual meetings of our Association in order to keep abreast of the times, exchange sentiments and ideas with his fellow surveyors and keep up that "esprit de

corps" so absolutely necessary to all bodies of men following the same or kindred callings of this twentieth century. I think we all recognize the fact that this Association has raised our profession to a much higher plane than it occupied twenty-five years ago, and I think you will all agree with me when I say that any gentleman who now wins the diploma of Ontario Land Surveyor is "ipso facto" a Civil Engineer and a very well qualified one too.

While I am sorry to say the past season has not been entirely satisfactory, from a financial standpoint, to the great majority of surveyors in this Province, still we must be thankful that it was not worse, we must all realize that we are at war with a cruel and powerful foe and that we must be prepared to sacrifice everything, even life itself, so that this doctrine of Bernhardism may be wiped off the earth for all time to come.

Now, gentlemen, I see by the programme which has been prepared by our genial and indefatigable Secretary-Treasurer that this meeting will be most interesting and instructive and I would invite all to thoroughly discuss the papers and questions coming from the meeting. I would especially invite the younger members to take a more active part in these discussions, you will generally find that it is the chap with the gift of the gab that comes to the front whether he is possessed of ability or not. I hope none of our younger members will be afraid of making mistakes, we all make them, and it is only by acknowledging and correcting our mistakes that we can ever hope to approach the ideal.

The past season is the first in over thirty years that the writer has not been actively engaged in some branch of survey work, and by reason of this long experience I trust you will pardon me if I offer a few words of advice to the younger members of our Association.

We must remember that any work we are called upon to do no matter how small or insignificant it may seem, whether it is on private surveys, municipal work, Government work or surveys in disputed cases which may reach the courts, we must bring out the very best that is in us, don't be afraid of spending too much time or of using up too much paper, take all your observations, measurements and angles as closely and accurately as you possibly can and take complete, neat, copious and intelligent notes of everything you can do, leave absolutely nothing to memory or guess work, and when you have made

your plans and tracings and are finished with these notes, for the time being, file them away safely and systematically so that you can put your hand on them at any future time, and so that they will also be of use to generations yet to come.

There is one matter that I hope will be dealt with in some tangible way at the present meeting; reference has frequently been made as to the necessity of having a special (or one of our standing committees) take up the work of compiling the various survey cases which have been decided in the courts, and I would like very much to see this Committee appointed and put to work without further delay. We have much valuable information along this line, already in our reports, and especially that very complete list of cases compiled by Mr. H. L. Esten in 1896, a gentleman, whom with your permission, I would suggest as Chairman of this Committee if it is the pleasure of this Association to appoint one. I would also respectfully suggest that one other Toronto gentleman at least be placed on this Committee, they are here at the headquarters of our Ontario Courts and can watch the cases as they come up, and I think we should have printed in our annual reports a complete resume of all the cases of this character decided each year.

Let me conclude, gentlemen, by wishing you all a happy and prosperous year. I trust the business of the present meeting will be conducted in a spirit of friendliness and harmony and with the sole object of advancing the best interests of our profession.

REPORTS

SECRETARY-TREASURER'S REPORT.

Mr. Chairman—

At the meeting of the Council held on April 21st, 1914, a resolution was passed declaring the 31st of January the end of the financial year of the Association's business, and I have, therefore, the honor to lay before you a report of the business of the Association transacted between the 16th day of February, 1914, and the 31st January, 1915.

A contract was made with the Business Printing Company of Toronto, for the publication of our report, and as soon as the minutes of the last Annual Meeting, together with the reports and papers comprising the proceedings, were in shape, these were put in the hands of this Company for publication. It was not until the 1st of September that the publication was complete and copies were mailed to all members in good standing, and to those not more than one year in arrears. These were mailed to the last address known of the surveyor, and in quite a number of cases the report failed to reach them, as also other communications and circulars similarly addressed.

Exchanges of reports were arranged and carried out with the Dominion Land Surveyors' Association, Manitoba Land Surveyors Association, Iowa Civil Engineers and Surveyors Society, Ohio Engineering Society, Illinois Society of Engineers, Indiana Engineering Society, and also 25 copies were forwarded to the Alberta Land Surveyors and 25 copies to the Saskatchewan Land Surveyors. The report was also sent to the several Libraries and Scientific Societies on our mailing list.

The official register of members is up-to-date and tabulates as follows:—

Active members	267
Withdrawn from practice	102
Deceased	100
	<hr/>
Total roll	469

On the active list there are fourteen exempt from payment of annual dues under Sec. 41, Ontario Land Surveyors Act. During the past year three members have withdrawn from active practice and seven newly licensed surveyors have been added to the active list.

Four of our members have answered the call to arms for the defence of the Empire, namely,—Wilmot J. Baird of Scarborough, Colin W. G. Gibson of Hamilton, and Clayton E. Bush of Edmonton, who went with the first contingent of Canadian forces, and E. G. MacKay of Hamilton, now with the second contingent.

It has been a sorrowful duty to record on the deceased list during the past year the names of Dean Galbraith of the Faculty of Applied Science, Toronto University, who was "pater preceptor" to the majority of Ontario Land Surveyors under the half century mark; Thos. C. Keefer of Ottawa, who in earlier days was identified with many public works in Canada and whose name has been on the list of Land Surveyors since 1840, and Archibald W. Ponton of Edmonton, Alberta.

During the past year the correspondence in connection with the affairs of the Association necessitated the writing of about 500 ordinary letters. There were also mailed five different sets of circular letters of about 250 each.

The payment of annual fees, I regret to say, has not been as well attended to by members as usual. The total amount of arrears of fees is \$1272. Of this amount there is over \$900 which is being carried on the books and increasing from year to year, which seems to be impossible to collect. In a great number of cases the addresses of the parties are not known and the majority of them are not practising land surveying in the Province. The balance of these arrears, however, is made up principally of members who are one or two years in arrears and who have neglected to give the matter their attention.

The financial statement herewith shows the transactions of the past year and the present state of the Association's finances. There are no outstanding liabilities.

FINANCIAL STATEMENT FEBRUARY 1st, 1915.

RECEIPTS.

Balance in Savings Bank Account 16th Feb., 1914..	\$1,331.05
Balance in Current Bank Account, less outstanding cheques amounting to \$239.85, 16th Feb., 1914	239.70
Cash on hand 16th Feb., 1914	188.63
Receipts from Board of Examiners including Gov- ernment grant (\$200.00)	657.00
Receipts from annual membership fees	710.00
Receipts from advertisement and sale of reports ..	12.00
Interest on Consumers Gas Co. stock	100.00
Interest accrued on Savings Bank Account	40.16
	<hr/>
	\$3,278.54
	<hr/>

EXPENDITURE.

Amount paid Auditors	\$ 10.00
“ “ for Stenographic report annual meet- ing	75.00
Amount of grant to Secretary-Treasurer	400.00
“ paid for postage	84.50
“ “ premium on Secy.-Treasurer's bond	7.50
“ “ E. D. Armour, K.C., for opinion	50.00
“ “ for rent for library and lecture room	50.00
Expenses paid members of council April, 1914	27.65
Paid for freight, brokerage, cartage	12.11
“ “ use of lantern and slides	6.00
“ “ publication of annual report	426.70
“ “ printing and stationery	91.42
“ “ testing and certifying to standards	28.00
“ “ expenses of Board of Examiners	28.40
	<hr/>
	\$1,297.28
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SUMMARY 1915.

Total receipts including Bank Balance	\$3,278.54	
“ Expenditure	1,297.28	
		<hr/>
To Balance		\$1,981.26
		<hr/>
By current Bank Account balance Feb. 1st, 1915, less outstanding cheques	\$ 607.45	
By Savings Bank Account balance Feb. 1st, 1915	1,371.21	
Cash on hand	2.60	
		<hr/>
		\$1981.26
		<hr/>

ASSETS.

Cash in Bank and on hand	\$1,981.26
20 shares Consumers Gas Co. stock	1,760.00
Office furniture	140.00
13 Lufkin Rule Standards	130.00
Arrears of fees collectable (Est)	300.00
	<hr/>
	\$4,311.26

L. V. RORKE,
Secretary-Treasurer.

AUDITORS' REPORT.

We hereby certify that we have examined the Secretary-Treasurer's vouchers, receipts, final statement and bank account and find them correct.

JOHN VAN NOSTRAND,
A. E. JUPP,
Auditors.

February 1st, 1915.

REPORT OF COUNCIL OF MANAGEMENT.

The Council of Management beg to report as follows:—

The annual meeting was held on the 21st April, 1914, all members of Council present. The following resolutions were adopted at that meeting:—

1. Exemption from annual dues of William M. Manigault, under section 41, subsection 5, R. S. O., 1914, Chap. 165.

2. The Committee on Polar Research was discontinued and a special Committee on Roads and Pavements formed.

3. The appointment of chairman and members of the different committees as printed in the annual report.

4. The adoption of the report of the Special Committee regarding standardizing of governing lines and monuments on subdivisions.

5. The confirming of an agreement for rental with the Engineers' Club as follows:—

\$20.00 for annual meeting and \$30.00 for rent and care of library.

6. The adopting of the 31st January, as the end of the Association's financial year.

Second annual meeting of the Council held on February 16th, 1915.

All members present. The following resolutions were adopted:—

1. Passing the report of Secretary-Treasurer.

2. The granting of \$400.00 to the Red Cross Association and the Belgium Relief Fund.

3. The rebating of the annual fees of all members of the Association who have entered into active service on behalf of the Empire.

4. The appointing of committees and chairmen during annual meeting of Association.

Respectfully submitted,

G. B. KIRKPATRICK,

Chairman.

REPORT OF COMMITTEE ON PUBLICATION.

The Business Printing Company of Toronto were engaged to publish the proceedings of the last annual meeting of the Association, their tender at an average price of \$1.70 per page for doing this work, being as low as any obtained, and this Company or their predecessors, have printed all former reports, I believe, since the publication of the proceedings of the annual meeting was begun.

Copies of these reports were distributed as follows:—

Illinois Society of Engineers and Surveyors....	200
Ohio Engineering Society	200
Indiana Engineering Society	175
Iowa Engineering Society	175
Dominion Land Surveyors' Association	150
Manitoba Land Surveyors' Association	50
Alberta Land Surveyors' Association	25
Saskatchewan Society of Surveyors	25

To the members of this Association in good standing, also to the various scientific Libraries and Societies on our mailing list who requested the same.

In accordance with the resolution passed at the last annual meeting, no advertisements were solicited.

There are several copies of the Survey Act which were bound in leather still on hand. These are for distribution to any member in good standing who has not already received one.

Back numbers of the Association's reports, with the exceptions of the years 1893, 1908, 1909, 1910, 1911 and 1913, are in stock in the repository, and can be procured on application to the Secretary-Treasurer.

Respectfully submitted,

L. V. RORKE,

Chairman.

REPORT OF BOARD OF EXAMINERS.

An adjourned meeting of the Board was held on the 22nd May, 1914, and the following candidates passed the examination under the provisions of resolutions passed at the Board Meeting on the 6th and 10th February, 1914.

Preliminary Examination:—

Reginald Archibald Cox,
Thomas Karl DeMorest,
Henry George Mathers.

Final Examination:—

Frederick Archibald Bell,
James Russell Wood,
Stanley James Pepler.

The following bonds have been approved of and filed with the Provincial Treasurer in accordance with the provisions of the Act respecting Land Surveyors, 1 George 5th, chapter 41, section 35:—

F. A. Bell,
M. E. Crouch,
Karl Huffman,
P. A. Jackson,
R. S. Kirkup,
F. H. Muckleston,
S. G. McDougall,
N. B. MacRostie,
J. R. Wood.

A meeting of the Board was held on the 1st of February, 1915, and the following passed the examinations.

Preliminary Examination:—

Alfred Cook,
Arthur Fraleigh,
Vernon White Gibson,
Campbell Griffin,
Harold McPherson Hall,
Standish Andrew Lee,
Lincoln Mooney,
Lewis Goodwin Manton,
Cyril George Ruben,
John Alexander West.

The following passed the required Final Examination:—

Thomas Holmes Bartley,
 William Benjamin Beatty,
 Wescote Lewis Lyttleton Cassels,
 Edward Fitzgerald,
 Charles Vincent Gallagher,
 John Strickland Leitch,
 Joseph Albert Marck,
 Chas. Herbert Meader,
 Patrick Joseph McGarry,
 Wilbert Henry Norrish,
 Abram Lealand Stanley Nash,
 Orville Rolfson,
 William S. Winters,
 Benjamin Clifford Pierce,

Several candidates were allowed to take a supplementary examination on such date as the Board may appoint.

The following articles were filed by the undernamed pupils during the year:—

Name of Pupil.	Name of Surveyor.	Residence.	Date of Articles.	Term.
Rae, Matthew.....	Robt. M. Gourlay....	Toronto	Feb. 18, 1914	3 years
Enright, Thos. N....	W. H. Browne.....	Toronto	Feb. 12, 1914	3 years
Fitzgerald, Ed.....	F. F. Clarke.....	Toronto	Feb. 2, 1914	1 year
Clawson, E. E.....	E. D. Bolton.....	Listowel	Jan. 1, 1914	1 year
Junkin, R. L.....	H. W. Tate.....	Toronto	Feb. 23, 1914	1 year
LaPlant, John F....	A. M. Jackson.....	Brantford	Apr. 25, 1914	3 years
Farrell, K. A.....	Speight and van Nostrand	Toronto	Mar. 1, 1914	1 year
Ireson, E. T.....	G. S. Abrey.....	Toronto	Mar. 2, 1914	1 year
Higgins, P. M.....	A. M. Jackson.....	Brantford	Apr. 11, 1914	1 year
Winters, Wm. S....	Speight and van Nostrand	Toronto	Mar. 16, 1914	1 year
Blyth, John M.....	Isaac Taylor.....	Dundalk	May 6, 1914	1 year
Noecker, Claude....	J. A. Bell.....	St. Thomas	May 15, 1914	1 year
Shupe, Stanley....	Hebt. Johnston....	Toronto	May 1, 1914	1 year
Wright, Leopold....	H. C. Sewell.....	Berlin	Apr. 17, 1914	3 years
Perrie, Wm. W.....	W. G. Webster.....	Hamilton	Feb. 6, 1914	3 years
Lovelace, Stanley...	F. N. Rutherford....	St. Catharines ..	Feb. 23, 1914	1 year
Coulson, Chas. L...	F. N. Rutherford....	St. Catharines ..	Feb. 23, 1914	1 year

G. B. KIRKPATRICK,

Chairman of the Board.

REPORT OF COMMITTEE ON ENTERTAINMENT.

Your Committee beg to report as follows:

The Annual Dinner was held at the Engineers' Club on Wednesday, February 17th, sixty-one members and guests being present; the number of out-of-town members being particularly gratifying. The arrangements made by the Club for our entertainment were in every way satisfactory. The chair was occupied by the President, Mr. J. W. Fitzgerald, and the Vice chair by Mr. E. T. Wilkie, the Vice-President.

The following toasts were duly honored:—

“The King,” proposed by the President.

“The Empire and Canada,” proposed by Mr. Aubrey White, C.M.G., responded to by Dean Ellis, Mr. Angus McMurchy, K.C., Mr. F. Arnoldi, K.C.

“Army and Navy,” proposed by Mr. J. S. Dobie, responded to by Col. van Nostrand, Col. Cowan, Capt. W. Ford Howland.

“Sister Societies,” proposed by Mr. Willis Chipman, responded to by Mr. C. Heys, President of Engineers' Club of Toronto, Mr. R. T. Stupart, Royal Canadian Institute and Pres. Engineering Society, Toronto University.

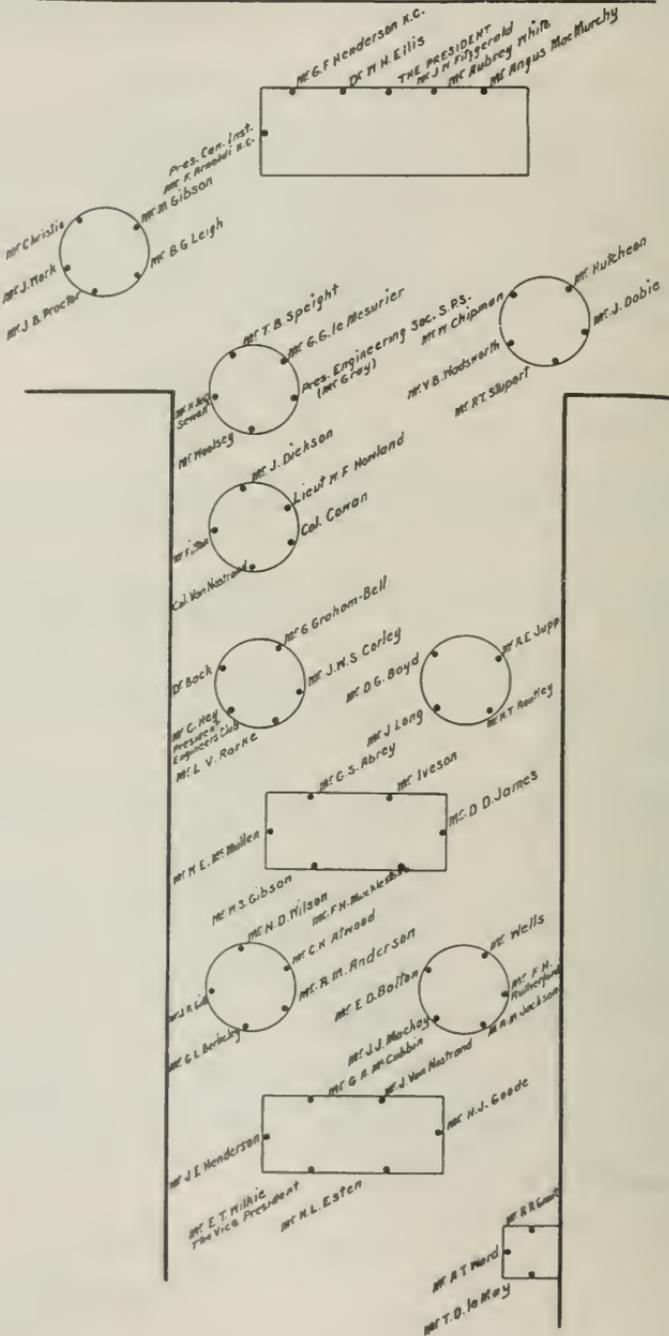
“Our Guests,” proposed by Mr. J. L. Lang, responded to by Mr. G. F. Henderson, K.C., Mr. Seymour Corley, K.C.

During the evening an excellent programme of songs, assisted by an orchestra kindly provided by the President, was interspersed with the toasts. Pursuant to the instructions given at the general meeting your Committee has prepared a plan of the dining room, which may be of interest to the members and which is attached hereto.

Your Committee wishes to express its appreciation of the kindness of the Engineers' Club of Toronto in extending its privileges to the members of the Association, and to acknowledge its indebtedness to all those who helped make the meeting a success.

Respectfully submitted.

T. D. LeMAY,
Chairman.



REPORT OF COMMITTEE ON REPOSITORY AND BIOGRAPHY.

During the past two months about one hundred and twenty-five letters and circulars have been mailed to members and others throughout Canada, asking for biographical sketches and photographs of deceased members, also for the proper addresses of members published as "unknown" in last year's Proceedings.

Although only a small percentage have as yet responded to our inquiries, we have received much valuable material, and we hope to be able to furnish to the Secretary before the proceedings for 1915 are published, sufficient information to fill in the blanks that now appear in the schedule of deceased members, and to give the proper addresses of all members.

The following biographical sketches have appeared in the Proceedings without portraits, and we would recommend that these portraits be published in the first issue of Proceedings.

Aylesworth, Sr., Chas. F.	See 1913 Proceedings
Bolger, Francis	" 1896 "
Browne, W. A.	" 1913 "
Burke, W. R.	" 1897 "
Coad, Richard	" 1897 "
Hanning, C. G.	" 1908 "
Jones, Ed. Robt.	" 1914 "
Kirk, Joseph Green	" 1900 "
Rombough, W. R.	" 1913 "
Schofield, Milton C.	" 1908 "

We have now on file unpublished sketches and photographs of the following deceased members:—

Bray, Edgar,	Keefer, Thos. C.,
Davidson, Alexander,	Lynch-Staunton, F. H.
Davidson, W. S.	Robinson, Wm.,
Furlonge, Wm. Holland	Rubidge, T. S.
Haskins, Wm.	Salter, A. P.

About thirty-three biographical sketches of deceased members have disappeared from the Repository.

In time we hope to secure biographical sketches for about eighteen deceased members whose photographs we have, and twenty-one sketches from living members whose photographs are on file. We also hope to secure biographical sketches of four deceased members whose portraits only have appeared in the Proceedings.

We would recommend that as many of the photographs and sketches be published in the 1915 Proceedings as the Council of the Association may consider advisable.

The Joint Libraries at the Engineers' Club of the Association of Ontario Land Surveyors, Toronto Branch of the Canadian Society of Civil Engineers, and the Ontario Association of Architects, has now been catalogued, and we understand it is the intention to publish an index, but possibly this matter may be deferred. The card index is available, and members of our Association are at liberty to consult any book or publication in the Library.

Respectfully submitted,

WILLIS CHIPMAN,

Chairman.

DISCUSSION.

Mr. Rorke—In moving the adoption of this report I would like to say I know Mr. Chipman has gone to a very great deal of trouble during the last year in obtaining material to complete and fill up our biographical memoirs in the repository, and he is still working hard at it. Anything Mr. Chipman undertakes to do he generally does to the very uttermost. He refers to thirty-three biographical sketches of deceased members which have disappeared from the repository. You all know some years ago when the land surveyors' material was in the Parliament Buildings they had a fire up there, and considerable quantity of the material was destroyed, and I have no doubt these, amongst other things, was lost at that time. That is the only way I can account for the disappearance of these sketches. They may possibly yet be found somewhere amongst the materials we have, but I have examined everywhere and I have not been able to find them. I have much pleasure in moving the adoption of the report.

Mr. Gaviller—As a member of that Committee I can endorse every word Mr. Rorke has said, and as to the energy shown by Mr. Chipman ever since the Association was formed. As he says, Mr. Chipman puts his whole force into anything he undertakes. I have much pleasure in seconding the adoption of the report.

The Vice-President put the motion that the report be accepted and printed in the proceedings, which, on a vote having been taken, was declared carried.



C. F. AYLSWORTH, Sen., MADOC.
Report 1913, page 80.



WM. R. ROMBOUGH, NAPANEE.
Report 1913, page 77.



RICHARD COAD, GLENCOE.
Report 1897, page 161.



GROUP, Oct., 1863. (Standing, left to right), J. Marshall, Kincardine; A. Bell, Almonte; J. Harris, Manitoba. (Sitting), A. Wilson, J. S. Caddy, E. Bray, Oakville.



WM. A. BROWNE, TORONTO.
Report 1913, page 78.



WM. ROBT. BURKE, WOODSTOCK.
Report 1897, page 161.



JOS. GREEN KIRK, STRATFORD.
Report 1900, page 221.



C. G. HANNING, TORONTO.
Report 1908, page 150.



MILTON C. SCHOFIELD, GUELPH.
Report 1908, page 154.



FRANCIS BOLGER, LINDSAY.
Report 1896, page 181.



EDWARD ROBERT JONES, SARNIA.
Report 1914, page 58.



WM. HASKINS.

WILLIAM HASKINS.

An obituary notice of William Haskins appeared on page 182 of the 1896 Proceedings. Mr. Haskins served his apprenticeship with F. F. Passmore, P.L.S.

A portrait is now published, and the following additional information has been contributed by Mr. E. G. Barrow.

Mr. Haskins was a universal favorite, being of a genial and kindly disposition, but it is impossible for a man holding the position of City Engineer to escape making some enemies. In this connection he related

to me one day that a celebrated Phrenologist came to the city and gave public exhibitions of his skill. One of them Mr. Haskins attended, and during the performance his most bitter enemy called out for Haskins to go to the platform, expecting that some disagreeable characteristic would be revealed by the Phrenologist, but much to the chagrin and discomfiture of this man, the Phrenologist, after feeling his head all over, said: "You can place perfect confidence in this man; he could not be dishonest if he tried," and words to that effect.

The occasion before alluded to, when our friendship was nearly broken, happened in this way: I was Assistant City Engineer at the time, and Mr. Chas. Wallace was my assistant. Mr. Haskins had received orders from the City Council to prepare estimates and plans of the Beckett Drive, a scenic road on the side of the Mountain at Hamilton. The public were much interested in this matter, some predicting failure on account of the sliding nature of the ground and soft clay on which the road had to be built. Mr. Haskins was very anxious that the press should not gather any information as to cost, grades, etc., until he had presented his complete report to the City Council, so he gave the key of a room in an obscure part of the City Hall to me, and gave orders to have the door locked and put the key

in my pocket at night. Here Mr. Wallace and I made the plans and estimates under his instructions. We had nearly completed our work when to our horror and dismay the whole cost of the road with grades and other information was published in one of the newspapers.

Mr. Haskins naturally blamed me for it, as being the only person having the key to the room, and Mr. Wallace denied giving any information. As it was placing me in a very bad position, Mr. Morrison, now Col. E. B. Morrison, D.S.A., then admitted that he had got a key from the caretaker of the City Hall, who probably did not think what the consequences would be. This explanation of course, satisfied Mr. Haskins, and I remained his Chief Assistant until his death in 1896.

Besides being a very clever engineer, he was also an expert in fruit growing and had a farm of 40 acres which was skillfully underdrained, and in every way a model farm. This was his hobby, and he was about to drive me out to it on the day of his death.

I cannot do better in conclusion than to quote a paragraph from the Hamilton Spectator:—

“Mr. Haskins was a good man, with all that the words imply; an excellent citizen, a warm and loyal friend, a just and careful public officer, and a genial gentleman with whom personal acquaintance was both a pleasure and an honor.”

WILLIAM ROBINSON.

William Robinson was born in New Ross, County of Wexford, Ireland, March 17th, 1812, and received his education from an uncle who was a professor in the Trinity College, Dublin, and from a brother who was a surveyor on the Trigonometrical Survey of Ireland; he came to Canada with his family in 1833 and settled with his father in the Township of Burford. The following spring he went to Hamilton and obtained employment as a carpenter; from Hamilton he went to Brantford, and in 1839 he went to London and obtained employment from the contractor who built the Barracks in that city.

He then went to Toronto and obtained employment for two years with Thos. Young, the Architect of the University of Kings College, City Engineer, and Drawing Master at the



WILLIAM ROBINSON.

College, and during his employment with Mr. Young, he took up the study of surveying; the next two years he was engaged by Mr. Richie, a prominent builder of Toronto, as assistant to his head foreman; he took up the study of land surveying, and in 1846 successfully passed an examination at Montreal and received a license to practice in the Province of Upper Canada; the Hon. Wm. Henry Bolton and the Hon. W. B. Robinson became his securities for the sum of \$2,000; he returned to Toronto and taught geometrical drawing for a year. In 1849 he commenced the survey of the Toronto and Owen Sound Road through the Townships of Melancthon, Artemesia, Holland and other Townships. Two years later he returned to Toronto and entered into business with Mr. C. Rankin; this partnership was dissolved in 1851, Mr. Robinson continuing business until 1852. A severe attack of illness prevented him working for some time. He then went to London and entered into a partnership with W. B. Leather, Architect and Civil Engineer; this partnership was dissolved when Mr. Robinson was appointed City Engineer of London, Ont., in 1857, which position he held for twenty-one years and five months, until the completion of the Water Works System of the City of London, in 1878. While holding the position of City Engineer, Mr. Robinson carried on a private business of surveying, civil engineering, and architecture, and several of the public buildings in London were erected under his supervision.

In 1874 Mr. Robinson formed a partnership with T. H. Tracy, who was appointed to the position of City Engineer of London, on the resignation of Mr. Robinson.

Mr. Robinson's death occurred on October 11th, 1894.

Contributed by John M. Moore, O.L.S., London, Ont.

WALTER S. DAVIDSON.

Walter Stanley Davidson, son of Alexander Davidson, P.L.S., was born on June 30th, 1860, at Arkona.

He attended Woodstock College, and the School of Practical Science, Toronto, afterwards serving his apprenticeship with his father and passed as a P. L. S., April 9th, 1884. At various times he filled the position of Township Engineer for every Township in the County of Lambton, except Euphemia.

In 1898, he subdivided the Township of Mather, in the Rainy River District, and in 1900 the Kettle and Stony Point Reserves (Lake Huron). In the same year he also made an exploratory survey in Algoma.

He died from typhoid fever at Arkona, on January 20th, 1901.

Contributed by Miss Marie Davidson.



W. S. DAVIDSON.

EDGAR BRAY.

The late Edgar Bray was born near Oakville, Halton County, Ontario, on December 18th, 1843. After leaving the High School he served his apprenticeship of three years with George Brockett Abrey, passing his final examination qualifying him as Provincial Land Surveyor on October 6th, 1866. His first independent survey was on Manitoulin Island shortly afterwards.

By Act of Parliament passed in April, 1872, provision was made for admitting Provincial Land Surveyors to practice as Dominion Land Surveyors. Mr. Bray took advantage of this and shortly after the passage of the Act secured a contract



EDGAR BRAY.

for the survey of a number of townships in Southern Manitoba, under instructions from Lieut. Col. J. S. Dennis who was then Surveyor General of Dominion Lands.

Mr. Bray was one of the pioneer surveyors of the West, very few surveys having been made west of Lake Superior until the year before he began his career. He, along with the other surveyors of that time had to encounter many hardships and delays which are no longer incident to survey work in that section of the country. The trip from Ottawa to Winnipeg

which may now be accomplished in about two days, at that time took from two to four weeks. The nearest railway terminal was at Moorhead, Minnesota, a three day's trip by stage or a week's trip by Red River boat from Winnipeg. Beyond Winnipeg, practically the only means of transportation was a two-wheeled vehicle known as the Red River cart.

From 1872 till 1889 and again from 1902 till the time of his death in 1908, Mr. Bray was almost continuously employed on Dominion Land Surveys. This work included subdivision contracts, surveys of block and base lines, trail and river traverses and the surveys of Indian reserves. His operations extended from Eastern Manitoba to the foot-hills of the Rocky Mountains, and as far north as Lesser Slave Lake.

The following is a list of the more important surveys performed by Mr. Bray in the north western Provinces:—

1873—Block Surveys in Manitoba.

1875-6—Block Survey, North Western Territory.

1878—Survey of Indian Reserves.

1880—Block Surveys, North Western Territory.

1882—Block Lines.

1883—Azimuth Observations, Block and Outline Surveys.

1902—Township Outlines.

1903—Subdivision Surveys.

1905—Re-Survey of Townships.

Mr. Bray died suddenly at Kamsack, Sask., after a few hours illness on August 20th, 1908, when engaged upon subdivision surveys in the vicinity.

Mr. Bray was a careful and efficient surveyor, and his work gave satisfaction to the Department.

ALEXANDER DAVIDSON.

The subject of this sketch was born in New Sarum, County of Elgin, Ontario, on February 24th, 1826. For several years he taught school in the Township of Dorchester, in the County of Middlesex, and Bosanquet, in the County of Lambton, and after a course of training at Woodstock College, passed his examination as a Provincial Land Surveyor on October 11th, 1858.

He surveyed large portions of the County of Lambton.

Mr. Davidson was a personal friend of the late Hon. George W. Ross, who often travelled with him throughout the country. Several municipal positions were held by Mr. Davidson, and he was an acknowledged authority on drainage.

After an illness of several weeks, he died at his home at Arkona on September 16th, 1899.

Contributed by Miss Della Davidson.



ALEXANDER DAVIDSON.

WILLIAM HOLLAND FURLONGE.

The subject of this sketch was born in 1852 in London, England, where his father was an extensive ship owner.



W. H. FURLONGE.

Voyages to Australia and elsewhere developed a fondness for nautical instruments, especially the mariners quadrant. He was a nephew of Sir Wm. White-way, at one time Governor of Newfoundland. It appears he came to Port Arthur then to Prince Arthur Landing about 1874, and became articled to David Forneri, P.L.S., then practicing there, and after passing with great credit his examination for P. L. S. on April 6th, 1877, was shortly afterward employed by the Silver Islet Mine in Lake Superior. His interest in the work was so great that he had a special \$325 mining transit made

and the accuracy of the results is testimony to the skill and care exercised in the hazardous undertaking extending over one-fourth of a mile under the waters of Lake Superior. His association during this work with such mining experts as Captain Frue of "Frue Vanner" fame, and Capts. Robert and John Tretheway and Karl Kreissman, assayist, encouraged him in pursuing the study of Mineralogy, a fine microscope being part of his outfit. His next special work was a survey of the well known Beaver Mine south west of Port Arthur, of which he was part owner.

His mining location work was always regarded as most reliable and is familiarly known under the affix T, which initial he chose as distinct and the easiest to cut. Until his departure for the alluring gold fields of South Africa he was associated with the late W. W. Russell, C.E. He left Port Arthur in 1887, and on the 26th of January, 1888, he embarked from Plymouth, England, for Cape Barberton and Johan-

nesburg, in which latter place he settled down for a while with his former friend, Kriessman, who followed him two years after. His pay there he informed a friend here, Capt. Geo. Cosgrave, to whom I am indebted for much information and accompanying photo, was \$1,000 a month, but the board alone cost \$200. Shortly after this, while on a visit to a mining field in Madagascar, he fell a victim to the dreaded fever. He was a most genial, efficient, painstaking and honorable member of our profession. He was unmarried. The original records of his surveys are in the possession of A. L. Russell, of Port Arthur.

Contributed by A. L. Russell, O.L.S., Port Arthur.

THOMAS COLTRIN KEEFER.

The following memorandum was furnished the Chairman of the Committee on February 17th, 1914:—

“ Although I am, I believe, the oldest Land Surveyor on the list, I have the shortest record of service as such, of any of the others. I may be called an ‘ emergency ’ man.

“ I left Upper Canada College in 1837, and went directly to the Erie Canal, at Lockport. I returned to Canada in '39, and found that the Parliament of Upper Canada had passed a Bill creating Commissioners for dealing with disputes between farmers as to their boundaries. An elder brother of mine was Chairman of the Commission, and as they required a Land Surveyor he advised me to take out a license as such, which I did in 1840, and received my commission in that year, August 14th, 1840, a license which I think may have been an illegal one as I was not of age, having been born in 1821. I never acted for that Commission because immediately



T. C. KEEFER.

on its formation the lawyers who controlled Parliament decided that it would never do to take the settlement of disputes in this manner, and took steps to repeal the Act at once.

“As a commencement of service for the enlargement of the Welland Canal was made in 1840, I never acted under my Commission, except to the certifying as to the correctness of land surveys for public works made by myself or my assistants.”

“Yours very truly,

“(Signed) THOS. C. KEEFER.”

His father was born a British subject in New Jersey on November 8th, 1773, and came to Canada in 1790, settling at Thorold. He had fifteen children, of whom only two survived at the date of his death on June 25th, 1858. George Keefer was the first President of the Welland Canal Company, and the first sod on this undertaking was turned by him on November 30th, 1824.

His sons were as follows:—George, Samuel and Thos. C. (civil engineers); Augustus and Alexander (lawyers); Jacob and Peter (merchants and millers); John, James, Charles H. (M. D.); George Jr. was Engineer on the Welland, St. Lawrence; and Samuel, Chief Engineer, Public Works, Ottawa, and built the original upper Suspension Bridge at Niagara Falls.

Thos. C. served his apprenticeship in St. Catharines, and passed his final examinations on August 14th, 1840. In 1851 he was employed upon surveys for the Grand Trunk Railway. For many years he was engaged upon Water Works construction at Montreal, Hamilton, Toronto, Ottawa and other places in Canada.

In 1887 Mr. Keefer was President of the Canadian Society of Civil Engineers, and 1888 President of the American Society of Civil Engineers. He was also a member of the Institution of Civil Engineer (Great Britain), and was created C. M. G. in 1878.

Mr. Keefer's death occurred in January, 1915. Charles Keefer, C.E., of Ottawa is the only surviving son.

THOMAS STAFFORD RUBIDGE.

Mr. Rubidge was admitted to practice February 9th, 1849.

He was engaged upon the engineering staff of Williamsburg Canals, and resident engineer at Iroquois in 1844-48; 1852-60, engineering staff Grand Trunk Railway in charge of surveys and construction between Cornwall and Prescott; 1860-63, engineering staff Board of Works in charge of harbor and other surveys in Ontario; 1865-72, Intercolonial Railway surveys and construction in New Brunswick and Nova Scotia; 1872-82, St. Lawrence Canals, engineer in charge of surveys for a 14-foot navigation, Lake St. Francis to Kingston; 1881-88, superintending engineer in charge of Trent Canal's surveys and construction; 1888-1904, superintending engineer St. Lawrence



THOS. S. RUBIDGE, O.L.S.

Canals for 14-foot navigation including intermediate river reaches. It was, however, as a hydraulic engineer that Mr. Rubidge was best known, and it was the improvement of the navigation of the River St. Lawrence, between Montreal and Kingston, to which his great experience and ability were principally directed.

Upon the death of Mr. John Page, in 1890, Mr. Rubidge was offered the position of Chief Engineer of Canals by the late Sir John A. Macdonald. This honor he declined as he preferred to devote his remaining years to the improvement of the St. Lawrence route. A few years ago it was intimated to him that he would be appointed one of the consulting engineers of the Panama Canal if he were willing to accept the position; this he also declined, and at the time of his death the commission for the construction of the New York barge

canals were about to offer him the position of consulting engineer, he having been previously unofficially notified of their decision. As an hydraulic engineer, Mr. Rubidge was not only a man of great ability, but he was always abreast of the times. With him civil engineering was a progressive science, and he was ever ready to discard old methods the moment he found the modern ones were better.

It was not only as an engineer that Mr. Rubidge was known for we find that during the "Trent Affair" in October, 1861, he was requested by the General Officer Commanding to raise a field battery for service along the St. Lawrence River and Canals between Cornwall and Prescott. This he at once did, and for several years Captain Rubidge was in command of it. As a recognition of his services he received a medal from the Canadian Government a few years ago, and the deed to a grant of land in Northern Ontario from the Provincial Government.

ALBERT PELLEW SALTER, P.L.S.

The subject of this sketch was born at Teignmouth, Devonshire, England, June 17th, 1816, and died at Sandwich, County of Essex, Ontario, September 5th, 1874.



1. JOHN JOHNSTON, Draughtsman.
2. A. P. SALTER, P.L.S.
3. ARTHUR JONES, P.L.S.
4. JAMES JOHNSTON, P.L.S.

Mr. Salter came to Canada in 1834. The first few years he lived in the township of Plympton, County of Lambton. During the rebellion of 1837 he served under Col. Dewlap, Maj. Elliot and Lieut. Col. of

others, and at the time of his death he was the Kent Militia.

He married in 1839 and returned to Sandwich where for several years he discharged the duties of Grammar School teacher, during which time he studied land surveying and civil engineering. He served his apprenticeship with _____ of

and passed his final examinations on September 2nd, 1844. In 1850 moved to Chatham and began the practice of his profession. In 1854 he was engaged by the Government to report on the character of the country and usefulness of the lands to the north of Lake Huron from Lake Nipissing to Goulais Bay in Lake Superior. About 1856 he was also appointed Chief of Survey of that region, and in connection with this work he had under his direction as Assistant Provincial Land Surveyors, Messrs. Moberly, T. W. Herrick, P. S. Donnelly, T. N. Molesworth and James Johnston. The last mentioned was drowned in Lake Superior on January 1st, 1861, when with Mr. Salter as assistant. In 1859 Mr. Salter was appointed by the Government to superintend the construction of the colonization roads in the neighborhood of Sault Ste. Marie, the road from the Sault to Root Rivers, from Sault to Garden River, also other roads in that vicinity.

From 1862 Mr. Salter practiced in Chatham and Sandwich until 1874 and during that time he made the survey of the line from Amherstburg to Buffalo, which was afterwards the Canadian Southern Railway.

The following surveyors served their apprenticeship under Mr. Salter: E. R. Jones, Sarnia; Arthur Jones, Chatham; John H. Jones, Sarnia.

The following important Government surveys were performed by Mr. Salter:—

1847-48—Mineral Locations, Lake Superior.

1855—Explorations Lake Huron and Lake Superior.

1856—Exploration Line, Lake Nipissing to Lake Superior.

1858—Township North of Lake Huron.

1859—Town Plot near Sault.

1860—Inspection Survey.

1860—Townships, Tarentorus and Korah.

1861—Bruce Mines Road.

1866—Michipicoten to Montreal River.

1873—Townships north shore Lake Huron.

1875—Townships of Victoria.

Material for the above sketch was furnished by Miss Letitia Salter, of 47 St. Vincent St., Toronto, daughter of Mr. Salter.

The list of Government surveys, however, were given by Mr. G. B. Kirkpatrick.

We are also indebted to Miss Salter for the group photograph.



F. H. LYNCH-STAUNTON.

George Lynch-Staunton, K.C., of Hamilton, has furnished us the following information respecting his father, F. H. Lynch-Staunton.

“The late Francis Hardwick Lynch-Staunton was born on August 15th, 1828, in the County of Galway, Ireland, and

was the second son of George S. Lynch-Staunton, D.L., of Clydagh House, Galway, Ireland. He was educated at St. Mary's College, Oscott, England, where he was a fellow student of the great geologist St. George Milbart, the late Cardinal Howard, Lord Acton, the present Professor of History at Cambridge University, and Major General Dormar who was killed some years ago by a tiger at Madras. One of his teachers was a Mr. Hemas, son of the poet Mrs. Felimia Hemas.

His father by royal sign Manual assumed the name of Staunton in compliance with the conditions of the will of his cousin, Sir George L. Staunton, Baronet."

Mr. Staunton had a large circle of friends, and was a member of the Hamilton Club at the time of his death.

See also Proceedings of 1899, page 223.

REPORT OF COMMITTEE ON ROADS AND PAVEMENTS.

Mr. President:—The past year has shown substantial progress toward more efficient organization for highway construction in this Province; one of the leading features being the report of the Public Roads and Highway Commission. A Royal Commission consisting of C. A. Magrath, W. A. McLean, O.L.S., and A. M. Rankin, M.P.P., was appointed in August, 1913 to investigate fully all phases of the road situation, and to report upon a more progressive plan for highway improvement in this Province. This report, presented to the Government in March, 1914, recommends an expenditure of \$30,000,000 within a period of 15 years, in the construction of main highways and leading market roads. A chief feature of the report is the proposed classification of roads as follows:—

(1) Township roads, to be controlled by township councils.

(2) County roads, to include the leading market roads of each locality, and to be controlled by county councils.

(3) Main highways, being for the most part direct routes between cities, and to be constructed and controlled by special commissions.

(4) A fourth class, suburban roads, is also defined, to include the main highways and leading market roads in the vicinity of cities, and to which the cities will directly contribute.

The report has been received throughout the Province with much public favor, and very little adverse criticism was offered. It was the announced intention of the Government to at once bring the recommendations of the Commission into effect, but to what extent the influence of the war may delay its adoption, is as yet uncertain. Financial conditions affecting Government revenues very materially will no doubt require careful consideration.

Toronto-Hamilton Highway.

One immediate result of the report of the Commission has been the undertaking of the Toronto-Hamilton highway. The importance of this road was urged by the Commission, and a survey for construction was completed. On the outbreak of the war, this work was immediately available as a means of dealing with the problem of unemployment. Following the principles of the report, a special commission was at once appointed, and the road is now in a process of construction. This will be a concrete pavement, 18 feet in width, with gravel or stone shoulders, to a total width of 24 feet. While serving an important fruit, market garden and suburban residential district, the road will be an important route for commercial traffic between the two cities, Toronto and Hamilton; and will also form an important link in what is anticipated will eventually be a main line of traffic between Windsor and Montreal.

County Roads.

Your committee recognizes the primary importance of improving township roads and leading market roads, thereby aiding in the development of the agricultural districts of the Province. Active steps have been taken in 20 counties of the Province, for some years, in the improvement of such roads, under the Highway Improvement Act. There are still 18 counties in the Province, however, which have not adopted the County Road System, and your committee are strongly of the opinion that the adoption of the County Road Systems by all the counties in the Province is exceedingly desirable. The principle is recognized that in order to provide adequate construction for leading lines of traffic, there must be a division of control, whereby such roads will come under a separate authority, for which purpose county councils are well organized.

A Patriotic Highway.

The proposal that a main highway be constructed through the Province, as a patriotic undertaking at the conclusion of the war, is one which commends itself to your committee. Such a road will demand an expenditure per mile much in excess of that required by the ordinary market road. To finance such an undertaking, in all parts, through the ordinary process of taxation and Provincial subsidies, would be a matter of much difficulty. As a work of monumental character, it will, we believe, be especially suitable at the conclusion of the war, and we are of the opinion that the practical value of such a permanent highway will commend itself to the public to such an extent that large private subscriptions will be available, and we are of the opinion that the matter is one which should be kept before the public in a favorable light.

New Ontario.

In New Ontario, the construction of main highways is making rapid progress, under the Northern and North-western Development Act. By this Act, passed in 1912, the sum of \$5,000,000 was set aside for the development of the northern part of the Province, and the greater part of this sum is being expended in road construction. The portions of the "Clay Belt" which are best suited for settlement are being opened up by the construction of main and branch roads, so that the settlers may have easy access to their lands. A trunk road from Sudbury to Sault Ste. Marie, a distance of about 180 miles is well under way, while similar roads are being constructed in the Rainy River, Thunder Bay, Timiskaming and other districts of the Province. Nearly all of this work is being done under the direction of members of this Association.

Standard Specifications.

The preparation of standard specifications has been considered by your committee. At the present time road construction and paving is in a stage of such transition that standard specifications are of only temporary value. Such specifications have been prepared by other organizations, and we are of the opinion that for the present, it is not advisable that any steps toward this end should be taken by this Association.

Permanent Bridges.

One of the most important details of highway improvement is permanent bridge construction of steel and concrete. The Municipal Act now provides that all county bridges shall be constructed in accordance with standard specifications approved by the Provincial Engineer of Highways. The application of these specifications to county bridge construction has been very beneficial, and we are of the opinion that it should be extended as well to the bridge construction of townships, towns and villages.

Expert Supervision.

In carrying out works of highway improvement, including bridge construction, there is much need for competent and experienced supervision and skilled workmen. We are pleased to note that the Ontario Office of Public Roads has organized a course of lectures to be given at the Parliament Buildings, Toronto, for county engineers and road superintendents. This course will consist of talks by experts on the various phases of road and highway construction. We are of the opinion that the educational qualifications of Ontario Land Surveyors are eminently such as to fit them for this work which has become a highly specialized branch of civil engineering.

Good Roads Association.

Your committee beg to suggest that the members of this Association individually identify themselves as closely as possible with the Good Roads Association. We would like to have a discussion as to the advisability of arranging to have our annual meeting come at such a time that members could attend the sessions of the Good Roads Association, as well as of our own body.

Respectfully submitted,

JAMES S. DOBIE,
Chairman.

DISCUSSION.

I might say that the great work of highway construction going on throughout the Province now is in the hands of the Ontario Land Surveyors. Mr. W. A. MacLean, a member of this Association last year was President of the Good Roads As-

sociation of America and is a member of the Highway Commission, and is a man who has done more than anyone else in the Province to forward the Good Roads Movement. The Northern Development Act, which calls for an expenditure of five million dollars in the development of Northern Ontario, of which two million dollars has already been spent, is under the supervision of Mr. Whitson, a past president of this Association; the Sudbury and Sault Ste. Marie main highway is under the direction of Mr. John Lang, a member of this Association. This question of good roads is coming to be one of the most important factors in the industrial development of this country, and I cannot help but think that we, as an Association, are letting one of the greatest chances we can possibly have slip out of our fingers if we do not improve every opportunity to identify ourselves more closely with it, and I think it is particularly brought home to the members of this Association this year when things are a little slack in a good many lines that work of this kind is being carried on by County Councils and so on, and the Ontario Land Surveyors in the community, who should be eminently qualified for that work, are being passed over, work of that kind being given out to men who have no engineering experience whatever.

I have not got this report just in shape for printing yet and I would like to keep it until such time as I can write it out in shape for publication. We have with us Mr. MacLean this afternoon and I think the members of the Association would all like to hear some remarks from Mr. MacLean on the good roads question, and I would like to hear a discussion from the members and see if we cannot get into this good roads movement in some organized way.

The Vice-President—Perhaps we might now hear from Mr. MacLean; he would perhaps like to say something on the subject and certainly we would be glad to hear something from him.

Mr. W. A. MacLean—Mr. Vice-President and Gentlemen, I am extremely happy to be here this afternoon and to hear the very enthusiastic remarks of the Chairman of the Roads and Pavements Committee. I have been connected with the highway development of Ontario for some eighteen years. When I first entered this work I felt that it was the field of the Ontario Land Surveyor. I felt that they were the men associated with municipal affairs who should be keenly interested in this work. During the period in which

I have been employed in the work myself my feeling in that regard has become intensified from year to year. There is, as the Chairman has said, a big field opening up which will require the services of capable men if the highway construction of the Province is to be carried on with efficiency and economy. In the past I have had the privilege of placing papers before your Association and in each case have tried to impress upon the Association the importance of this work, that is the advantage which the work can be to members of the Association, but more particularly the advantage which the members of this Association can be to the public in carrying on this work. I have felt too that the Surveyors' Association has not in the past shown the keen appreciation of the situation which I hoped for at any rate. On all occasions I seek to urge the employment of our engineers and surveyors in this work, but I am so often met with a prejudice which you know exists with regard to the employment of engineers among municipal councillors. There is a prejudice there which I have found it hard to overcome. In order to get municipal councils to place their highway construction under the skilled man we have to throw open the field and say, you don't have to employ an engineer, but we always add, if you can secure the services of an engineer they are the men who are qualified to take charge and through whom you can secure the greatest efficiency. The Chairman referred to the fact and I think quite fairly that I have sought to secure the employment of members of our Association as far as possible in this work. I do it not because I hold a brief for the members of the Association, although I am keenly interested with you in it all, but because I feel you are the men who can give the best service to the public in this regard. Now, I have felt too that in overcoming this prejudice your Association might take steps which you have not in the past. Sometimes I say to a Council, employ so-and-so, he is in your locality. Well, he is not an engineer, he is only a surveyor. I think it would be good policy on the part of this Association to in some way incorporate in our examinations some of the subjects which a man taking charge of highway construction should be acquainted with. This is a matter which has been under discussion by your Association before. Some years ago I recall suggesting it. Other organizations are going ahead and if this Association doesn't go ahead, if it stands still it will fall behind in the race. My view is, and I am stating it somewhat bluntly, that we should be in a position to say that every surveyor has passed an examination in the subjects that

qualify him for a post as highway engineer of a municipality. I don't think it would involve, perhaps, at the present time a change in the Surveying Act. We could put on these subjects, and they are only a few, as optional subjects, which the men going up for examination could try if they saw fit. In time I believe that the situation will freely open up so that in our Act we can apply these subjects as all others are. That is the subjects I would refer to the Highway Acts of the Province, and we should get statics and the strength of materials and possibly an examination in bridge designing. You have under your control the drainage work of the Province; you are required to pass an examination in the Act in order to carry out these acts and you must have certain engineering skill in order to build the bridges over the drains that we were speaking of this afternoon. It seems to me the simplest possible step to even incorporate in our Act the subjects that every highway man should be familiar with, and experience will soon develop any man's information in a subject if we only give him the simple elements to start with. Our examination in these subjects need not be severe. If they were applied in the more elementary form so that a man who is turned out as a surveyor would be, by Act of Parliament, as you are at the present time in connection with surveys—by Act of Parliament named as a highway professional man of the Province, it would be a most desirable step in advancing the interests of our Association and would be in the public interests and a great deal of help to our Department in securing and supplying men to take charge of this work.

I am pleased, as I have said, with the report that has been presented and hope that it will be followed up with the same interest in future years and that our Association will become, as I believe it ought to be, the highway authority of Ontario. I thank you, Mr. Vice-President. (Applause.)

The Vice-President—We are very glad to have heard Mr. McLean and possibly we may be able to do something to help the Association along in that line according to his suggestions. Now, this report of the Committee is before you. If there is any further discussion regarding it or any member wishes to say anything further about it, we will be glad to hear him.

Mr. A. J. van Nostrand—Mr. Chairman, it seems to me that the programme for this afternoon has been arranged with a beautiful regard for logical sequence; it has come grad-

ually up to the point we have now, each stage being carefully proven, and I think we have reached a very desirable stage. We find that in the matter of the Ditches and Watercourses Act the Ontario Land Surveyor appears as a logical person to be appointed to carry out the wishes of the municipalities; that may have been just the thin edge of the wedge inserted by some astute land surveyor but it has helped a great deal; that meant that the subject was put on the curriculum and is required by the Board of Examiners. The subject of leveling and laying out of curves did not at one time belong in any sense to land surveying proper, but the later developments of the profession have shown that they are absolutely essential. No one could quarrel with us for adding those subjects, because they are required by every Land Surveyor in his ordinary land surveying practice. The matter of the Ditches and Watercourses Act, was perhaps going a little afield, but since no one objected I think we were very wise in doing so. This new question it seems to me is a very desirable one for us to consider and the only thing is to find out the best way to approach it. I would suggest that possibly the Board of Examiners having taken it into consideration could arrange to apply for a sufficient change in the Statute to introduce the necessary subjects into the examinations for Land Surveyors. I have much pleasure in moving the adoption of the report as presented, subject to whatever minor changes the Chairman finds necessary to make in it and that it be printed in the proceedings.

Mr. Speight—I have great pleasure in seconding that motion to adopt the report. I might say that the Board of Examiners informally discussed this very thing at the last meeting, and I made a suggestion to several of the members that I thought it would be a good thing to have the subject added to the curriculum even if we had to drop off some of the other subjects that were not of so much importance. So that I am sure the Board will be very glad to take up any recommendation of this Association. I am sure I voice the opinions of all those present that all the reports we have had here today have been of an unusually high order, and that the Chairmen of the different committees have gone to a great deal of trouble. I think it has been one of the most profitable days we have had in many years. I have great pleasure in seconding the adoption of the report.

The Vice-President put the motion, which, on a vote having been taken, was declared carried.

Mr. Routly—Before the subject is dropped I would like to enlarge upon one feature of this report and that is this that at one time we had our meetings at the same time as the Good Roads Association met, but for the last two years this has not been the case and I think we will miss a part of the benefit of this report unless we follow up the suggestions of the Chairman of the Committee by forming a much closer alliance than we have at the present time with the Good Roads Association. It is contrary of course to our principles to advertise ourselves in the ordinary way, but there are legitimate ways in which we can get in touch with other organizations, and at least put ourselves in a position that we are open to handle the work. As it stands at the present time it is very much as Mr. McLean has stated, that in the community where the surveyor is practising simply as a surveyor and has not followed municipal engineering, if the Council is undertaking road work they look upon a surveyor as being no more qualified to handle the work than a doctor or lawyer. At the present time I think practically all of the important road positions in Ontario are held by our members; not only Mr. McLean's Department and Mr. Whitson's, and Mr. Lang, but other surveyors actively engaged in road work, are under Mr. Whitson the engineer in charge of the work. I think Mr. Jackson, of Niagara Falls, is a member of this Association and Mr. Wheelock, and the work in Coleman Township has always been under the charge of an Ontario Land Surveyor, and in every other place—I don't just remember them at the present time—where important road work has been carried on it has been nearly always under the charge of an Ontario Land Surveyor; at the same time town councils throughout the country do not realize that fact. They know these men are able men, but it has not been brought home to them that they are members of this Association. I think if we could arrange with the Good Roads Association some way by which we would attend their sessions by invitation as a body, or bring ourselves in closer relationship with them, this fact would be brought home to them in such a way that any county or municipal body initiating new road work and casting their eye around for the best man to handle it for them, would immediately say, all the rest of the counties have engaged the nearest Ontario Land Surveyor, and why shouldn't we? I was somewhat interested to know just what size on that chart of Mr. Wilson's road engineering filled. I must say that I appreciated that report very much. I would like to have had an opportunity to read it over before it was read here. I think there is a

great deal for us to learn from Mr. Wilson's report. He points out for one thing a great many branches in which some surveyors are engaged. There are lines carried on by some surveyors that the great body of surveyors overlook; and as things look at the present time for strictly Ontario Land Surveyors' work, it is coming to the time when we will need to branch out. I would like to have heard more discussion on Mr. Wilson's very able report and I would like to suggest that the Council of this Association be empowered by this meeting. If there is any way in which it can be done, to hold a sort of formal meeting about the third Tuesday in February, and if by postponing the general meeting for a week or so, we could meet about the same time as the Good Roads Association, we would be in a position then, all being in the city, to attend the sessions of the Good Roads Association. If this meeting could authorize the Council to make that arrangement I think it would be a good thing for this present meeting to do.

Mr. A. J. van Nostrand—I think the change in the date of our meeting was made in order to avoid clashing with the Dominion Land Surveyors in the matter of the Board of Examiners and in that way we got the statute changed. It might be possible for the Good Roads Association to have a little leeway to come and go.

Mr. McLean—The annual meeting of the Ontario Good Roads Association is not fixed in any way, but is usually held as far on in the spring as it is felt safe to count on the attendance of the Municipal Councillors. This year it has been placed at the end of March. That, however, would hardly suit this Association. I would suggest that a committee be appointed to interview the Executive Committee of the Ontario Good Roads Association with a view to having the annual meeting held at the same time. If it would bring the matter to a focus I would move that the President appoint a committee to meet the Executive of the Ontario Good Roads Association with a view to having the annual meetings held at the same time.

Mr. Smith—Mr. Vice-President, the discussion has been very interesting to myself as well as to the rest of you. I have been connected with road construction, I guess for thirty-five years, in a sort of out-of-the-way corner, and I think this Association should take an interest in it. I have much pleasure in seconding Mr. McLean's resolution. I think we ought to get together in some way or another a little closer.

Why wouldn't there be some way of the older members of this Association—if you take into consideration an additional examination or qualification—qualifying as well as the younger members? Experience counts a great deal in road construction as well as anything else and I would like this Association to take that into consideration if they take any action in the matter at all. I have much pleasure in seconding Mr. McLean's motion.

The Vice-President put the motion that the President of this Association appoint a committee to meet with the Executive Committee of the Good Roads Association to make an effort to harmonize the meetings of the two bodies, which was carried.

Mr. MacKay—I would like to ask if every member of this Association is not eligible for membership in the Good Roads Association?

Mr. McLean—Certainly, at one dollar a year.

Mr. MacKay—I think quite a number already are members of the Good Roads Association.

Mr. McLean—In view of the way in which some of my previous remarks were followed up by, I think, members of the Council. I would like to make the further motion that this Council be asked to take into consideration the addition of certain subjects to the curriculum which would place on the final examination of the O.L.S. which would harmonize the work with the subjects required for highway engineering. The motion is put in a rather roundabout way. It was suggested by Mr. Speight stating the matter had been under the consideration of the Council.

Mr. Speight—No, by the Board of Examiners.

Mr. McLean—It would possibly bring the matter more definitely before the Council if such a resolution were passed.

Mr. van Nostrand—I have much pleasure in seconding Mr. McLean's motion, and I think myself that the selection of the Council instead of the Board of Examiners, as suggested a few moments ago, is more desirable. The Council have to meet and arrange the affairs of the Association and that is one new item that could be taken up by it, and there are a sufficient number of members of the Council familiar

with the working of the Board to insure harmony in the work of the two. The work that may be done by the Council is certain to fit in with the work that may be done by the Board of Examiners.

Mr. Lang—In this connection there are some of us who feel that possibly by doing that there would be an overcrowding in the final examination and that some of the subjects in the final examination belong to the preliminary examination.

The Vice-President—It appeals to me that subjects of that kind are left pretty much to the descretion of the Council and Board of Examiners and they set the papers. If you arbitrarily move some of the subjects from the final to the preliminary you will probably be making a pretty stiff examination for some of the boys. However, it is moved by Mr. McLean, seconded by Mr. van Nostrand, that the Council of the Association take up the matter of suggesting that further subjects be placed in the examination so as to enable the candidates to take up harmoniously the work in connection with the good roads movement. Is that it, Mr. McLean.

Mr. McLean—To readjust the curriculum to incorporate subjects relating to highway engineering.

The motion was voted upon and carried.

REPORT OF COMMITTEE ON EXPLORATION.

Mr. President and Gentlemen, the Committee on Exploration would report as follows:

While little exploration has been done during the past year in the Province of Ontario, a great deal may be said regarding what should be done in the near future. Within the last three years an area has been added to the Province exceeding by about one-fourth the combined areas of Great Britain and Ireland, and concerning this vast region we know comparatively little. Portions of it, however, have been explored, and the reports of explorers are sufficiently favorable to make it desirable that we should know more about it.

In 1886 Mr. A. P. Low explored a portion of it lying between Lake Winnipeg and Hudson Bay, travelling via Berins and Severn Rivers, and reported that at the Hudson's Bay Company's posts visited on the route, good crops of potatoes

and other roots were raised, and that at Trout Lake—which is situated near the centre of the District of Patricia—no difficulty was experienced from summer frost. Much good land, suitable for agriculture but still virgin soil, was also reported at various parts of his route.

In 1912 Mr. J. B. Tyrrell travelled over a large portion of the same route, coming up at Severn river from Hudson Bay, ascending the Fawn River to Trout Lake, and then proceeding by the upper Severn, Cat Lake, Lake St. Joseph, and Lake Seul, to Sioux Lookout on the National Transcontinental Ry. His route thus crossed the highest point of the district, in lat. 52° and long. 92°, from which many of its rivers take their rise. From that point south and north as far as Trout Lake, the surface of the country is rocky and broken, but from the neighborhood of Trout Lake northward the rock is covered with glacial clays, or marine clays and sand, which contain agricultural possibilities. Mr. Tyrrell estimated the area of these deposits to be fifty or sixty thousand square miles. The only unknown quantity affecting agriculture appears to be the climate, and that can only become known by trial, and to effect this Mr. Tyrrell recommended the establishment of an experimental farm or garden at Trout Lake; and similar farms might be established at other possible centres of settlement.

The war in Europe, in which we are no mean participants, at present absorbs a great deal of attention, but when that is ended satisfactorily and affairs generally became readjusted, there is no doubt that a strong tide of immigration will be turned towards Canada; and of this Ontario can only secure her share by knowing beforehand what opportunities she has to offer those intending to settle among us. This can only be done by carrying out exploratory surveys to determine the extent and climatic conditions of our northern agricultural area.

Respectfully submitted.

LOUIS B. STEWART,

Chairman.

DISCUSSION.

Those are a few of the ideas I put together with the idea of raising a discussion.

The Vice-President—You have heard the report. Does any person wish to discuss any question?

On motion of Mr. Gaviller, seconded by Mr. Dickson, the report was adopted and ordered to be printed in the proceedings.

REPORT OF COMMITTEE ON ENGINEERING.

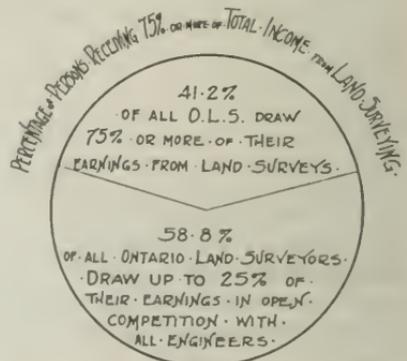
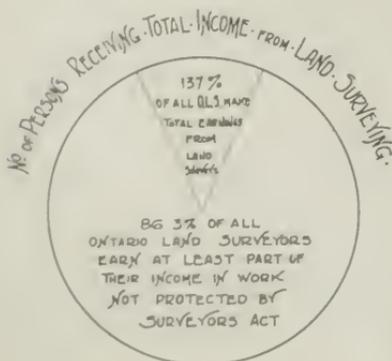
Mr. President—

Your Committee on Engineering beg leave to submit the following report:

The Land Surveyor's Act grants rights to, and places responsibilities upon the members of this Association which segregates them from the great unorganized multitude of Engineers. On the other hand, Ontario Land Surveyors have always claimed citizenship in that great realm of engineering. To determine in some measure to what extent the average Ontario Land Surveyor was interested in engineering, your Committee undertook to circularize the members of the Association in this respect, and to compile the results so obtained. The presentation of these results with certain comments and suggestions form this report.

In 1902 the Bill then being mooted to incorporate the Civil Engineers in Ontario was the subject of a paper at the annual meeting of this Association, and a general discussion of the relation of the Ontario Land Surveyor to the broader field of engineering may be read in the minutes of that meeting. It does not appear, however, that any even approximate statistics were known regarding to what extent the O. L. S. was dependent for his bread and butter upon engineering work.

As it is easier to define the term Land Surveying as understood in Ontario, than it is the term Engineering, we have more or less arbitrarily defined Land Surveying as field or

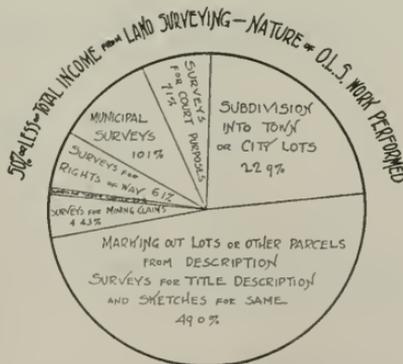
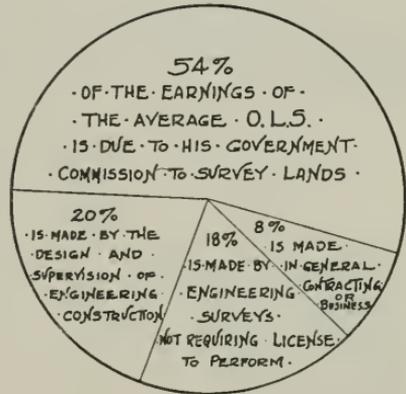
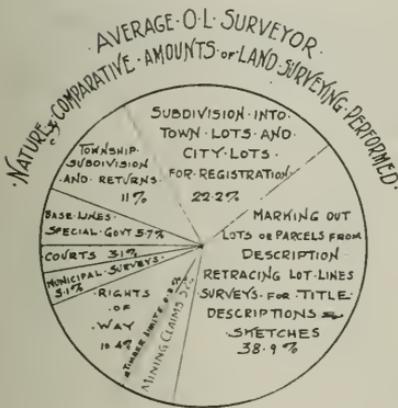


Only 13.7 per cent. of all O. L. S. obtain all their income from land surveying; 41.2 per cent. obtain three-quarters or over therefrom.

56.86 per cent. obtain at least half their income.

43.14 per cent. obtain less than half from land surveying.

37.3 per cent. obtain less than quarter.



The average land surveyor derives his profits from land surveying in the following proportions:—

1. Base lines and special Government work, inspection, etc.	5.7%
2. Township sub-division and returns	11.0 "
3. Sub-division in town or city lots and plans for registration ..	22.4 "
4. Marking out lots or parcels, or lines, surveys for titles, description and sketches	38.9 "
5. Surveys of mining claims	5.2 "
6. Surveys of timber limits	0.2 "
7. Surveys of right of way	10.4 "
8. Municipal surveys	3.1 "
9. Surveys for court purposes	3.1 "
	100%

The accompanying table shows the relative importance of the several departments of O. L. S. work to those surveyors dependent upon land surveying for the whole or part of their income.

	All earnings from O. L. S. work	75 per cent. or over from O. L. S. work	50 per cent. or over from O. L. S. work	50 per cent. or under from O. L. S. work	25 per cent. or under from O. L. S. work	Average O. L. S.
Base lines and Special Government work..	0.9	6.2	6.2			5.7
Twp. sub-division	21.4	11.9	12.5			11.0
Town and city lot sub-div.; plans for registration	17.0	20.7	22.2	22.9	7.3	22.4
Marking out lots, parcels, or lines; surveys for title	43.4	39.5	36.3	49.0	60.0	38.9
Timber limits		0.1	0.2	0.3	0.4	0.2
Mining claims	1.4	5.2	5.7	4.5	6.7	5.2
Right of way	15.0	12.3	11.5	6.1	8.9	10.4
Municipal surveys		2.0	2.1	10.1	10.7	3.1
Court surveys	0.9	2.1	2.6	7.1	6.0	3.1
	100.0	100.0	100.0	100.0	100.0	100.0

Coming back again to the average O. L. S. we determine that his income is drawn as follows:—

LAND SURVEYING—

Base lines and special Government work	3.1%
Township sub-division and returns	5.9
Sub-division of town or city lots and plans for registration	12.0

Marking out parcels or lines, surveys for title, sketches, descriptions	20.8	
Mining claims	2.8	
Timber limits	0.1	
Right of way	5.6	
Municipal surveys	1.7	
Court surveys	1.7	53.7%
ENGINEERING—		
Geodetic surveys	1.6	
Railway location	0.6	
Waterpower development	0.7	
Layout of buildings	0.6	
Mine surveying	0.5	
Land sub-division topography	1.8	
Drainage and watercourse improvements	12.4	
Landscape architecture and architecture	0.5	
Structural steelwork design and supervision	1.5	
Concrete structures, design and supervision	2.9	
Pavements and walks, design and supervision	5.9	
Sewers and sewerage systems	3.9	
Waterworks	2.2	
Railway construction	1.7	
Draughting and blueprinting	0.6	
Teaching	1.2	38.6
CONTRACTING—	4.8	4.8
OTHER BUSINESSES AND PROFESSIONS—	2.9	2.9
		100%

Considering the engineering work performed by the average O. L. S. separately, we find it divides itself into the following proportions in accordance to importance:

Drainage and watercourse improvements	32.2%
Pavements and walks	15.4
Sewers and sewerage systems	10.1
Concrete structures	7.5
Waterworks	5.7
Land sub-division topography	4.7
Railway construction	4.4
Geodetic surveys	4.2
Structural steelwork	3.8
Teaching	3.1
Waterpower development	1.8
Railway location	1.5
Layout of buildings	1.5

Miscellaneous draughting	1.5
Mine surveying	1.3
Landscape architecture and architecture	1.3
	100.0%

As stated above, these statistics are evolved from a most incomplete census and are believed to favor land surveying members unduly, so that the 53.7 per cent. of income made from land surveying shown for the average O. L. S. is greater than is actually the case. There seems to be no possibility but what this percentage from Engineering will increase, rather than decrease.

As one's reputation depends upon general efficiency in all branches of work undertaken, and inefficiency in one branch of one's business must react upon the whole, it would appear that the time must soon come when the O. L. S. Association must demand of its members certain requirements of knowledge of the basic principles underlying Engineering.

Again, Ontario has now but entered the threshold of a new class of surveying—Geodetic Work. With the extension of the Northern Boundary of Ontario, O. L. S. are now confronted with their first Geodetic boundary, and for that matter the first of its kind in Canada. With the completion of the sub-division of the Province into Townships, there will undoubtedly come a demand for precise surveys in Ontario. This is a field in pure surveying outside the field of land surveying as Ontario interprets that phrase. This should not be so, though judging by any standard of examination now required, the Ontario Land Surveyor has not the qualifications to undertake Geodetic surveys.

Your Committee would call to mind that this Association is primarily an Association of Surveyors and not of construction engineers, and would respectfully suggest that any dissipation of energy in examining their students in elementary engineering subjects should be guarded against but that if engineering knowledge by O. L. S. is desirable, to demand of their students certificate of preliminary technical training. But on the other hand, that the trend of advancement should be towards a higher standard of surveying, mathematical, practical and legal, that the letters O. L. S. may attain to more and more the nature of a post-graduate degree, that the status of the profession may be raised, and the remuneration of its members increased.

NORMAN D. WILSON,
Chairman.

REPORT OF DRAINAGE COMMITTEE.

Your Drainage Committee beg to report as follows:

(1) The thanks of the Association is due to the Honourable W. J. Hanna, Provincial Secretary, and Geo. F. Henderson, Esq., K.C., Drainage Referee for Ontario, for their ready response to our request that decisions of the drainage courts be published in some form available for the use of engineers, municipal officers and others interested in the practical working of the drainage laws.

We are informed that the Provincial Government has undertaken to publish these decisions as special drainage bulletins. The Referee is now engaged in the preparation of the first of these bulletins covering many points of interest already decided. We expect that this will be printed early in the present year and that others will follow from time to time.

With this assistance so cheerfully given by the principal author of the drainage law and its chief interpreter, engineers should find many of their difficulties overcome.

(2) A good working knowledge of the drainage laws as they now exist and a uniformity of practice amongst engineers in applying them, appears more desirable than frequent amendments.

It cannot be expected that laws will be so perfect as to provide absolute justice in every case, but on the whole there is little evidence of hardship to individuals or municipalities under the present laws.

(3) There are two minor defects in The Ditches and Watercourses Act which have been frequently mentioned in the discussions of the Association. The first is in Section 16, Sub-section 3 which provides for the engineer making his award only in case he finds that the ditch is required. It has happened that the engineer on attending at the locality found that the ditch was not required but that proceedings had been taken maliciously. It also not infrequently happens that the initiating owner having very strong views of his own as to the course of the ditch and its point of commencement and termination, has served his notices in such a way that the engineer can only make the award in the way desired by this owner or abandon the proceedings. The section should be amended to provide for an award as to costs in any event.

The second defect in the Ditches and Watercourses Act is in Section 28, which provides for the inspection of the work by the engineer at the time fixed for completion, but does not provide for payment of the costs. An amendment should authorize the engineer to certify his fees to the clerk of the municipality and by whom they should be paid.

(4) There has been some uncertainty as to the right of municipalities to assess under the Drainage Act the lands actually owned for the purpose of right of way by the Hydro Electric Power Commission of Ontario. Some municipal councils have expressly instructed their engineers not to assess such lands considering that there was no possibility of collecting the assessments. On the other hand we are advised that in at least one municipality this assessment, where levied, has been paid by the Power Commission.

(5) Sub-sections 2 and 3 of Section 9 of the Drainage Act which provides for bridges to afford access from lands of owners to the travelled portion of the highway and for farm bridges respectively, receive their full share of attention from all parties concerned including owners, municipal councils and the engineers. The access bridges are made part of the drainage works both for construction and maintenance, while farm bridges are provided for only in the way of payment to be made to the owner, who assumes all responsibility thereafter. The Honourable the Provincial Secretary, who is, perhaps, better acquainted with the drainage laws and with drainage practice than any other member of the Legislature, has invited the councils of certain counties in which considerable drainage work is done and also this Association to express an opinion as to whether or not the present provision for farm bridges is generally satisfactory.

In theory there would appear to be no reason why both classes of bridges should not form part of the drainage works both for construction and for maintenance, but in practice there are some differences between the two classes and some very strong objections to constructing and maintaining the farm bridges. Access bridges are on the highway where they may be frequently inspected, and further they are in daily use by the owner at all seasons of the year and they are a standing invitation to the public to use them for the purpose of approaching the farm buildings from the highway. Further, it may be assumed generally that ditches constructed along the road side are not in the natural course of the water and being wholly artificial the cost of the bridges and the re-

sponsibility for their construction and maintenance should be placed upon the drainage scheme.

Farm bridges, on the other hand, are usually so situated that they are used only by the owner for the purpose of his farm work and neither the general public nor the drainage area has any interest in them whatever. It may be conceded as a general proposition that drains crossing private property follow approximately the natural course of the water, and that bridges of some kind would be required by the owner whether the municipal drains were constructed or not. Under these circumstances it would be unfair to the drainage scheme to have it burdened with the cost of bridges which would be necessary even if there were no scheme. In some cases the damage done to a farm by severance is less than the cost of constructing a bridge, and then the construction and maintenance of a bridge would be a serious waste of money and owners would prefer to be paid for the damage and to do without the bridge. Many transfers of land have been made in this way on terms entirely satisfactory to the owner; he receives his allowance for a bridge and sells the severed portion of his land and on the whole is better off than if the bridge had been built for him.

If farm bridges must be constructed and maintained by the drainage works they will be substantially built according to plans and specifications of the engineers, and the cost of plans and supervision added to the cost of the work. This would give no cause of complaint to the engineers, but the result would be a considerable increase in the cost of drainage works as a whole, an increase in the cost of bridges above what the cost would be if built by the owners and in all probability much greater friction than at present in carrying out the provisions of the Act. The private owner should be fairly treated in the way of compensation where the construction or enlargement of farm bridges is rendered necessary by the drainage work, but the responsibility for the construction and maintenance of a bridge in which the owner alone is interested should be left with him. Your Committee do not consider necessary any change in the Drainage Act in respect to access and farm bridges.

(6) Sub-section 5 of Section 9 of the Drainage Act requires the engineer to fix the amount of compensation to be paid to owners for damages to lands and crops occasioned by the disposal of material taken from the drainage work. Neither this nor any other section of the Act appears to auth-

orize the engineer to determine the amount to be paid for the land actually taken by the drain and any necessary buildings or roadways which may also be required in the case of pumping plants. Your Committee are of the opinion that if the Act were amended in this respect it would meet the requirements of several cases which are not now covered by the Act.

(7) Perhaps the worst pitfall in the path of the drainage engineer at the present time is the interpretation of Sections 75 and 77 of the Act, rendered in the case of *Gibson vs. West Luther*. In substance this means that an engineer has no power to vary the proportion of assessment for maintenance of a drainage work unless expressly authorized to do so. If a drainage work affecting two or more municipalities requires both repairs and improvements the cost of repairs must be separately estimated and must then be assessed in the proportion previously determined for maintenance of the work. The cost of improvement may be assessed by the engineer wholly on his own judgment. The effect of this decision has been to endanger the reports of engineers prepared with great trouble and at considerable cost and also to put municipalities to considerable expense in litigation before the report is made. An extract from this judgment follows:

Henderson, K.C., Referee:—"The Report adopted by the by-law in question professes to be made under the provisions of section 77 of the Act, which is the old 75th Section. The resolution of the Township Council appointing the engineer instructs him to act under Section 75, but I assume that this was done in ignorance of the change of numbering of the new Act of 1910, and that the intention was, as the by-law puts it, that the engineer should report upon a scheme within the provisions of the present Section 77. In any event, there was no mandate to the engineer which would authorize him to act under the provisions of both of the present Sections 75 and 77, if in law it was necessary for him to have a mandate sufficiently wide to cover both sections in order to warrant the making of the report in question.

"The report provides not only for the repair of the drain, as originally constructed, but also for a very substantial extension and improvement of the outlet. In the schedule of assessments, some five hundred acres of land which were assessed in the original scheme are no longer assessed, and nearly four thousand acres of land which were not in the original scheme were taken in. One property only is assessed for benefit, all the other assessments being for injuring liability. This is

altogether different from the original schedules of assessment, which would appear to have been entirely disregarded by the engineer, whom I understand to have been advised under Section 77, he should treat the scheme as an entirely new one. This view of the Section, as applied to a scheme of this kind, was in my opinion wrong, and as a result the report and by-law must be set aside.

“A word in explanation of the intention of the Act—Sections 71, 72 and 73 are declaratory of the obligations of municipalities as to maintenance. They make it plain that the original proportions of assessments, both within each municipality and as between municipalities themselves, stand fixed unless and until they are varied in manner as specifically provided by Section 75. As between different townships, an appeal to the Referee is provided for by Section 74, in respect of the matters referred to in that section, but notwithstanding the wide powers there given to the Referee, he cannot alter the fixed proportions of the original assessments. These are held sacred until varied under Section 75; *Chatham v. Dover*, 8 O.L.R. 132; O.W.R. 882.

“The sections following 75 provide for the improvement, extension and alteration of a drainage work as incidental to the proper ‘maintenance’ of the scheme, which the interpretation section of the Act, Section 2, s.s.g. broadly defines as its repair and preservation. These sections neither enlarge nor abridge the provisions of sections 71, 72 and 73, but are supplementary to them, as providing for new and additional work, not mere repair. In working them out in connection with a scheme which is both repair and improvement, such as this, the fixed proportions of the original assessments must be adhered to, as regards the work previously constructed and its mere repair, unless and until these proportions become the new basis for future assessments and remain such until again varied, and so from time to time. See Sub-Section 5 of Sec. 75, which was enacted to meet the difficulty suggested in the judgment of Burton, J. A., in *Caradoc v. Ekfrid*, 24 A.R. 576, 1 C. & S. 295.

“As regards the new work the engineer under section 77 has all power of assessment as if the scheme were a new one. Here he should work out a separate schedule of assessments, and as to this new work it is quite proper for him to disregard lands not affected by it, whether or not included in the original scheme, and also take in other lands which are affected by it, again irrespective of their being or not being assessed

originally. In the actual preparation of the schedules of assessment which are to form parts of his report, it would be quite proper for him to keep the different assessments in different columns, as suggested in *Rochester v. Mersea*, 2 O.L.R. 435, but I see no reason why the two should not be combined, with the ordinary result as to columns, provided that the basis of computation is correct.

"Practically speaking, however, the better course to adopt in a case such as this would be for the engineer, so soon as he finds that conditions have changed since the making of the original report so as to warrant the inclusion of new lands, and perhaps the exclusion of some of the old, to ask the Council for a special mandate under Section 75 as well as under Section 77, and the appropriate repair section. Having obtained such a full mandate, he would then have to all intents and purposes a free hand to do substantial justice to all parties. Unfortunately for the report now in question, its author had only the limited authority of the one section."

(8) The distinction between outlet liability and injuring liability is one on which engineers cannot even yet agree, and any light on this subject is always welcome. The following extract from a judgment by the Referee in the case of *Orford* against *Aldbrough* appears to be more enlightening than anything else that has come to our notice.

"It may be convenient to shortly state the practical distinction between injuring and outlet liability, in view of the fact that many lawyers and most engineers complain of difficulty in understanding it. Where lands can be more effectively drained after the construction of the drainage work than before, because they will have an outlet which they did not have before, they are assessable for outlet liability. Where lands are effectively drained, but where their waters are not taken to a sufficient outlet, so that legally speaking they have no outlet at all, and the drainage work will give them a sufficient outlet, they are again assessable for outlet liability. The test is that in order to enable an assessment for outlet liability the drainage work must be necessary, in face of law, to enable or improve the cultivation or drainage of the land assessed."

"Where in the course of his examination the engineer finds lands suffering injury from water brought from upper lands by artificial means, and his proposed work will pick this water up and carry it to a sufficient outlet, he can assess for in-

juring liability the lands from which the water causing the damage is so artificially brought. This is usually on pretty much the same state of affairs as the second kind of outlet liability, but from the opposite point of view, the test now being the existence of injured lands seeking relief, not higher lands seeking outlet. It follows that the extent of liability differs in each case, as set out in the respective sections."

DRAINAGE QUESTION DRAWER.

Question No. 1.

An award ditch was constructed in 1893 and by a long course outletted into Big Creek. Three of the owners of parcels at the head of this award have now petitioned under the Municipal Drainage Act to have their lands drained. They ask for the award ditch to be used for a certain distance and then for a new drain to be constructed by a new, shorter and better route (in my opinion) to an outlet in the same Big Creek.

The old ditch was 10,489 feet long while the new one will use the upper 2,400 feet of the award and will reach an outlet at a distance of 4,900 feet all told.

How should I proceed? The petition is in order but some of the petitioners have maintenance on the old award to go below where the ditch will be diverted. If I report on taking the water the way suggested by the petitioners, and which I think is the proper way, would the owners on the award below the diversion be assessable for "cut off" and how would their rights be affected

Presumably the owners at the head whose water is diverted would no longer be liable for maintenance under the award below the diversion.

The enclosed sketch may make my explanation clearer.

Answer to Question No. 1.

If the petition is sufficiently signed the proposed municipal drain may be constructed incorporating therein the upper portion of the award drain.

As to the maintenance of the lower portion of the award drain your Committee is of the opinion that the award will be practically superseded by the drainage by-law and that future maintenance of that portion of the award drain not incorporated into the municipal drain could only be provided for by reconsideration, under the Ditches and Watercourses Act.

If the lands along the lower portion of the award drain are actually benefitted or afforded an improved outlet by reason of the upper portion being diverted, then these lands are liable for assessment.

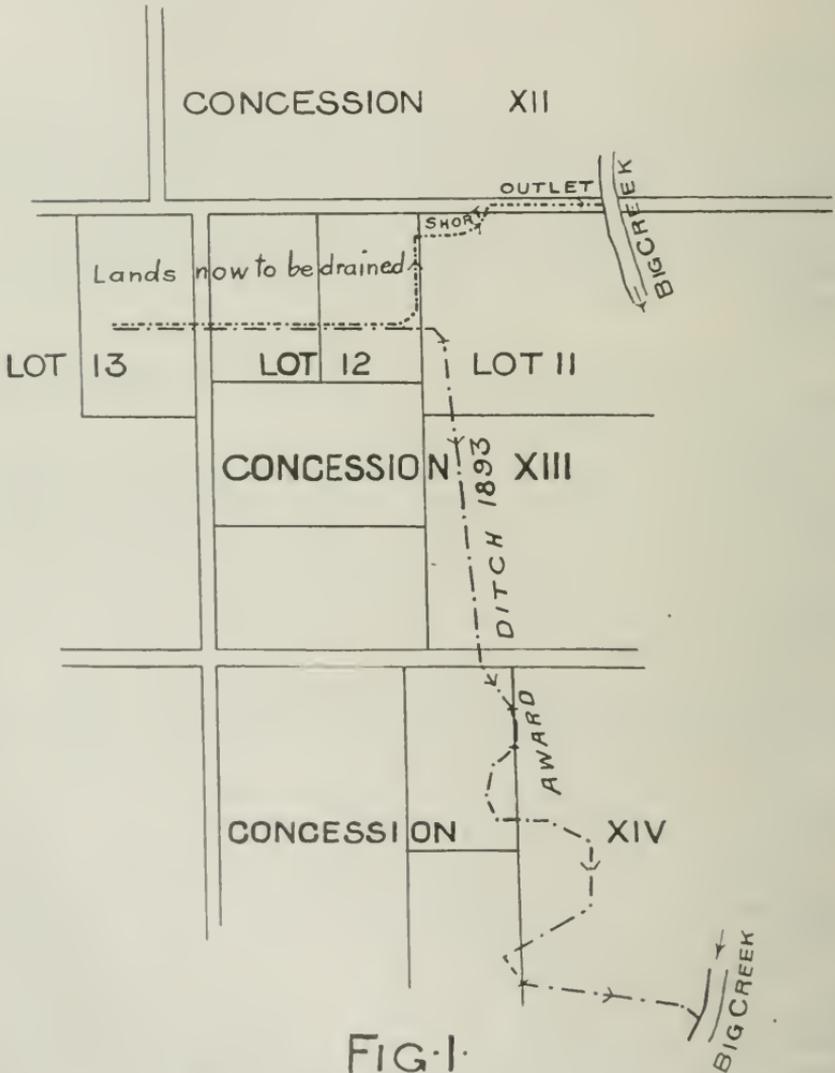


FIG. 1.

Question No. 2.

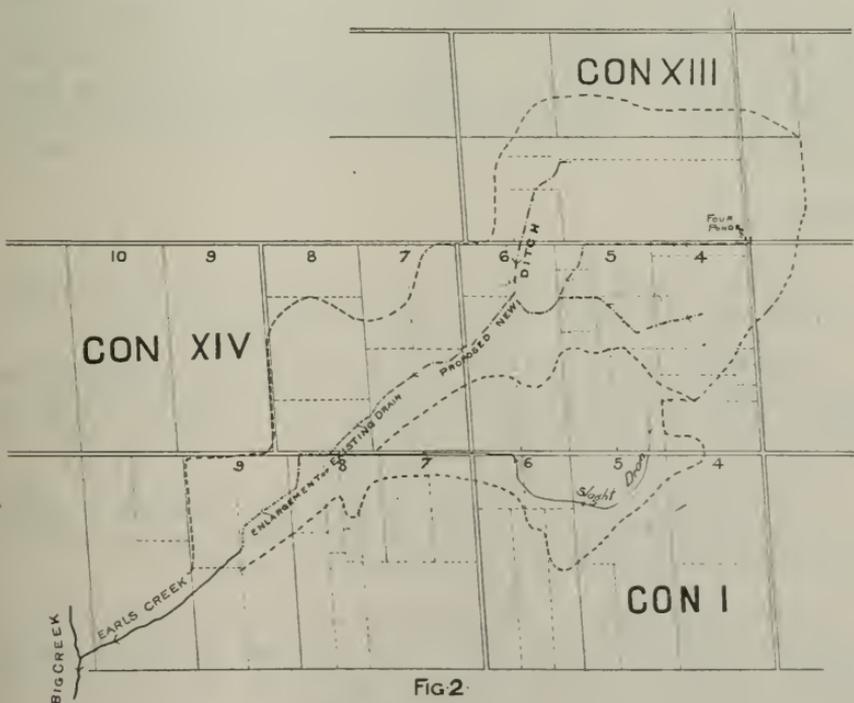
The accompanying sketch shows the location of the proposed new ditch and tile, and the enlargement of existing ditches, the estimate for the work also called for the cleaning to a minimum width of 11 feet of the channel of Earless Creek as far as Big Creek.

Drainage areas are shown by heavy dotted white lines, and other ditches by full white lines.

The petition for this drain described the south halves of Lots 3, 4, 5 and 6 in the 13th Concession and Lots 4, 5, 6 and 7 in the 14th Concession.

At the reading of the report a majority of the persons benefited in the area described in the petition was not secured and the report was not adopted.

Fisher the chief petitioner was assessed for about \$450.00 and still wants drainage. How can he now legitimately obtain it?



Answer to Question No. 2.

The following courses are open :

(1) To initiate proceedings under the Ditches and Watercourses Act, the only limitations being as to length and cost as provided in the Act. It sometimes happens that where one owner takes proceedings under the Ditches and Watercourses Act the other owners, although opposed to the drain, will sign a petition under the Drainage Act rather than have proceedings continue under the Ditches and Watercourses Act.

(2) Section 78 of the Drainage Act allows a Township Council without any petition to repair, improve and extend certain drains which have not been constructed under the Act. This applies to drains constructed out of the general funds of the municipality or by statute labor, and the practical result is that the Council may apply the Drainage Act to the repair, improvement and extension of nearly any drain on the road side. This is occasionally found to be a convenient way of initiating a drainage scheme.

(3) Petitions are frequently drawn which purposely describe a limited area in which the necessary majority can be secured for the petition. Some such drains have been constructed on the petition of a single owner and no attack made on the by-law. The only decision on this point known to your Committee holds that the petition should describe a reasonable area.

Question No. 3.

The accompanying plan shows an award ditch put through in 1884, and the course of a proposed Municipal Drain.

The three owners, Amy, Day & Thompson, petitioned the Council describing their three properties in the petition for a drain under the Municipal Drainage Act to relieve them of the flooding caused by the award ditch.

At the time the award ditch was put through a small creek was utilized for an outlet, which followed the course now proposed to be constructed as a municipal drain.

Amy says that at the time the award was put through fish used to run right up this small creek to the point where the award ditch was outletted, and no doubt the engineer at that time considered it a sufficient outlet.

At the present time it is not a sufficient outlet and the parties to the petition suffer damage accordingly.

Can such a petition be acted upon by the Council, it being sufficiently signed for the area described?

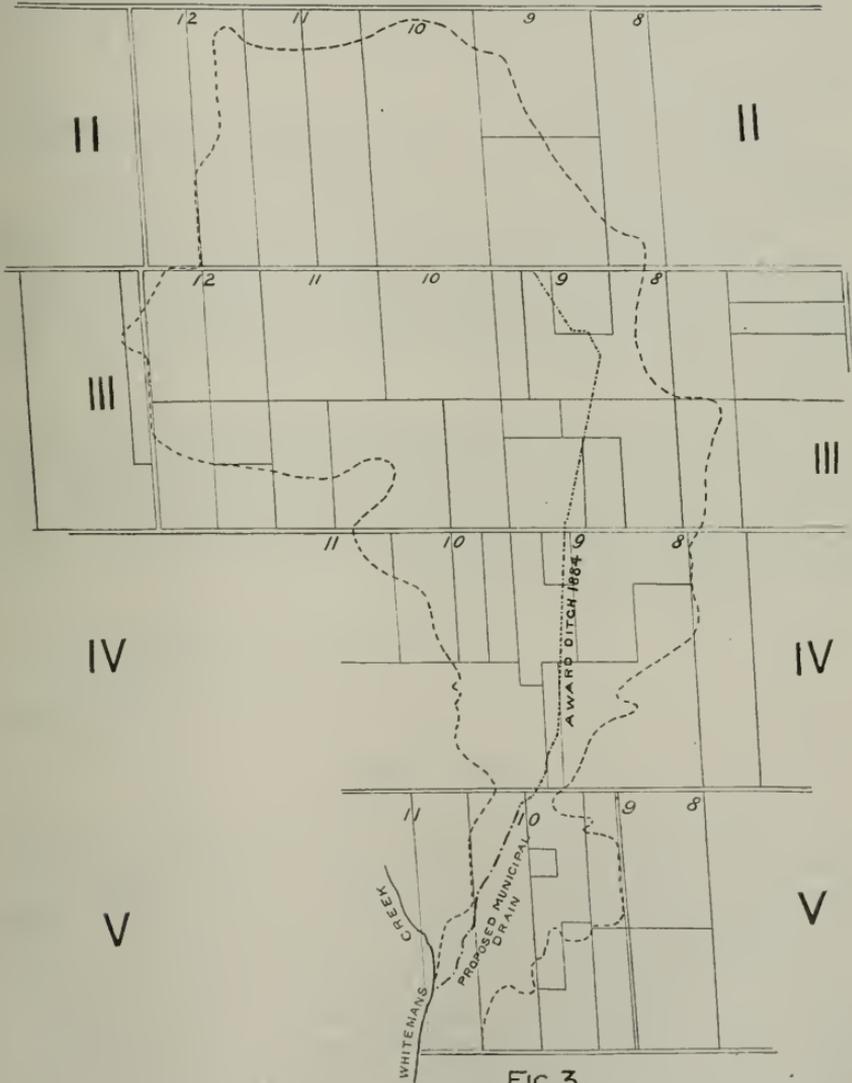


FIG 3

If the red portion is constructed as a municipal drain, can lands be assessed beyond the area assessed for the construction of the award ditch into which such lands have no right to drain?

What procedure should be adopted?

I advised the Council to adopt the award ditch as a municipal drain, and this was done in accordance with the Act.

Answer to Question No. 3.

The petition appears to be a proper one which describes a reasonable drainage area and is sufficiently signed, and we see no reason why it should not be acted on by the Council.

The assessment can be extended over all the lands benefited by the drain, lands using it as an outlet or which would be afforded an improved outlet within the meaning of the Act and lands which contribute to the injury of the lands of the petitioners regardless of the distance of such lands from the drainage work.

The conversion of the award drain above the lands of the petitioners into a municipal drain does not appear necessary for the purpose of carrying out the work petitioned for. If, however, the award drain has been legally converted into a municipal drain the Council has power to extend it to a sufficient outlet without a petition.

Respectfully submitted,

G. A. McCUBBIN,

Chairman.

DISCUSSION.

Mr Henderson—Mr. Chairman and Gentlemen: I am not altogether quite clear as to why I am here except that I have been long enough dealing with engineers, particularly drainage engineers, to know I am always very glad to be with them. I understood from Mr. McCubbin there were some practical questions arising out of the operation of the Drainage Act which were bothering some members of your Association and that I was to try to help in solving some of those questions. I don't think it is desired I should address you, but if anyone has any questions to ask I would be very pleased to talk them over. If you want me to talk about the Drainage Act I am a lawyer,

and a lawyer can always talk if you turn the crank, but I don't think that is precisely the object of my being here.

Mr. McCubbin—There were two questions in particular which were submitted to the Drainage Committee and which the Committee didn't feel competent to answer. One of them was in reference to petitions for Municipal work. In my practice I have had sometimes a petition presented that has come to me in which one single owner desires his land to be drained by a Municipal drain and the Council has acted on that and referred it to me to make a report. The question is what should a petition really describe. (Reads Section 21.)

Mr. Henderson—Your organization a year ago requested, I think, the Provincial Secretary, who is a member of the Ontario Government, who looks particularly after drainage matters, to do something in the way of rendering drainage judgments accessible to your profession. I don't know whether you know the result—your Secretary probably does—but the result is that I said I would be only too glad to do it, the difficulty is that very few of my judgments are worth printing, it occasionally happens that one is and then I have it printed, but just at present the stenographer for the eastern end of the Province is at work collecting a number of reported and unreported cases, which we hope to have published in blue book form very shortly. The reason of its publication in Blue Book form is it will be distributed to the members of your profession, and we hope to follow it up from time to time as the material comes to be worth the while to print a blue book, and you will have the judgments in that way. I have a sort of slight hope that some of the drainage engineers will think it worth while to have these bound. I don't think we can get the Government to bind them, do you think, Mr. McLean? Possibly that may be done. The reason I say that is this, if you had had that collection of cases you would have found that clearly dealt with in a case which I decided, and I think the name is Duane vs. the Township of Finch. It is an Eastern Ontario case and of course some of the men from the west, Mr. Wilkie, think we don't know anything about drainage down in the east, you might tell them a little different. I decided there what I believe to be the law, that there must be in good faith a reasonable saucer basin, that is, there must be more than one lot to start with, there must be a majority; the Act says a single owner can't constitute himself a majority, nor can an engineer nor anyone else say, I am going to take out three lots or more and get a majority of them. The tri-

bunal before whom the matter comes must be satisfied in good faith that the parties have selected a low-lying basin of land requiring drainage, and you must have a majority of the owners within that low-lying basin of land. I have emphasized the words "in good faith," because some of you know I have set my face against unnecessary expense in surveying, that is in the interests of the engineers I may say, and where a party has acted in good faith, slight errors are usually overcome.

Mr. McCubbin—In reference to that low-lying area described in the petition, that might mean low lands which were surrounded by a much larger area of high lands which would not be considered at all.

Mr. Henderson—In the case of Duane and Finch there is a peninsula running out into this low-lying land. Now, that should have been described because there was a neck to it so very narrow it was practically in the middle of the low-lying land, it necessarily drained onto the low-lying land and should be included in the area.

Mr. McCubbin—There is another question the Drainage Committee was struggling with and in which there was no judgment at all as a basis for our report and that was this, say an award drain is constructed under the Ditches and Water-courses Act, there is one provision in the Drainage Act for taking that over in whole as a Municipal Drain, there is also in Section nine, in one of the sub-sections, a provision for the engineer incorporating private or award ditches in whole or in part into a municipal scheme. The question is this, suppose an engineer in reporting upon a municipal drain takes only a small portion of an award drain and incorporates that into the municipal drain, what happen the award? Is there any award left or is there an award so far as the undisturbed portion of the drain is concerned or is there practically nothing left of the award?

Mr. Henderson—Please remember when I say I am very glad to talk things over with you I can speak with positiveness as to any question which has been decided. As to any question which remains undecided I am very glad to tell you what I think at the present moment, but I must speak subject to correction after hearing argument on any question that arises in a concrete case and in that sense it is more or less a confidential talk. That is a question that never has arisen,

but I should say that if you incorporated what I would call an outlet section of an award drain the balance of the award might very well remain as an award. Does that answer your question? But I can't quite understand at the moment a case where you could take an intermediate section of an award drain into a municipal drainage scheme.

Mr. McCubbin—We take the upper portion of the award drain and divert under a petition by a different course altogether, take it to a different outlet, then you have the upper portion of that award drain forming part of your municipal drain. The owners who were on the upper portion have part of the lower portion to maintain.

Mr. Henderson—The award drain is already dug and somebody below had that upper portion to maintain?

Mr. McCubbin—Yes, and somebody above had the lower part to maintain.

Mr. Henderson—I fancy the result would be that party would be relieved of maintenance and any other party might have the award reconsidered under the provisions of the Ditches and Watercourses Act. You must remember this, I can't bind the county judges who have jurisdiction over the ditches and watercourses. I should fancy practically a superior jurisdiction has intervened, has cut off a portion of that drain. I haven't had anything to do with the Ditches and Watercourses Act for about 20 or 25 years, when I was fool enough to write a little book on it, but my recollection is there is provision for reconsideration in that Act.

Mr. McCubbin—Our idea is when the award is interfered with by the Drainage Act, one owner who has a portion to maintain and had been cut out by the award, could not sit back and laugh at the other fellows and serve them with notice to clean out.

Mr. Henderson—I would think the proper thing to do would be to have the ditches and watercourses scheme reconsidered under the Act. I think that is the obvious thing to do. That is something that ought to be done and let the township engineer read just the liabilities between the parties in a fair way. That is what should be done, but as a matter of law the superior powers having intervened that man is unquestionably relieved from his obligation to maintain. There is nothing to maintain. It is exactly as though nature had taken care of the

piece it was his duty to maintain. The practical way of going about it clearly would be to have the award reconsidered.

Mr. McCubbin—Then there is a case of Gibson and West Luther which is one that has made a great deal of trouble for surveyors. We are looking for the easy way out of it. The trouble is that we get instructions to report on a drain and the work is partly repair and partly improvement; we must estimate separately the cost of the repair and the cost of the improvement and we must assess them separately under the law and practically it is impossible to do it.

Mr. Henderson—It is not theoretically impossible and why should it be practically impossible, where it is part repair and part improvement?

Mr. McCubbin—When you get the original plan and profiles according to which the drain was constructed ten or fifteen years ago there are no bench marks at all from which you can re-establish the old levels; you can't determine the old grade, that is the principal difficulty.

Mr. Henderson—Still the Act says you are bound by the old proportionate assessment? That is your difficulty is it?

Mr. McCubbin—That is the difficulty.

Mr. Henderson—You have the old proportionate assessment to work on to the extent that it is improvement but your practical difficulty is to know just how much is improvement in actuality and how much is repair?

Mr. McCubbin—Yes.

Mr. Henderson—You do your best and who can say you haven't got it right?

Mr. McCubbin—The experts on the other side.

Mr. Henderson—You know the position they are in and the position you have been in as an expert on the other side, don't you, once or twice? Oh, Mr. McCubbin, let the engineer in a case of that kind do his best, no man can do more, and he may be pretty sure he will be taken care of. A drainage scheme is not upset, as you know, for the sake of upsetting it.

Mr. McCubbin—We know it is not done by the courts; we know it may be done by other municipalities.

Mr. Henderson—But they tried to upset it on the ground that you didn't have bench marks to go to. Your evidence can't demonstrate absolutely that you have mathematically worked out the exact definition; you have done your best and you have separated the assessments and I think you can pretty safely depend on them being protected. You don't think, do you, of any improvement? I can't think at the moment of any improvement in the Act that could be made in that regard.

Mr. McCubbin—That is just the difficulty, but still in nine cases out of ten the engineer in reading the Drainage Act where it says the proportions of assessment shall govern for maintenance unless and until they are varied by the report of an engineer, the engineer thinks when he is instructed to make a report he has the authority to report on everything he thinks of including variation of assessment.

Mr. Henderson—That is the reason I rather went out of my way in the case of Gibson and West Luther to say something that was not really necessary to the decision of that case, knowing that the engineers were very often under that mistake, and wanting to call attention to it, and I tried to suggest the way out of the difficulty. Of course the danger, as you know, is mainly in the Court of Appeal, because I have never hesitated to say from the Bench, and I say it now, that I try to work the Drainage Act out in such a way as to dig drains and not to print appeal books and try to be practical with it, and if the engineer has substantially accomplished the result the Act intended him to accomplish, naturally one tries to do the descent thing and uphold his report whatever the experts may say in the way of picking flaws in his work. Were you on the case where the township authorities had spent all the appropriation for supervision of the work in paying commissioners and had not had an engineer on the work at all, and the result was that admittedly the work had never been a complete work and didn't work satisfactorily on that account? That was a case where it was absolutely impossible for anybody to say what should be done to complete the work. What I did in that case was to direct a mandamus that the work should be done to the satisfaction of the engineer who originally had it in charge and who should have been kept employed by the Council.

Mr. McCubbin—That was McLean against Euphemia.

Mr. Henderson—Yes.

Mr. McCubbin—I had all my own bench marks there and they were all reported.

Mr. Henderson—When you got there there were some bench marks gone. I may be thinking of another case. Nobody could tell what remained to do the work, and that has arisen more than once. In the case you mention I tried to lay down the plain specific directions in Gibson and Luther as an easy way to meet the requirements of the Act and I don't see how it could be made any more simple. Of course, the best thing to be done in a case of that kind is for an engineer before he commences his work to get wide open instructions of the Act which gives him authority to vary assessments, then you don't meet that difficulty.

Mr. McCubbin—In regard to the proposed amendment the Hon. Provincial Secretary has asked my opinion as to the advisability of making farm bridges a charge against the drainage work. Our opinion on the whole has been rather against that.

Mr. Henderson—You are the best qualified to know.

Mr. McCubbin—It looks to us as if there would be a good deal more friction with the private owners in working out the Act. I thought probably you would have some experience too that would enable you to say.

Mr. Henderson—I have never heard of any difficulty; I have rather looked upon the present provision as to farm bridges as rather helping than hurting. Sometimes there are certain practical aspects of it, aren't there, that help you out in your work?

Mr. McCubbin—Yes.

Mr. Henderson—I might be asked to recommend proposed legislation and that would be my inclination of opinion. I have never heard of any difficulty about it. Of course, Gentlemen, Mr. McCubbin has these drainage questions very much at heart. I recognize some others here whom I know who are equally interested and if there are any points I will be very glad to answer them. I don't think you want to listen to cursory remarks about things.

Mr. McCubbin—From your experience in trying all these drainage cases you are acquainted with practically all the difficulties the engineers have to face. Now I have run across

a few difficulties and Mr. Jackson has some others, and other engineers who are not here have run across many others.

Mr. Henderson—I must confess, and I am glad to confess that my experience is that the drainage engineers—I use that term advisedly—of this Province know their business. I can't at the moment recollect a case where any man has appeared before me who didn't prove himself to be a credit to his profession. Some have a better acquaintance with the provisions of the Act than others, but I have always found the engineers to be exceedingly reasonable men who were glad to talk things over and open to conviction, and I think the usual result of our litigation is that the Referee and engineers can adjourn to the appropriate place and perhaps have a little subsequent talk without any friction arising. I am always glad to meet the profession.

Mr. Jackson—Might I hark back to that matter of area again. It is the question that is on the board.

Mr. Henderson—Certainly.

Mr. Jackson—It is question No. 2. The man petitions for a new drain in good faith; he practically describes the whole drainage area down to the existing drain, and he went about the thing in too good faith; he described too large an area, he was a man holding 200 acres and one of the branch drains where a number of people held four, five, seven and ten acre parcels, and at the time when I went to make the assessment I couldn't get within a quarter of a mile of the drain without running over the tops of my rubber boots; it was a place that wanted it exceedingly bad. In going about in too good faith he described too large a basin. Having once done that and having had his petition turned down he was in an awkward position; he naturally said the surveyor has been down here, and he came to me to help him out. The poor chap has since then sold his place because he couldn't get drainage. It was a question of whether he could legally have come on again and described a smaller area.

Mr. Henderson—How much of that area that you have indicated there now would you assess for benefit?

Mr. Jackson—The whole of it.

Mr. Henderson—Direct benefit?

Mr. Jackson—Yes.

Mr. Henderson—How can it be too large an area?

Mr. Jackson—In that it prevented him getting his drainage.

Mr. Henderson—You must have a majority, that is the difficulty. That appears to be a case where he simply couldn't get a majority within the necessary area.

Mr. Jackson—Difficulty afterwards arose in this way, he was too far from an outlet to enable us to get that constructed as an award ditch under the limited cost.

Mr. Henderson—That would appear to be a case where he simply couldn't get a majority, and the Act requires a majority.

Mr. McCubbin—It is a case where a man would have to do without the majority.

Mr. Henderson—If there are no other questions to be asked I don't propose at this time in the afternoon to burden you with my talk. I came here to answer questions and I am very glad, if I may say this, that I am of course technically supposed to be a judge of drainage cases, but there is no reason that I know of why an engineer who is acting as an engineer under the Municipal Drainage Act, that is, an engineer promoting a scheme and who is sworn to do his duty under that Act and is in that sense just as much a judge as I am, independent, between the parties—I say there is no reason why he should not drop in on me at any time he happens to find me and talk things over. There is a great difference between that and discussing the matter between litigants when they come before me. One thing I always like to emphasize is that an engineer who undertakes the duties of engineer under the provisions of the Municipal Drainage Act is a sworn officer of the law. He has an absolute right and there is no reason in the world why we should not talk like this. I am assuming now I am talking to men who may be now or at some future time engineers under the Municipal Drainage Act, and judges, because that is what they are under the Municipal Drainage Act, with very important functions to perform. So that now or at any other time I will be delighted to discuss any of these matters with any members of the profession or to help the profession in any way I can.

Mr. Code—Under the Drainage Act is there any limited

distance that land shall be assessed above the commencement of the improvement?

Mr. Henderson—Technically, no, Mr. Code. If they are contributing water, sending water down into the lower townships, and they are getting an improved outlet and needing it why shouldn't they pay for it?

Mr. Code—You think the engineer should go as far as the water is contributed?

Mr. Henderson—It is a question of fact as far as water is contributed, and as far as the stream through which they contribute it is being affected by the actual physical work to be done. It must be a question of improved outlet or injuring liability.

Mr. Code—Sometimes the amount a person might raise wouldn't pay for the work.

Mr. Henderson—You have got to use your judgment. You must give the drainage Court credit for a certain amount of humor and a certain amount of imagination. I remember one man who said in the witness box before me one day when Counsel cross-examining had suddenly opened before him and was reading from some of Judge Gwynne's utterly impossible descriptions, and asked, have you done this and that? He said, We never do that; I have been digging drains now for fifty years and don't have to. He was perfectly right. He didn't have to, but he shouldn't have admitted it under oath in the witness box; it is a dangerous thing to do.

Underneath it all is this that you have got to remember if you are laying out a little bit of a scheme for the benefit of the poorer farmers, you have got to bear that in mind and you may have to do a little skating around the corners when you get into the witness box, but you will probably get around all right if you have given these people a square deal. That is what the Act is intended to do for them; it is not intended to swamp them with expense, it is not intended that they cannot get drainage without being swamped with expenses. And let me tell you this, the engineers of this Province do not spend money unnecessarily. That is my experience. Exercise your judgment and if the matter gets into litigation and it turns out you have not made an examination in elaborate detail of some point that becomes important it will be time enough then to meet it. This is a Farmers' Act, and it is

supposed to be worked out on rules of common sense. It is true the Court of Appeal is sitting up there but they don't give much trouble really. As far as the rest of it is concerned we don't quarrel with the engineers much, but there is one thing I want to say, I have laid it down as a matter of principle, and I think I am right, that the engineer who takes an oath and makes the elaborate examination that the Act requires him to make, should have the preference in the witness box over the man who simply comes in and criticizes his work after a cursory examination. It doesn't follow they are equally honest. I give the preference to the engineer who did his work under oath originally because he was doing it independently. A lawyer is working for a client, an engineer is working for a client, the man who made that report is not working for a client, he is working for a community, and he gets the benefit of that always, and I think it is proper he should get the benefit. I would like it to be understood that that is not in any sense a reflection on engineering as a profession. I have heard it said that it means a man is going to get into the witness box for a fee and give evidence. If he gets there he is bound to earn his fee to the very best of his ability, of course honestly, but he is bound to put his evidence in language that is the most favorable to his opinion, but my point is that underneath his opinion there is not the foundation there is underneath the opinion of the man who made the report. I would like to know if anyone disagrees with that. The reason I bring it up is I know it has been discussed by certain members of the profession.

Gentlemen, it has been very pleasant to have this talk, and I am pleased to be able to say that someone was kind enough to invite me to join you to-night at your banquet, and I hope to see you again then. (Applause.)

Mr. McCubbin—If it is not out of order I would like to move a hearty vote of thanks from this Association to Mr. Henderson, the Drainage Referee, for the heart to heart talk he has given us this afternoon, and the very practical help he has given us. (Carried with applause.)

REPORT OF COMMITTEE ON LAND SURVEYING.

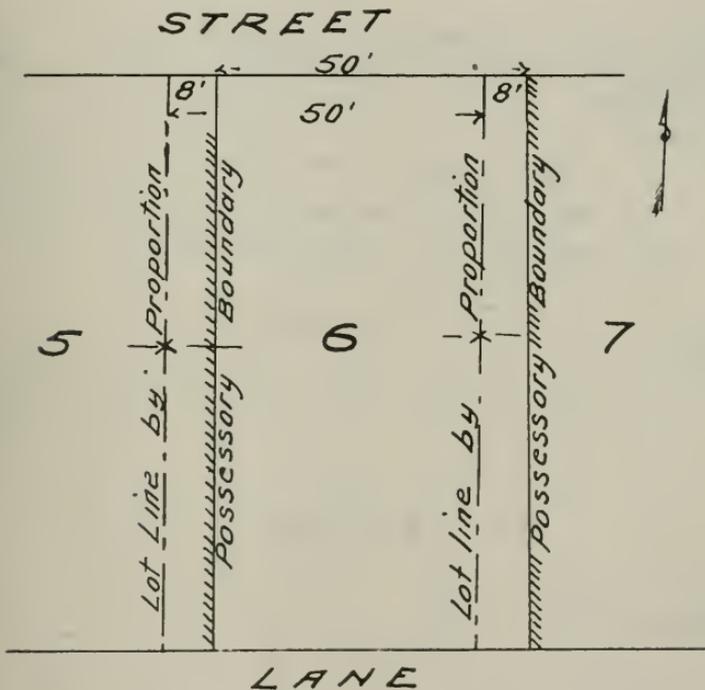
Mr. President—There has been a large number of questions sent to this Committee this year, which your committee have given their best attention and the answers are given herewith.

Following the resolution made at our last meeting, the Secretary has sent out circulars some months previous, showing by illustrations or sketches the questions, so that the members would have time to consider them. Several members have sent replies to these, which have helped the committee considerably.

C. J. MURPHY,

Chairman.

Question No. 1, Re E. and W. $\frac{1}{2}$ Lot 6.



Query.-

Where should the line between the East and west halves of Lot 6 be run?

The answer to this question would depend on the circumstances. If the theoretical lot lines by proportion could be established without any doubt, then the line between the East and West half, should be run midway between the lines "by proportion," not regarding the possessory boundaries, but if the "Lot lines by proportion" are in doubt, or uncertain, owing to the data from which they are obtained being uncertain, then it would be reasonable to assume the "possessory boundaries" as correct, and run the line between the E. and W. $\frac{1}{2}$ midway between them.

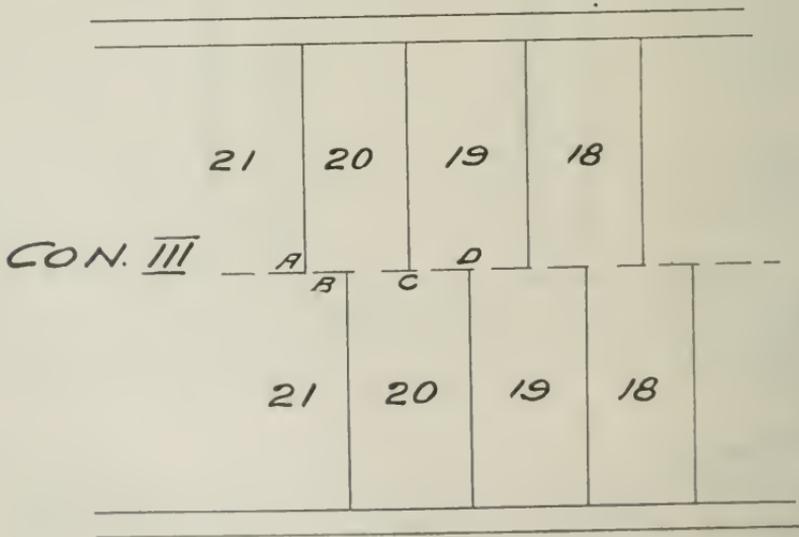
In the first case a special description would have to be drawn.

Question 2, Re Rear Line in Double Front.

Join A and B, B and C, C and D, this would cover all cases likely to arise.

Query.- To define the rear line between the N. + S. halves of Lot 20, what points do you connect.?

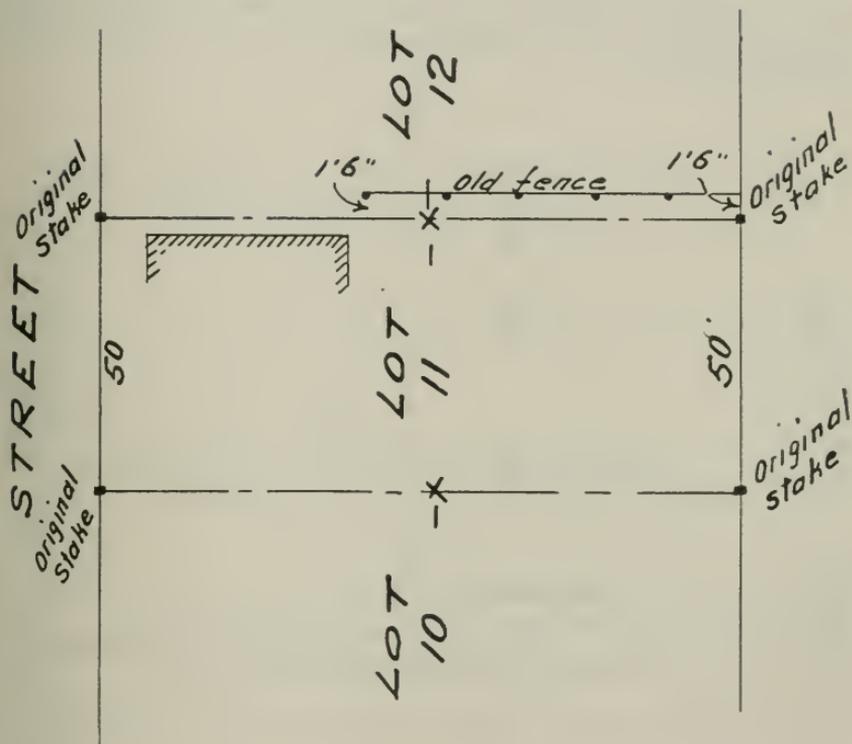
CON. IV.



CON. II

Question 3, Re Old Boundary, Partly Fenced Only.

Yes, if it has been standing over the 10 years.

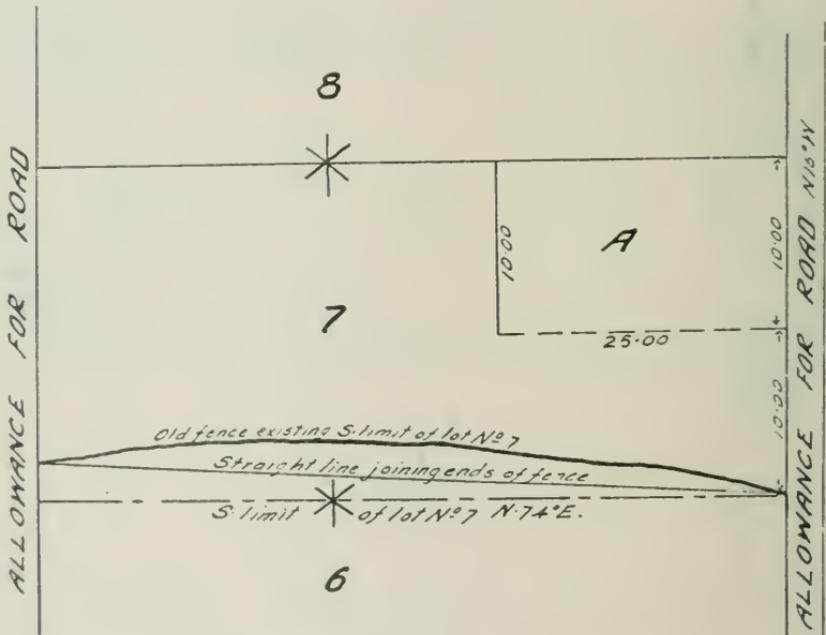


Does the old fence, which stands 1'6" north of the lot line, constitute a possessory boundary?

Question 4, Re Southern Limit Parcel A.

From the information given the south boundary of parcel "A" appears to be intended to be parallel to the "Last mentioned limit," which is the fence forming the existing southerly boundary of Lot 7, the course S 74° W does not signify anything.

No reason at all for running south limit of parcel A parallel to a straight line joining extreme ends of existing south boundary fence.

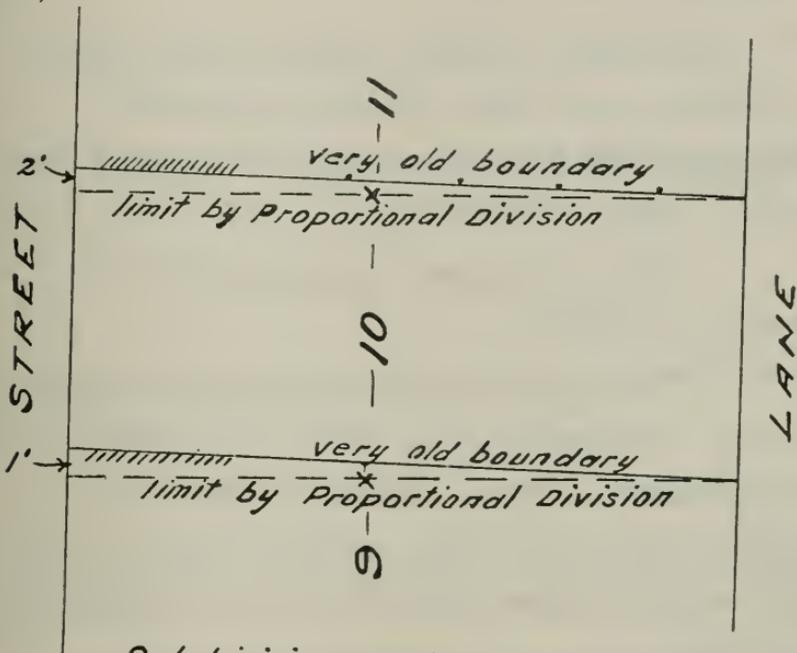


The South limit of parcel "A" is described as, Commencing at a point on the Westerly limit of the allowance for road 10.00 North of the fence forming the existing Southerly limit of lot N° 7. Thence Westerly ^{S 74° W} (parallel to the last mentioned limit) 25.00.

QUERY? How should this line be run? Does section 39 of the Act apply

Question No. 5, Re Lots 9, 10, and 11 and Old Possessory Boundary.

The answer to this question would depend largely on the circumstances. If the "limit by proportional division" can be established, without any doubt, then the descriptions should be drawn, of part of Lot 10, only and to include the part of Lot 11 (which would be claimed by possession or by a quit claim).



Subdivision made 55 years ago

outside limits of plan can be located and lot lines can be fixed by proportional division.

The existing limits of lot 10 are very old and constitute possessory boundaries.

Query.— In drawing description of this parcel, which is to be divided into two, is it proper to include the part of lot 11 which is not in the registered title?

But of the "limits by proportional division" are from any reason uncertain then it would be correct to assume the "very old boundaries" to be correct, for both sides, and draw the descriptions to them. The descriptions should specially refer to these old boundaries as forming the existing boundaries of the lot at the date of the survey.

Question 6, a, b, c, and d.

At what stage between its construction and total disappearance, through old age, does a fence cease to be a title boundary?

How can a possessory title be extinguished?

A fence line has been the boundary between properties for about 40 years, it has fallen down and been removed, say within 5 years, but the stumps and traces of it are plainly visible.

Query.-

Do these stumps and traces constitute a boundary by possession, the true boundary between the properties, according to the plan, being different from that shown by the said fence?

What is the "centre line" of a board fence and a wire fence?

(a) Can not state any limit of time, as long as evidences of the fence exist, such as stumps, or traces on the ground, they will be evidences of a boundary.

(b) Title by possession can be extinguished by the adjoining owner gaining possession, for the statutory period of 10 years.

(c) Yes, the fence was long enough existing to gain title by possession.

(d) Centre line of fences. The line between the posts and the boards, i.e., the board wall is on our party, and the posts are on the other.

This is in accordance with a judicial decision.

In a wire fence the custom appears to be to regard the line as being between the wire and the posts.

Question 7, Re Lots 13 in 1st and 2nd Concessions.

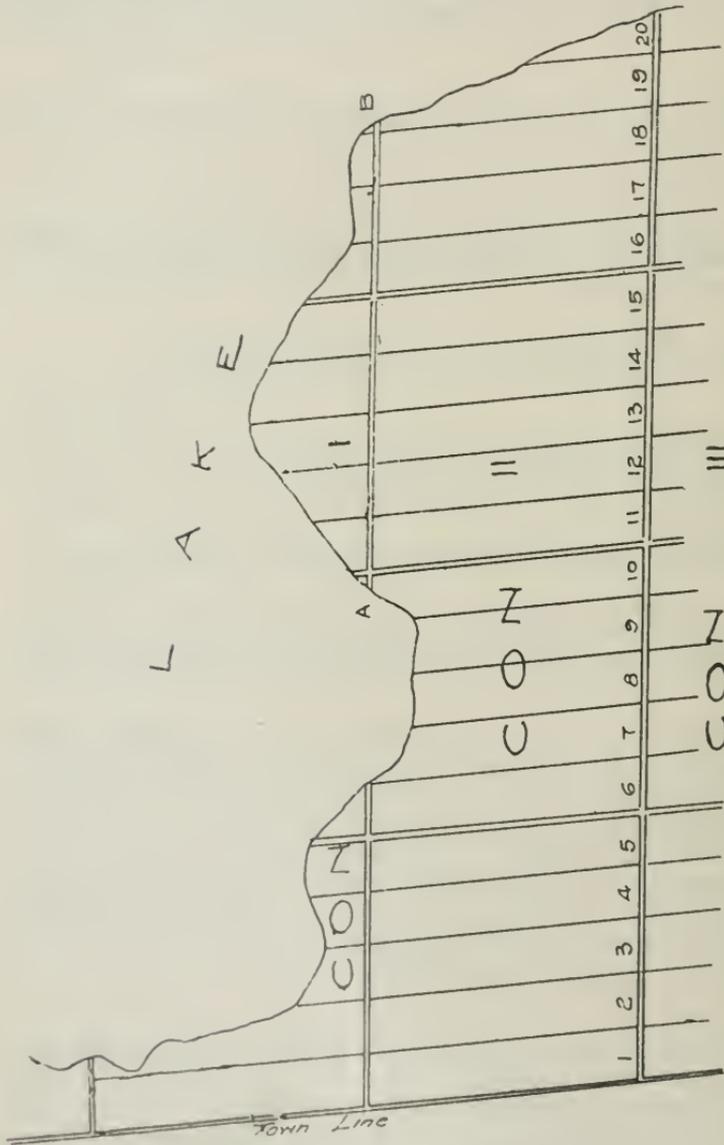
That is understood to be a single front concession and that the concession line between 1st and 2nd was run up to lot 6.

Beginning on concession line between concessions 1 and 2 at the last whole lot (between 6 and 7) run to rear of concession 2 on governing line, then lay off net distances for lots along rear of concession 2 to line between 10 and 11. Then run between 10 and 11 parallel to governing line to depth of concession 2 as given on original plan, etc., etc, then going from A to B along front of concession 2 (which will be at net depth from rear of concession 2), go net distances for lots 11, 12, 13, 14, etc., etc., parallel to governing line.

In winter on the ice. Continue along the concession line between 1st and 2nd concession from the west whole lot (6), laying off net distances from lots 7, 8, 9, 10, etc., crossing the lake, allowing for roads and run lines parallel to governing lines, allowing net depth of concession 2 from the rear.

The broken front lots in concession 1 run parallel to the governing line of concession 1.

There may be a special Act governing these concessions.

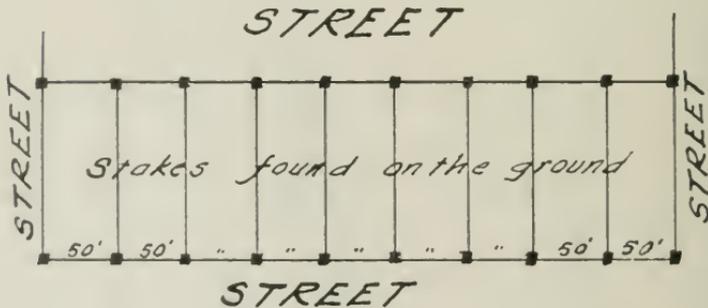
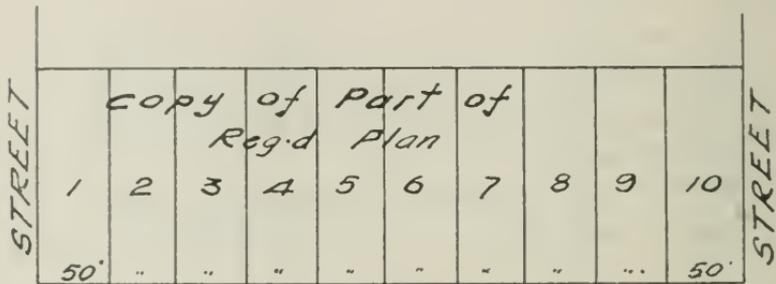


LINE A-B was not run in original survey.
How should lot 13 in Concessions I and II be laid out?

Question 9, 10 Lots on Plan, 9 on Ground.

If the stakes said to be found on the ground were numbered for the lots, then the numbering on the posts would govern the position of the lots.

If the posts were not numbered, would think it a good case to let alone, had better be rectified by the vendors.

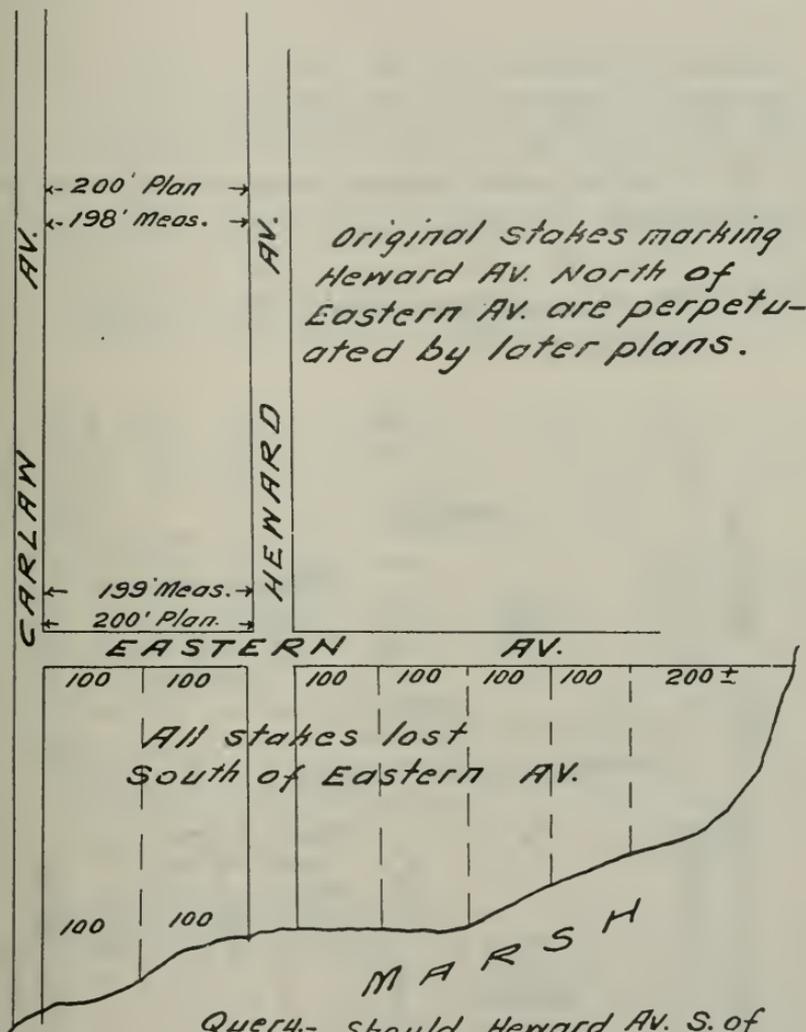


Query

How would you stake
out Lot 10?

Question 10, Re Heward Avenue.

Establish Heward Avenue by measuring net distance East of Carlaw Avenue on Eastern Avenue and run parallel to Carlaw Avenue.



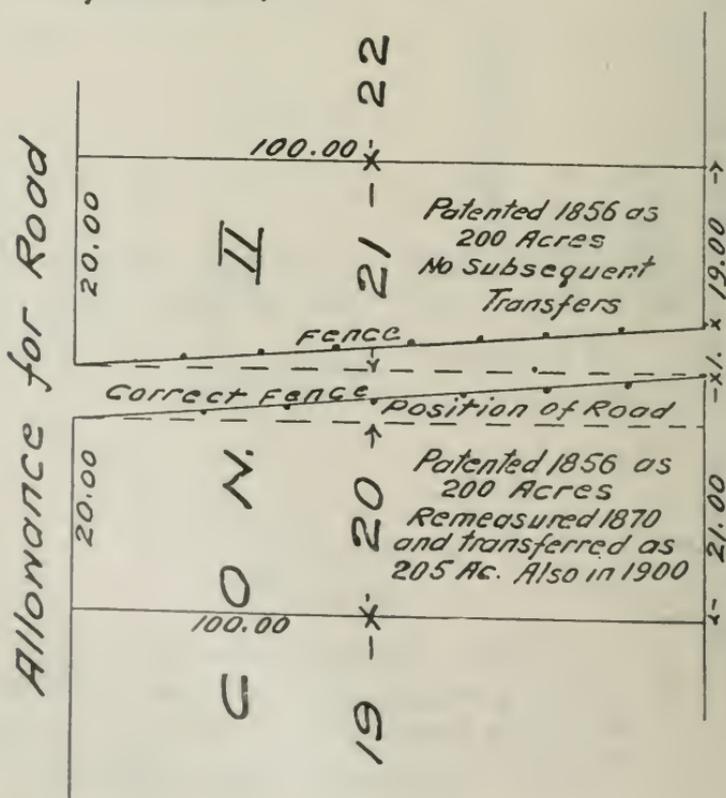
Query.- Should Heward Av. S. of Eastern Av. be fixed by production or by measuring net from Carlaw? Should it run parallel to Carlaw?

Question 11, Re Road Allowance.

Locate south limit lot 21 without reference to travelled road. Public, no doubt, have possession of the travelled road by usage.

The road between lots 20 and 21 was incorrectly located in the survey made after the granting of the patents in 1856 it is graded and paved and has been continuously travelled since that date.

Query.- How would you locate the S. limit of Lot 21?



DISCUSSION.

Re Question No. 1.

Mr. Christie—You would find the original stakes nearby in order to establish that line?

Mr. Murphy—That, the party who sent the question does not tell me.

Mr. Grant—So far as your survey is concerned if you cut that up in two equal halves you will hear nothing further in connection with your survey, but the moment you make your survey you have to go ahead and get a quit claim. In this particular case you stake out the 25 feet as occupied and you have no further trouble, whereas in the other case you probably go through a whole lot of trouble. The most natural way is to stake out the 25 feet, although it is not the correct way.

Mr. Murphy—That is what the committee thinks. They think if you have to draw a description which includes part of another lot, immediately your employer tries to file that description there is trouble in the Registry Office.

Mr. Gaviller—In these cases it very frequently happens that you find two boundaries, especially one resembling this where it is eight feet on each side, those lines might have been run some twenty or thirty years before, and you are called upon to divide that lot, the surveyor is called upon to take the best he can get. It is quite natural to suppose that the original surveyor who laid it out had information as to the original stakes. It is a matter of supposition that he has had far more opportunity than the man who comes years afterwards. We all know the further you go the more likely you are to entirely differ from the original on the ground.

Mr. Murphy—Question 2 refers to establishing the blind line between half lots in a double front concession. This sketch shows the north half of lot 20 to be not directly opposite the south half; in fact it is about half way in between, and the committee in considering that thing said, join the points A and B, B and C, C and D and that would be the line between the north and south half.

Mr. Smith—Each of those points are half way across the concession?

Mr. Murphy—Yes.

Mr. Ardagh—I come from a double front county in which there are a great many double front concessions, and when I went up for my examination I was specially coached on that question and I was told the proper way to do that was to join A-C and B-D and then if the part B-C didn't coincide, in that case there might be a piece of debatable land and it would have to be settled in a court of law.

Mr. Murphy—There might be a gap in between.

Mr. Ardagh—Yes. I believe I got full marks for answering the question in that way.

Mr. Murphy—That is a debatable question.

Mr. Dickson—Would you have A-B, C-D a straight line?

Mr. Ardagh—Oh, no, it might not be.

Mr. van Nostrand—Is there any statutory authority for that method?

Mr. Murphy—It was just the result of the experience of the Committee. You can read the authority into the Statute. The Statute says they are to be midway between the concessions, these lines being turned like that. (Indicates.)

Mr. van Nostrand—My recollection of the Survey Act is that you should join A-C and B-D and if there comes an overlap or a space between it has to be settled outside of the Survey Act as a matter of priority of title or who can fight the longest. That doesn't concern the surveyor; he has to abide by the Statute.

Mr. Gaviller—Your idea would be joining from side to side of each half. The way I look at that clause in the Act, it is to define the boundary that was not run in the original survey as far as caused by the two lines on the same side of the lot not meeting at the centre of the concession. When the old Act first came in nobody recognized jogs, they were not known; they are not shown on the original plans, and the farmers claimed they ought to have a line straight through from the front post to the rear post; didn't think anything about the bearing. When the Act says you are to run from the concession line to the centre of the concession on one side and then go back to the other concession and run half way back what are you to do? The act tells you to join those two

points. That makes a jog there and then there is a jog on the other side and then of course the blind line joins those.

Mr. Wilkie—Mr. van Nostrand, assuming your theory is correct and assuming we are in a township in which the lots do not butt each other, transposing the lower half of this figure twenty over on to nineteen, what would you do?

Mr. van Nostrand—I would still stick to the Statute.

Mr. Wilkie—Explain your method of sticking to the Statute. Supposing you undertake to do as you have said, join A-C and B-D, how are you going to do it?

The Statute will read in Mr. Gaviller's idea of it.

Mr. Smith—As near as I can recollect that thing was up on my final examination and my reply was that the centre of the concession is half way across on each lot line and that these points are joined—A-B, B-C and C-D would be all joined one after the other. Each point has got to be determined by chaining through from concession to concession.

Mr. van Nostrand—According to the diagram what point would you join?

Mr. Smith—A-B, B-C and C-D.

Mr. Murphy—We consider that would cover every case that would likely arise.

Mr. van Nostrand—Take the case of the surveyor defining the rear of the north half of lot 20, he is told in Section 35 how to fix the points, and then in the latter part of the section it says "a straight line adjoining the extremities and the division or side lines on any half lot in such concession so drawn shall be the true boundary of that end of the half lot which has not been bounded in the original survey." I don't see how you can get past that. He has to take the two sides of his half lot and join by a straight line.

Mr. Dickson—But supposing I go to define the north boundary of the south half of lot 20 and the lot line between 19 and 20, 20 and 21, I run the line all the way across and take the centre. But then coming to the north half of the line between lots 19 and 20, I take the centre of that also and I might find that a straight line from C-D would not strike the centre there; there would be another angle owing to the

crookedness of the concession, therefore I contend the line between 19 and 20, the north half, should be run across the whole concession and the centre of that taken also.

Mr. Smith—That practically means that you would join A-B C-D?

Mr. Dickson—Yes, join the whole of them, but it wouldn't be a straight line.

Mr. Ardagh—My position is exactly the same as Mr. van Nostrand according to the Act. It is important to me. I have never had any practical difficulty but if I was called to survey the north half of 20 at the point A-C and C-D the point B would have nothing to do with me at that time. If afterwards I was called upon to survey the south half I would join them together and then if the point came north of that it would be a question of priority of claim.

Mr. Murphy—Wouldn't that be the same thing? The same question arises in a mining claim. Suppose you have surveyed previously the north half of lot 20 and you have joined the line A-C, then you come again and want to survey the south half of lot 20 and you arrive at the point A-D, and as you say you find that your point A comes north of the line B-C, I should say that that line ought to terminate at the south boundary of the north half of 20 which you have done before; that would practically be the same thing. Then you would join the points C and D. That would be exactly the same thing as you do in a mining claim where the lines superimpose one another.

Mr. Ardagh—But in each case I have followed exactly the Act in the survey of the two halves, but there would be a discrepancy between the two surveys; there might be a little piece of land in there which would have to be settled by priority of claim.

Mr. Speight—Your line would not be following the centre of the concession.

Mr. Ardagh—No, it wouldn't necessarily follow the centre of the concession at point B; it would be the centre at A-C and at C-D, but owing to the peculiarities in the way, concession lines may be run—in this case there is not very much in the jog, but in some cases one lot is completely away from the other—one half does not butt on the other half and then this question of overlap arises which is a more important matter.

Mr. van Nostrand—It seems to me if that is the finding of the committee then we should bow to their decision, but we might reasonably ask them to have the Statute adjusted to fit their finding.

Mr. Murphy—We might do that.

The Vice-President—Question No. 3 is: "Does the old fence, which stands 1 foot 6 inches north of the lot line, constitute a possessory boundary?"

Mr. Murphy—That is another case of possessory boundary. We have lot 11 and that is shown marked out by stakes. To the north of that there is an old fence and on the north side there is a house, and the old fence which constitutes a boundary by possession is one foot six inches north of the line defined by the original stake. The question is does the old fence which stands constitute a possessory boundary?

Mr. Smith—Would not the old fence standing as it is be pretty good evidence that it started from an original post?

Mr. Murphy—The committee think that from all the information given there, that the old boundary already fixed has been standing over ten years.

There is some doubt about the question of enclosure in a case like that. We don't see any reason why it should not hold by possession in the usual way.

Mr. Grant—It does not constitute the north limit of the lot.

Mr. Murphy—No, no question about that; it is simply a straight encroachment.

Mr. Christie—Doesn't it depend a good deal on what kind of fence it is, if it is a slash fence through a wood.

Mr. Murphy—I don't think the kind of fence cuts any figure.

Mr. Ward—Hasn't there been any decisions as to whether a fence must enclose something to be the boundary?

Mr. Speight—The Committee were unable to find any case.

Mr. Murphy—I came across a rather peculiar question a couple of years ago here. There was a party applying for title to land under the Land Titles and we made a survey of the property, and the circumstances were that it was a lot shown on an old plan and after we had made the survey we found the adjoining fences were about two feet away from the boundaries. The man we were making the survey for had about four feet more enclosed in the frontage, but the peculiarity was he didn't put up these fences himself, they were put up by adjoining owners, their own fences, and this man who had the vacant lot had no front fence on the street nor a rear fence and the Master of Titles refused to take that as evidence of possession to give title. He said the man must have it enclosed; he must have his flag flying and show his occupation. He couldn't take advantage of a neighbor's mistakes in that way simply because they had put their fences up in the wrong place and he would come along and claim what was in between. I don't see the point myself.

Mr. Ward—That point has been raised?

Mr. Murphy—Yes. I can't see just what the point is. I know enclosure has something to do with it.

Mr. Bell—I know one case came up and was adjourned where a man said he had cut a lawn for ten years and the fence was not essential to his simple occupation. It is simply to show he is in possession.

Mr. Jackson—How would you describe the north line of lot 11?

Mr. Murphy—If I had to describe the north line of lot 11 I would certainly describe it as being at the place where you see the original stake, and if I wanted to write a description of the premises appurtenant to the house, I would take along the old fence.

Mr. Jackson—But from the street you would do what?

Mr. Murphy—Go along the true limit from the street, as far back as the fence went, and then jog along the fence, but there is no question about it the man would be making title to part of lot 12.

Mr. MacKay—I had a case that came up before the County Judge in Hamilton. The party on lot 12 had a house and lawn adjacent to the house on lot 11 and they had cut the

grass on that. The man who owned the house on lot 11 wanted to put a side walk on the north side of that house and the party that owned the house on lot 12 objected, claiming they owned the lawn right up to that house, and the Judge upheld that decision.

Mr. Murphy—That has happened quite frequently here. He didn't have a fence there but he used it.

Mr. van Nostrand—Subject to the easement of the eaves?

Mr. MacKay—No, they claimed they owned the land right up to the other man's house, right under the eaves.

Mr. Murphy—There is nothing strange in that. He has been doing some act for many years and shows possession.

Mr. Ward—Would it not be necessary for the man to show he had cultivated up to the fence, that it had not been lying idle, to acquire possession in that strip of one foot six inches.

Mr. Murphy—Had he it enclosed?

Mr. Ward—No, but would not cultivation be necessary to prove occupation?

Mr. Murphy—No, if he had done any act; if he had made use of it, if he had cut the grass, if he had kept it in order.

Mr. Dobie—The fence itself would be an indication he had had possession of it.

Mr. Murphy—I wouldn't think in that case that the continuation of that fence to the street would cut any figure.

Mr. Dobie—Along where the fence is; the fence itself would be evidence.

Mr. Murphy—Yes, the fence is evidence. I was thinking more about what Mr. McKay said, some person using up to the house.

Mr. van Nostrand—It seems to me this is a very important question and we have not, so far as I can find, any information that settles the point. It was, I think, a general understanding that a fence such as the one enclosing part of lot 12 would hold and make possessory title even without its being

actually enclosing a part by turning down to the house and taking it in. Then a few years ago the question was brought up as to whether it was necessary for a fence to actually enclose, and I don't know that this has ever been settled. I think for our own sake we should get some advice and find out what the court findings have been on that point, because it is important, and any surveyor might get in trouble by making a wrong decision on that.

Mr. Murphy—I think that is a good thing. I have had that feeling for a long time about enclosure.

Mr. Grant—In the case you cited before was the man in actual possession? Was he living on the property?

Mr. Murphy—No, he wasn't.

Mr. Grant—That would differ entirely from this here.

Mr. Murphy—He was simply dependent on the occupation of his neighbors. His neighbors had put up their fences and he wanted to take advantage of it.

Mr. Grant—That would extend the term from ten to twelve years; it would take twenty years to give title.

Mr. Murphy—Why do you say that?

Mr. Grant—There is law on that point; there are certain classes of property in which a term of ten years in actual possession gives title; in the other case it is twenty years.

Mr. Murphy—I think it only applies in the case of minors or infants, where property is held in trust for an infant I don't think the Statute runs against them. I believe so, I am not perfectly sure.

Mr. Speight—I might say that it was the intention of the committee if they could find a case bearing on this particular question that they would have it embodied in the report and I move that this be added to the report if we can find a case for the information of the members.

Mr. Ward—I understand Mr. Proudfoot had a case similar to this some years ago; I don't remember what the position was but I remember his discussing the case in the office. The impression he got was that he had failed because the fence did not enclose. I had a case similar to this on Simpson Avenue but there was an old gate. They laid a lot of stress on the point that the gate had always remained there.

Mr. Wilkie—The committee will add the case to the report when they find it.

Question No. 4.

Mr. Murphy—The question is “The south limit of parcel A is described as commencing at a point in the westerly limit of the allowance for road ten chains north of the fence forming the existing southerly limit of Lot No. 7, thence westerly south 74 degrees west parallel to the last mentioned limit 25 chains.” How should this line be run? Does Section 39 of the Act apply?

Mr. Speight—You want to read Section 44 perhaps.

Mr. Murphy—The committee didn't think either of those sections would apply in that particular case because the point seems to be this, that you see this fence line which they say constitutes the existing southerly limit of lot 7 is specified to be the starting point, and it is also specified that it shall be south 74 degrees west, parallel to the last mentioned limit. The committee's finding was that the last mentioned limit was the governing point and that it should run parallel to the fence. In other words we should have ten chains up from the road allowance to the point of commencement and that the south westerly corner of the parcel should also be ten chains away from the fence.

Mr. Ward—Joining these two points would not make it parallel to the fence because the fence is irregular.

Mr. Murphy—Make it reasonably so.

Mr. Rutherford—It looks to me as if they intended to cut off twenty five acres from the corner of that lot.

Mr. Murphy—We can't go into the intention. The only thing we are asked to say anything about is how should that line be run. That to the committee's mind is the governing line.

Mr. Smith—That is that existing fence?

Mr. Murphy—Yes. We didn't think that the course “south 74 degrees west” signified anything.

Mr. Smith—The fact of the bearing being there doesn't amount to anything?

Mr. Murphy—No; it is just parallel to that fence, and again we say no reason at all could be given for running to the south limit of parcel A parallel to a straight line joining the ends of the governing line or old fence. That seems to be one of the alternatives to the party who sent this question in.

Mr. MacKay—Would you have your south boundary irregular just the same way?

Mr. Murphy—Yes.

Mr. Burwash—Suppose there was a bunch of straight lines approximately and a parallel line to the straight lines, when you come down it wouldn't be the same length; it wouldn't be twenty-five chains long, it would be like two sides of a road, one side would be longer than the other.

Mr. Murphy—That is the conclusion we came to. Take that parcel this way, that the party was selling parcel A commencing a chain north of the existing boundary, and the obvious intention would be he would sell the front of that lot and reserve a road whereby he would get into the back end of his lot. If you were to run that in the other way it might happen you would cut off his road altogether by running it north 74 degrees east.

Mr. Rorke—You think the owner should suffer the results of having such a description in his title.

Mr. Murphy—Why should he?

Mr. Rorke—He should employ a proper party to draw up the description.

Mr. Murphy—What we have to do is to say how that boundary should be run with that description.

Mr. Anderson—They are both marked on the ground, they are both probably irregular in the governing line and you are supposed to join the ends of the line or join the ends of the fence in a similar manner.

Mr. Murphy—Section 39 which you are quoting is a very specific thing, it is intended for the governing line of a section or concession in a township, it is simply that the law is there to do that, but it doesn't apply to everything.

Mr. Dobie—it doesn't apply to where there is possessory title.

Mr. Murphy—Supposing you are on the easterly side of the township lot in which that governing road was and the road was crooked and you had to mark that parcel off about ten acres in the corner of it, you wouldn't establish your road by taking your straight line through the extreme ends, would you?

Mr. Anderson—I think so.

Mr. Smith—Not the position of the road?

Mr. Murphy—No. That is about a parallel case to this.

Mr. Smith—That seems to have been the puzzle of the man who ran up against this, exactly as to whether he would draw his bearing from one end to the other, and here is the question, does Section 39 apply? It all boils down to this, whether you would apply Section 39?

Mr. Murphy—The committee has decided we should take the existing boundary.

Mr. Smith—That question of bearing doesn't come in at all?

Mr. Murphy—No.

Mr. Anderson—If we were running a line on that lot parallel to the south limit of the lot which is the governing line, would we run it straight or follow the blazes?

Mr. Murphy—It depends on what your description was, if you got a description.

Mr. Anderson—Supposing the south lot were the governing line.

Mr. Murphy—I am supposing you are joining the governing line which is crooked and the part of the land you are to lay out does not extend the full length of that governing line.

Mr. Anderson—I don't see that it alters the conditions whether it does or not because you may have the next parcel to lay out afterwards.

Mr. Ardagh—Section 39 only applies to lines run under authority.

Mr. Murphy—Yes, it is very specific.

Mr. Ardagh—It can't refer to possessory boundaries.

Re Question 5.

Mr. Murphy—The question is: A sub-division made 55 years ago, outside limits of plan can be located and lot lines can be fixed by proportional division. The existing limits of lot ten are very old and constitute possessory boundaries. In drawing descriptions of this parcel, which is to be divided into two, is it proper to include the part of lot 11 which is not in the registered title?

Mr. Smith—It is a question of difference in the variants that make this two feet. It is a wedged shaped piece.

Mr. Murphy—There is a difference in bearing and difference in frontage. That question seems to the committee to be very much on the same plane as that first one was asked, and the conclusion the committee arrived at was this: (Reads answer of committee).

We thought it better to incorporate in the description that these old boundaries were existing at the time of surveying and give the date, and they constituted the existing boundaries at that time, so that a future conveyancer would see that thing and see the meaning of the change in description.

Mr. Smith—Two descriptions are evidently necessary.

Mr. Murphy—Yes, that was part of the question. The parcel as it stands there has to be conveyed in two parcels to different people and a description has to be drawn. In drawing a description we thought it better to draw a special description in that way.

Mr. Smith—If I were selling lot No. 10, I would simply give a quit claim deed. I don't think I could give a deed in fee simple; the Registrar wouldn't accept it.

Mr. Murphy—You are speaking of a quit claim of lot 9.

Mr. Smith—I am looking at the north limit of lot 10. If I had part of lot 11 I would give a deed of lot 10, and the part of lot No. 11 which I held I would simply give a quit claim deed of; I have no paper title behind it. I had the same thing on a registered plan last summer. I had part of a street in the same position and we had to settle it that way before the Registrar would accept the plans.

Mr. Murphy—What was in our mind was that the same thing would occur if there was doubt about the data under which you did that. That is, you had to assume certain starting points, you were not sure about those starting points; you were not any surer about them being correct than you were sure about the existing boundaries being correct.

Mr. Smith—You have to be sure of your survey.

Mr. Murphy—You can't.

Mr. Smith—We have got to have the strongest end of the stick; we have got to be surer about that than anything else. It is a question of judgment or experience on the part of the surveyor—the difference between years of experience and only a few.

Mr. Murphy—In the other case if the question was in doubt and you couldn't be any more sure of your starting points or data from which you got this proportional division than you were of the very old boundaries themselves, it would be safer to assume they are put up by the original stakes.

Mr. Speight—Especially in view of that last judgment in the Home Bank case; that says to take existing boundaries.

Mr. MacKay—Suppose the original plan showed 50 feet would you still call that lot 10?

Mr. Murphy—Surely.

Mr. Anderson—In spite of the fact there are discrepancies in the other lots on either side of it?

Mr. MacKay—Supposing the next lot, 9, was only 49 feet, would lot 9 only have 49 feet and lot 10 51 feet?

Question No. 6.

Mr. Murphy—“At what stage between its construction and total disappearance, through old age, does a fence cease to be a title boundary? How can a possessory title be extinguished? A fence line has been the boundary between properties for about 40 years, it has fallen down and been removed, say within five years, but the stumps and traces constitute a boundary by possession, the true boundary between the properties according to the plan, being different

from that shown by the said fence? What is the "centre line" of a board fence and a wire fence."

(Reads committee's answer.)

Mr. Ward—Wouldn't you have to go back into the abstracts to find the same owner didn't own the land?

Mr. Murphy—No, we didn't do that.

Mr. Ward—Wouldn't it be necessary.

Mr. Murphy—Of course we were thinking of this case; they were separate owners. In the case of the same ownership the thing would not constitute a boundary at all.

Mr. Sewell—Do I understand the claim by possessory title is necessary to be proved? What I mean to say is if you occupy by a fence you occupy for ten years on your neighbor, the onus of proof is on you: you have got to prove that ten years or else you don't get it. If you pull down the fence where are you? You have no evidence at all? If that is pulled down ten years it goes back to the last owner.

Mr. Murphy—If a man gains a title by possession to property by occupying it or having it fenced in for over ten years he acquires a title for all time.

Mr. Sewell—But he has got to prove it.

Mr. Murphy—The proof is his boundaries, if he can prove time of occupation. And as I take the second clause of the question "how can a possessory title be extinguished?" It means the questioner wants to know how the man who has acquired title to his property can be ejected or dispossessed?

Mr. Sewell—Suppose he pulls down the fence and it remains down ten years, then it goes back to the owner?

Mr. Murphy—We think not. The first owner who has acquired title by possession, has acquired a title for all time and he can only be dispossessed of that by some person taking steps to fence in his ground. The mere fact of pulling down his fence doesn't alter the question at all. He is still theoretically in possession. As long as he can prove his boundary he has title to that land. The evidence of that possession and boundary are the stumps and remains of that fence.

Mr. MacKay—Supposing no stumps exist, just the holes where the posts were, would that constitute evidence?

Mr. Murphy—Yes. I think there is a case where a man had possession for ten years and took the fence away. That does not dispossess him of the land if he had possession.

Mr. Murphy—The last part of the question is "What is the centre line of a board fence and a wire fence?"

(Reads committee's answer.)

Mr. Grant—There is a decision given in 1897 on a survey made on the west side of Euclid Avenue (Cook v. Tate). The fence line was the centre line of the perpendicular board; that went up for appeal and was confirmed by three judges sitting on it.

Mr. Speight—Justice Ferguson was sitting on that case. He gave his reason because the carpenter when he took the face of the scantling had something definite to go on, and the scantling was let in to the face of the post.

Mr. Grant—In our own practice we generally recognize the face of the board, between that and the scantling. I know there is that discrepancy of half an inch; you can't swear to a fence line anyway to half an inch.

Mr. Jackson—What is the centre line of a board fence when nothing but stumps are in existence?

Mr. Murphy—If you could by some means discover which side the boards were then it would be the face of the posts nearest where the boards were.

Mr. Jackson—Why should the line post be one thing when the fence is standing up and another thing when the posts are in the ground and the fence has fallen down?

Mr. Murphy—Oh, no, not at all.

Mr. Anderson—If that was a legal fence originally the boards were on the other man.

Mr. Murphy—I don't understand your question.

Mr. Anderson—It would all depend on who put up the line fence. The man who put up the fence would put the boards on the other man.

Mr. Grant—A party fence is supposed to have one half of the posts on one side and the other half of the posts on the other side. If one man put up the fence he would naturally

put the posts on himself as he has no right to trespass on the other side, consequently the side away from himself would be the legal fence line.

Mr. Murphy—About 999 fences out of the thousand in this neighborhood are built straight through, the posts are entirely on the one side.

Mr. Ward—Yes, and usually the man who builds the fence puts the posts on his neighbor.

Mr. Murphy—I believe the whole purpose of that question is to get some conclusion as to what we would consider the centre line of a fence, and that is the committee's idea that the centre line of the fence is the line between the posts and boards.

Mr. Grant—The builder who was building took the inside of the scantling that runs along the top of the fence and he wants to know what was the centre line, where could it have gone to?

Mr. Murphy—I would interpret the description just exactly as I have said. The centre line of the boards or the line between the posts and boards.

Mr. Smith—Go back to the construction of the fence, the man who built the fence is given his marks; he stretches a chalk line from one end to the other and he brings the face of his post up to the chalk line. That is the practice. I never heard of any court decision before, but acting on that I always took the face of the post for the lot line or the line that we are after. That means the boarding was all on one side and the posts on the other.

Mr. MacKay—In a board fence that has been up a number of years and tilted over you take the face of the posts at the ground, do you not?

Mr. Murphy—I think I would use my judgment. You sometimes see a thing that is about on an angle of 45 degrees and you have got to consider how much that thing is below the ground.

Mr. MacKay—In other words, you size up where you thought the fence would have been when you thought it was originally constructed.

Mr. Murphy—That is a thing I could hardly give any definite answer on, you would just have to judge by circumstances.

Mr. Jackson—In connection with a wire fence it would be the same answer, take the line between the wire and the post.

Mr. Rutherford—In a lot of the old fences the posts are put up and iron tubing is run through the centre of the posts. The centre of the posts would be taken there.

Mr. Murphy—Yes. That is quite a common method here.

Re Question No. 7.

Mr. Murphy—The question is: "Line A-B was not run in original survey. How should lot 13 in concessions 1 and 2 be laid out?" The committee had to assume that this question referred to a single front concession and that the concession line between the first and second concession was run up to lot 6. Towards the left hand side of the paper you see is put "town line" and the inference is the concession line between 1 and 2 was surveyed up as far as lot 6. The committee's reply to that was. (Reads same.) Now the committee had to assume something because the question does not say what kind of concession it is.

Mr. Ward—It is single front.

Mr. Murphy—We have to assume that part of the concession which lies between lots 1 and 6 has been run and was surveyed and on that basis that would be one way of doing it. I might say that it is quite possible in a question of that kind there may be some special act in the township.

Mr. Sewell—There is a case in North Gwillimbury which is very much like that and in that there is a special act which will tell you what to do.

Mr. Murphy—We consider it to be governed by Section 34, Sub-section 2.

Re Question No. 8.

Mr. Murphy—The peculiarity in that thing is this, that Pine Avenue and Beach Avenue are given bearings, which

make a right angle, there is one whole lot and all the rest are fractional lots; they are broken by the curved line and there is no bearing put on those lots. You have a way of laying out the first lot at the corner because you see the dimension front and rear is the same, but beyond that there is no way of locating those lot lines except you assume they are drawn at right angles to Beach Avenue or drawn parallel to Pine Avenue, or you can put them in by measurement along the front and along the rear of the lots, and then there is the difficulty of that curved road.

Mr. Smith—How does the man find that that angle is $91^{\circ} 15'$ if there are no posts on the ground?

Mr. Ward—That was measured from original posts.

Mr. Murphy—How should the line between 98 and 99 be run? Should you take for granted it is parallel to Pine Avenue or at right angles to Beach Avenue? . The plan doesn't tell you how.

Mr. Smith—We all know if there is anything on the ground that we are sure of, what is on the ground is going to stay there even if it contradicts the plan.

Mr. Murphy—That is right about the angle exceeding the 90 degrees and we were able to discover original posts in front. There was no question about the determining the front on Beach Avenue at all, and also we were able to find posts up to the north-west corner of 97 on Balsam Avenue, and practically all those lines were parallel to Pine Avenue and the inference I drew from the thing was that 99 and 98 ought to be parallel to Pine Avenue also. Then it was complicated in some way by another surveyor coming in there and he had run the line between 98 and 99 and he took the view the plan showed it at right angles to Beach Avenue and he ran it at right angles and it made a difference of about four feet I think in the rear. (Reads committee's answer.)

Mr. Ward—I think the judgment was that the line was run at right angles, but the judge didn't hold it was right, but he said that the defendant had not proved that it was not right.

Mr. Ardagh—I note that the line between 98 and 99 is run from Balsam Avenue to Beach Avenue and not the other way?

Mr. Murphy—No.

Mr. Ward—That is on the original plan more or less.

Mr. McKay—What would you do in that case?

Mr. Murphy—Define that measurement from the north and then from the south and see what difference there would be. That 272 feet more or less is rather a weak point.

Mr. Fitton—How would you get the 273 feet around that curve?

Mr. Murphy—I don't know; I never tried it. I think the question is just interesting in that way that it shows how you can get a judicial decision on a very slender ground.

Re Question No. 9.

Mr. Murphy—A plan is filed showing lots 1 to 10 fronting on a street and lying in a block between two streets. The plan as I say shows ten lots. A surveyor goes on the ground and he finds all these lots staked out and finds the streets existing, and he is only able to find nine lots; there is a lot short actually as the thing is staked out on the ground, the stakes are there. The question is how would you stake out lot 10? One of the committee refers to that thing as a nebular hypothesis.

Mr. Rorke—How can you stake out something that does not exist?

Mr. Murphy—You have to have the different circumstances put before you. If a man has got a deed of lot 10 how are you going to find his lot? Supposing he has the first deed and lot 10 is the first lot sold in that block, the Vendor has to deliver lot 10 to the purchaser and the surveyor has to find it for him.

Mr. Smith—How did he get his deed if that part of the plan was not registered?

Mr. Murphy—It was registered. (Reads committee's answer.) If they were not numbered there would be no way of identifying any particular lot there.

Mr. Dickson—It seems to me in the lower part there is no lot 10, lot 9 comes up to the street.

Mr. Murphy—Yes. We will assume he did sell lot 10. That is an actual case and it is not five miles away from the city.

Mr. J. van Nostrand—The actual case is that on the corners of the block there were stakes. When I got on the ground I found all the stakes; they were a different style of stake to those on the corner of the block. There was no question as to there being a shortage of about 30 feet. The lots were 25 foot lots, and the lots actually marked out on the ground were one lot short of what the plan showed and the difference was taken up in these lots. The lots were irregular on the ground and they divided up the other five feet of deficiency when they were marking it out and dropped one lot as well.

Mr. Murphy—Were not the stakes numbered?

Mr. J. van Nostrand—They were very small stakes.

Mr. Speight—The block corners were numbered.

Mr. Wilkie—In your explanation of that do you take it to mean that you found where it called for ten lots of 50 feet each the block would be 500 feet, but you found it was divided into nine lots equivalently, practically about 66 feet each.

Mr. J. van Nostrand—Not exactly, but approximately.

Mr. Ward—The principle is the same.

Mr. Wilkie—The man who made the sub-division instead of staking it into ten lots sub-divided it into nine?

Mr. Ward—Yes.

Mr. J. van Nostrand—We couldn't find out whether the men who did the staking were those who made the plan of sub-division.

Mr. Murphy—Isn't it also the case that you couldn't get ten lots of the registered dimensions in that block at all?

Mr. J. van Nostrand—No.

Mr. Ward—Don't you think if the man sells lots 1 to 7 and gives a registered deed and the Registry Office recognize these seven lots, then he sells lot 10 and he gives a registered deed and lot 10 is recognized, and then he sells lot 9 and that joins on to lot 7, and he afterwards sells 8 and there is no 8 on

the ground, he is trying to sell something he hasn't got, therefore the last lot he conveys is the lot that is missing.

Mr. Murphy—That thing ought to be rectified by the vendors.

Mr. Le May—As to the question before us, has it got anything to do with whether he could sell it or not? The question is could we stake it out?

Mr. Murphy—No.

Mr. Le May—You are asked to stake lot 10 according to plan.

Mr. Murphy—Would you like to take the responsibility?

Mr. Le May—You don't know what lots are being sold and you are making a plan and you are asked to stake lot 10 and it happens to be the lot next the street and you stake it out that way.

Mr. Murphy—Suppose you had instructions and were told to go and stake out lot 10 and you go out on the ground and you find these original stakes, and supposing in that block somewhere there was a lot of building going on, piles of lumber and excavations for sewer and things like that which obliterated the middle stakes and made it impossible for you to measure through that block, but you found two or three or four of those original stakes and identified the street and identified them by marking on the corner stakes? It is quite possible for a man to set to work and stake out lot 10 next to the street in good faith and then it would be perhaps a couple of years before it would be found that someone was pinched.

Mr. Fullerton—You have a registered plan of ten lots, are you bound to lay off 50 feet for each lot in any case? You have the registered plan on the ground and you find the posts at the street angle on the one side and at the street angle on the other side of the block and nothing in between.

Mr. Murphy—You mean only the exterior boundaries of the lot?

Mr. Fullerton—Yes.

Mr. Murphy—I would think in that case by making a proportional division you could bring in lot 10.

Mr. Ward—The Master of Titles has held that although stakes were shown only at the block corners on the registered plan if it was proved that the surveyor had staked out all the lots prior to the plan being registered then they had the status of original stakes.

Mr. Murphy—The point was that the thing had been staked before the plan was filed.

Re Question No. 10.

Mr. Murphy—This question refers to Carlaw Avenue on the left hand, Heward Avenue north of Eastern Avenue seems to have been laid out at the same time with these lots that you see south of Eastern Avenue going down to the marsh. Heward Avenue north of Eastern Avenue is said to be perpetuated by the later plan. The question is: "Should Heward Avenue south of Eastern Avenue be fixed by production or by measuring net from Carlaw? Should it run parallel to Carlaw?" The plan shows it is put 200 feet away from Carlaw Avenue on the north side and south side because 100 feet are shown perpendicular between lots and the only thing against that method of laying it out is the difference in the distance from Carlaw Avenue and that part just north of Eastern Avenue.

Mr. Smith—You didn't produce?

Mr. Murphy—No, not produced.

Re Question No. 11.

This question is concerning a road allowance which has been located in the incorrect place. The question is: "The road between lots 20 and 21 was incorrectly located in the survey made after the granting of the patents in 1856. It is graded and paved and has been continuously travelled since that date. How would you locate the south limit of lot 21?"

The inference is that the extra five acres is composed of that part of the original road allowance which is fenced in by the diagonal south boundary of the existing fence. It is clear if lot 20 has the advantage of five acres that lot 21 to the north will suffer a loss of five acres.

Mr. Dickson—There was an original road allowance between lots 20 and 21 but the road was not built on the proper

road allowance. No length of possession will give them a title against the Crown.

Mr. Murphy—It is the other way round. The possession of the public will hold against the owner of lot 21.

Mr. Smith—The owner of lot 20 has got the first claim on that original road allowance and the road will stay where it is because the Council have got it there and will keep it there.

Mr. Dickson—I would run the true line between 20 and 21 then and he has simply got the road built on his land. They have been trespassing to that extent, but they have been trespassing so long that it is no longer a trespass. (Mr. Murphy reads committee's answer.) The public appear to have a user of 60 years.

Mr. Dickson—I think I must differ from Mr. Smith; as the owner of 21 has been trespassed upon he is entitled to that triangular piece instead of lot 20.

Mr. Sewell—Isn't it a case where the Crown has the fee after 60 years?

Mr. Murphy—The party is asking the committee more on the question of title. It is not what will be done with the road or whether he will move it, there is no question he can't do that, the Municipal Act would knock him out altogether. The conclusion the committee came to was, that for the sake of the title they would run the south boundary of 21 in the proper place and not regard the road whatever, and the public would have the use of that road up to the fence boundary, simply by time, but owner of lot 21 would not get it. In other words his proper boundary was away outside of the road, but the long user of the public would prevent him taking any occupation.

Mr. Murphy—I have a question here which a student sent me referring to mining claims. The committee thought it was worth while to draw an illustration of that and show the thing.

Mr. Vice-President—I want to draw your attention to the manner in which these questions have been brought before the Association at this meeting; this is somewhat of an innovation and different from the usual practice. These questions were submitted some time ago and printed and I think were

mailed to all members of the Association so that all the members have had them in their possession for a time and have been considering them more or less and knew something about them when they came here. The Executive thought, or some members of it, that your attention might be drawn to this and they would like an expression of opinion from those present as to whether this was a preferable method of dealing with the questions which were handed in for the question drawer; and it is also suggested that if the members think it is good policy that any members who may have questions that they would like to have answered by the Committee or brought before the Association. If they would send them in early in the season so that they can be dealt with similarly to the manner in which these have been dealt with it would be a good thing: that is diagrams prepared which can be properly printed and sent to the members so that they would have some time to consider them before coming to the meeting. When Mr. Murphy is through with this question we will be glad if any member, who feels disposed, will express his opinion as to this method, as to whether it is advisable to continue it or not.

I will read a statement that has been put in my hand: Mr. George F. Henderson, K.C., of Ottawa, Drainage Referee is in the city and has consented to address the Association informally on the subject of the Drainage Laws this afternoon; he is expected about four or four thirty after the conclusion of business at Osgoode Hall. The members may bring up for informal discussion with him any points of difficulty under the Drainage Act. If there are any persons who have any questions they would like to ask him I am sure Mr. Henderson will be glad to answer them.

Mr. Dickson—I think that is a capital arrangement to have those questions printed and sent around to the members. They were sent to me about a month ago and I was very glad to have them and I hope you will continue to do the same.

Mr. Murphy—(Referring to question previously mentioned.) A represents a mining claim which was staked out in July, 1910, and the patent was given I presume, and you see here are the prospector's lines and here is the line of his survey posts, Nos. 1, 2, 3, and 4, and subsequently, in August, 1910, a month or more later the adjoining claim is staked out. The prospector gets his No. 4 post inside of the survey line of the first staked claim, and if you join No. 1 post and No. 4

post in the statutory manner it will include part of the first staked claim. The question was whether the No. 2 post of the first staked claim should be joined to No. 4 post of the second staked claim, or whether they should join No. 1 and No. 4 and simply exclude that part of the first staked claim which is included in these two lines?

Mr. Rorke—My opinion would be that the survey of claim A is made by drawing a straight line from post No. 1 to post No. 2 and from 2 to 3, then claim B cannot include anything within the survey lines of claim A, but is entitled to anything staked which is outside of claim A which would come within the staking of claim B, therefore I think in the survey of B the boundary should be a straight line from 3 to 4, that this part should be included in B and should go over to the limit of A.

Mr. Murphy—In other words you think the outline of parcel B should be an irregular line?

Mr. Rorke—Yes.

Mr. Murphy—I understand it is permissible to join No. 2 and 3 and the claim would be recorded in that way if it was sent that way.

Mr. Rorke—If the sketch to record showed it that way. Yes.

Mr. Fullerton—In claim B the prospector knows where the posts are and the surveyor has nothing to do except to join the posts, then if it is overlapped by the claim that has been staked before, the part that is overlapped does not belong to claim B so that you would join 3 and 4.

Mr. Murphy—It is never claimed that this should include any part of the first claim.

Vice-President—Is there any further discussion on the manner of circulating these questions among the members?

Mr. Gaviller—I don't think there can be much doubt as to it being a great favor to the Association to have them beforehand. If we have the money to do it I think it would be better to continue it, it is a matter of expense.

Mr. Dickson—I move that the system of printing the questions received by the Surveying Committee and circulating them among the members be continued in the future.

Mr. Jackson—Is it intended that the motion should include drainage questions as well?

Mr. Vice-President—They have not been considered and don't know that they are under discussion at the present time. If you want the same principle followed it could be done.

Mr. Watson—That would include the whole question drawer as it is, no matter what committee it is.

On the motion being seconded by Mr. Smith the same was put to the meeting and adopted.

At 12.45 p.m. the meeting adjourned.

REPORT OF COMMITTEE ON TOPOGRAPHICAL SURVEY.

In submitting this report on Topographical Survey your chairman has to acknowledge that so far as the work is being carried on by the Province his information is an unknown quantity. The Militia Department is carrying on the work of mapping the country on a scale of 1-63360 to which they are adding more or less territory every year. Their survey work terminated early last season owing to the war. The Geological Survey also has a mapping department and are producing maps on the same scale, viz., one mile to the inch, some of which show the topographical features by means of contours. The Geodetic Survey of Canada in addition to the trigonometrical work, and precise levelling which has already covered a considerable area in the older provinces of the Dominion, has begun the work of mapping the country on a large scale viz., 1-1000 or more than 5 inches per mile. An area of 175 square miles in the vicinity of Ottawa has been accurately surveyed and data obtained for producing maps on the scale above mentioned with 25 foot contours. With such maps in ones possession ditches for drains, roads, tramways, railways, canals, etc., could be laid out from the map and full estimates as to cost, etc., determined in the office without spending months on the ground doing preliminary work before such information can be obtained. The value of such maps to the country does not need a long argument to demonstrate.

I have been able to secure from the Chief of the computing staff for the Geodetic Survey, Mr. Wm. Tobey, D.T.S.,

through kindness of Dr. King the Superintendent, an advance copy of the computations showing the geographic co-ordinates at the triangulation points in the Province of Ontario including also a few points in Quebec which were computed as parts of the same nets used in adjusting the figures. Mr. Tobey kindly prepared a brief explanation of methods employed in obtaining the co-ordinates, also a note which accompanied the records explaining the slight difference between the Canadian datum and the North American datum upon which the computed values are based, which communications I enclose herewith. I think this table will be an acquisition to the Annual Report as it gives the accurate latitudes and longitudes of points accessible to surveyors nearly all over the Province. As the tables are self explanatory, the usual symbols being used for latitude and longitude also "a¹" for the azimuth at observation station and "a²" back azimuth from second to first. I beg to submit those records without further comment.

THOS. FAWCETT,

Chairman.

Feb. 15th, 1915.

T. Fawcett, D.T.S., Geodetic Survey.

Dear Sir,—In reply to your request for an explanation of methods employed in obtaining the Geog. Co-ordinates which I submitted to you last year, I beg to submit the following general description of such methods and to express the hope that a more detailed description, accompanied by formulae and illustrated by sketches, will be given in the near future in the report of the Superintendent of the Geodetic Survey.

To avoid an ideal or visionary distribution of the errors as much as possible and so place errors in their most possible place, the adjustments were done by large figures or nets, thus barring the adjustments of small figures like quadrilaterals, pentagons, etc. These nets would contain anything from 30 to 100 conditions (the conditions up to the present being only angle and side equations). The angle equations were in all cases satisfied to .0001" and the side equations within corresponding limits. Base and Laplacian conditions are now being added to the above conditions and such introduction will thus necessarily bring in corrections to the Geog. Co-ord. data in your possession.

The triangulation thus adjusted was laid down on Clarke's Ellipsoid of 1866 and the Geographical Co-ordinates computed by the expansive formulae given in the treatises on Higher Geodasie and which formulae in many cases contained 10, 13 and 20 terms in the ϕ , λ and α series respectively. These formulae proved most satisfactory, for by their aid, starting from one corner of a triangle as initial point, the ϕ , λ and α can be computed around some of the largest triangles (of 75 miles to each side) and check on the values at the initial point to within .001 of ϕ , λ and α .

In these adjustments and probable errors of nearly all external sides of the triangulation nets were determined, thus showing to all who may use each side, the degree of reliance that may be placed upon them.

Yours truly,

WM. TOBEY.

February 19th, 1914.

Thos. Fawcett, Esq., D.L.S., Trafalgar Building, Ottawa.

Dear Sir,—Accompanying this letter I am sending you lists of Geographical Co-ordinates of points of the Geodetic Survey. You will notice that I have given them on two data, viz., the Canadian datum and the North American datum. Thus there are two sets of values for the majority of Geodetic points.

The values of the Canadian datum are dependent entirely upon the observed ϕ at Vankleek Hill. Hence the station error of that station will affect all of such values.

The values on the North American Datum are dependent upon the American line Royal to Bellevue. All such values depend upon the station Meades Ranch in Kansas, whose station error is most probably very small (See "Figure of Earth and Isostasy," by U.S.C. and G.S.) Such N. A. values are however only preliminary because they depend only upon the American line Royal—Bellevue, and not also upon our two bases at Coteau and Belleville as well as two Laplace points. The final N. A. values, however, should not differ very much from the enclosed preliminary ones.

Yours truly,

WM. TOBEY.

GEOGRAPHICAL CO-ORDINATES. CANADIAN DATUM. CONDITIONAL ADJUSTMENT.

Computed by E. E. Y., Checked by J. E. R.

Place	Latitude ϕ_1	Longitude λ_1	α_1	Distance	α_2	Latitude ϕ_2	Longitude λ_2	Place
Kilkenny	45-58-18.250	73-48-02.727	59-57-43.715	4.728562	240-23-40.685	46-12-40.167	73-12-01.625	Dusable
			128-29-17.629	4.9688056	309-09-17.211	45-26-48.404	72-52-10.515	Yamaska
			162-14-31.534	4.7317209	342-23-34.072	45-30-34.404	73-35-25.197	Royal
Royal	45-30-34.404	73-35-25.197	21-04-49.030	4.9224813	201-21-36.317	46-12-40.167	73-12-01.625	Dusable
			96-48-02.207	4.7542381	277-18-32.185	45-26-48.404	72-52-10.515	Yamaska
			127-17-16.382	4.9254932	307-53-32.321	45-02-49.901	72-44-22.849	St. Armand
			152-44-55.495	4.9574257	333-07-14.111	44-46-59.152	73-03-56.969	Bellevue
			196-34-23.887	4.7549411	16-25-37.530	45-01-07.854	73-47-46.161	Covey Hill
Covey Hill	45-01-07.857	73-47-46.165	56-30-10.044	4.9391470	237-09-38.309	45-26-48.404	72-52-10.515	Yamaska
			87-27-34.079	4.9207146	268-12-25.014	45-02-49.901	72-44-22.849	St. Armand
			114-10-04.918	4.8017840	294-41-09.839	44-46-59.152	73-03-56.969	Bellevue
Bellevue	44-46-59.152	73-03-56.969	41-09-08.730	4.5915820	221-22-57.731	45-02-49.901	72-44-22.849	St. Armand
St. Armand	45-02-49.901	72-44-22.849	347-06-41.917	4.6586242	167-01-09.803	45-26-48.404	72-52-10.515	Yamaska
			52-46-18.619	4.6901092	233-07-28.840	45-18-46.101	72-14-32.115	Orford
			86-52-49.536	4.5415193	267-11-33.538	45-03-48.173	72-17-54.808	Owl's Head
			09-52-59.193	4.4482525	189-05-22.988	45-18-46.101	72-14-32.115	Orford
			87-25-59.647	4.7398417	267-55-36.255	45-05-00.212	71-36-05.538	Hereford
Owl's Head	45-03-48.173	72-17-54.808	351-01-15.057	4.8807419	170-54-29.318	46-49-21.910	71-29-32.824	Belair
Thetford	46-08-51.536	71-20-13.335	51-44-13.743	4.9179412	232-21-04.678	46-36-20.554	70-29-19.144	Standon
			114-56-47.800	4.9171230	295-38-24.244	45-49-48.102	70-22-22.270	Limiers
			167-43-03.346	4.9004516	347-52-21.366	45-26-54.266	71-07-14.959	Megantic
Limiere	45-49-48.102	70-22-22.270	234-11-21.081	4.8579949	53-12-15.916	45-26-54.266	71-07-14.959	Megantic
			351-07-30.798	4.9379320	174-02-29.817	46-36-20.554	70-29-19.144	Standon
Standon	46-36-20.554	70-29-19.144	287-48-55.884	4.9055663	107-05-05.297	46-49-21.910	71-29-32.824	Belair
Old East Base	45-17-28.939	74-12-40.054	309-25-47.361	4.3935650	129-15-19.888	45-22-08.760	74-17-55.281	Rigaud
			236-32-50.493	4.2836248	56-24-07.545	45-30-36.990	74-39-59.246	Newton
Newton	45-22-08.760	74-25-18.595				45-16-25.007	74-37-34.012	Alexandria

GEOGRAPHICAL CO-ORDINATES, CANADIAN DATUM, CONDITIONAL ADJUSTMENT.

Computed by E. E. Y., Checked by A. E. R.

Place	Latitude ϕ_1	Longitude λ_1	α_1	Distance	α_2	Latitude ϕ_2	Longitude λ_2	Place
Vankleek	45-30-36.900	74-39-59.216	173-08-16.367	4.4231023	353-09-59.744	45-16-25.007	71-37-34.042	Alexandria
			205-55-37.776	4.4222335	25-49-20.018	45-17-46.455	74-48-49.762	Maxville
East Base	45-17-28.130	74-12-08.261	268-29-54.322	4.4837333	88-13-13.838	45-30-08.744	75-03-21.804	Plantagenet
			337-05-22.847	4.2871381	157-01-15.879	45-27-05.936	74-17-55.281	Rigaud
			62-54-56.963	4.7300795	213-21-06.511	45-30-34.404	73-35-25.197	Royal
			133-18-45.686	4.6434238	313-36-02.344	45-01-07.854	73-47-46.161	Covey Hill
			190-34-18.887	4.3490386	10-32-05.916	45-05-36.782	74-15-16.680	Huntingdon
			235-01-51.307	4.2848402	54-56-16.834	45-13-35.119	74-19-59.154	West Base
			296-47-51.886	4.2384763	116-38-29.825	45-22-08.760	74-25-18.595	Newton
West Base	45-13-35.119	74-19-59.154	336-19-57.726	4.2384763	156-16-10.675	45-22-08.760	74-25-18.595	Newton
			06-08-15.199	4.4009877	186-09-43-306	45-27-05.936	74-17-55.281	Rigaud
			118-26-44.019	4.6824578	298-49-33.781	45-17-28.939	74-12-07.054	Old East Base
			157-18-27.194	4.2044461	337-16-48.138	45-01-07.854	73-47-46.161	Covey Hill
Huntingdon	45-05-36.782	74-15-15.680	336-49-00.540	4.5228109	156-41-52.495	45-22-08.760	74-15-16.680	Huntingdon
			355-01-11.043	4.6015110	174-59-17.652	45-27-05.936	74-17-55.281	Newton
			48-10-07.765	4.8428730	228-38-26.986	45-30-34.404	74-17-55.281	Rigaud
			102-47-27.481	4.5686207	283-06-55.013	45-01-07.854	73-47-46.161	Royal
			274-48-36.367	4.6613834	94-23-55.082	45-07-36.023	74-50-06.512	Covey Hill
			297-19-38.527	4.6937116	116-55-49.515	45-17-46.455	74-48-49.762	Bonville
			304-32-13.312	4.5491898	124-16-23.917	45-16-25.007	74-37-34.042	Maxville
			282-53-54.862	4.4695796	102-38-10.840	45-30-36.990	74-37-34.042	Alexandria
Rigaud	45-27-05.936	74-17-55.281	33-40-24.863	4.8426325	214-01-48.045	45-58-18.256	74-39-59.246	Vankleek
			83-07-09.339	4.7462990	263-37-27.594	45-30-34.401	73-48-02.727	Kilkenny
			140-27-18.481	4.7938981	320-48-42.977	45-01-07.854	73-35-25.197	Royal
			225-27-43.264	4.1241108	46-22-27.557	45-22-08.760	73-47-46.161	Covey Hill
			232-28-28.816	4.5105236	52-14-30.047	45-16-25.007	74-25-18.595	Newton
			247-00-39.939	4.6424025	66-38-40.092	45-17-46.445	74-37-34.042	Alexandria
							74-48-49.762	Maxville

GEOGRAPHICAL CO-ORDINATES. CANADIAN DATUM. CONDITIONAL ADJUSTMENT.

Computed by E. E. Y., Checked by J. E. R.

Place	Latitude ϕ_1	Longitude λ_1	α_1	Distance	α_2	Latitude ϕ_2	Longitude λ_2	Place
Maxville	...45-17-46.455	71-48-49.762	99-37-20.936	4.1743360	279-45-21.109	45-16-25.007	74-37-34.042...	Alexandria
			185-05-12.050	4.2768932	05-04-17.578	45-07-36.023	74-50-06.512.....	Bonville
			242-49-56.682	4.2510887	62-41-20.315	45-13-22.136	75-00-56.727.....	Roxboro
			289-03-11.531	4.6825758	108-38-21.545	45-26-10.260	75-23-43.563.....	Navan
Bonville	...45-07-36.023	71-50-06.512	320-28-21.348	4.4734406	140-18-00.434	45-30-08.744	75-03-21.802..	Plantagenet
			307-01-38.515	4.2496693	126-53-57.343	45-13-22.136	75-00-56.727.....	Roxboro
			45-05-21.462	4.3647465	225-14-15.393	45-16-25.007	74-37-34.042..	Alexandria
Roxboro	...45-13-22.136	75-00-56.727	248-11-20.569	4.6550151	67-48-41.017	45-04-13.801	75-32-54.505..	North Mtn.
				4.8620439		45-29-24.300	75-51-49.564..	King Mtn.
			308-40-41.983	4.5804242	128-24-29.935	45-26-10.260	75-23-43.563.....	Navan
			354-12-46.165	4.4946498	174-11-02.931	45-30-08.744	75-03-21.802..	Plantagenet
Navan	...45-26-10.260	75-23-43.563	196-31-21.430	4.6271506	16-24-50.135	45-04-13.801	75-32-54.505..	North Mtn.
			279-27-17.857	4.5695568	99-07-16.072	45-29-24.300	75-51-49.564..	King Mtn.
			354-29-05.084	4.3372797	174-27-56.239	45-37-51.206	75-25-20.030	Buckingham
			74-22-28.553	4.4400051	254-36-59.518	45-30-08.744	75-03-21.802..	Plantagenet
Buckingham	45-37-51.206	75-25-20.030	116-24-82.103	4.5045202	296-40-13.406	45-30-08.744	75-03-21.802..	Plantagenet
			245-44-30.472	4.5781759	65-25-35-555	45-29-24.300	75-51-49.564..	King Mtn.
King Mtn.	...45-29-24.300	75-51-49.564		4.8003750		45-30-08.744	75-03-21.802..	Plantagenet
			151-56-25.275	4.7225263	332-09-52.306	45-04-13.801	75-32-54.505..	North Mtn.
			197-57-22.824	4.7882628	417-47-09.530	44-57-50.930	76-06-13.449.....	Elmsley
Elmsley	...44-57-50.930	76-06-13.449	74-41-31.673	4.6564464	255-05-05.571	45-04-13.801	75-32-54.505..	North Mtn.
			133-50-41.601	4.6413260	314-07-32.592	44-41-25.865	75-42-19.371	Elizabethown
			177-49-07.266	4.4900596	357-49-44.924	44-11-10.406	76-05-20.030.....	Bastard
			220-30-06.513	4.6044573	40-16-10.239	44-41-18.445	76-25-59.715.....	Crosby
			281-47-35.363	4.6584454	101-23-34.681	45-02-17.430	76-40-10.680.....	Lavant
Elizabeth	...44-41-25.865	75-42-19.371	16-18-23.970	4.6435440	196-25-02.557	45-04-13.801	75-32-54.505..	North Mtn.
			227-02-22.832	4.5022803	46-50-03.579	44-29-42.670	75-59-52.336..	Lansdowne
			269-14-08.500	4.4829753	88-57-57.549	44-41-10.406	76-05-20.030.....	Bastard

GEOGRAPHICAL CO-ORDINATES, CANADIAN DATUM, CONDITIONAL ADJUSTMENT.

Computed by E. E. Y., Checked by J. E. R.

Place	Latitude ϕ_1	Longitude λ_1	α_1	Distance	α_2	Latitude ϕ_2	Longitude λ_2	Place
Bastard	44-41-40 406	76-05-20 030	161-09-52, 418	4,3507422	341-23-42, 471	44-29-42, 670	75-53-52, 336...	Lansdowne
			270-38-30, 715	1,4361725	90-23-58, 921	44-11-18, 445	76-25-59, 715,	Crosby
			311-18-14, 823	1,7846581	130-53-39, 946	45-02-47, 430	76-40-10, 680,	Lavant
Crosby	44-41-18 135	76-25-59 715	121-41-45, 797	1,6095957	302-00-06, 181	44-29-42, 670	75-59-52, 336	Lansdowne
			240-05-17, 906	1,5139585	29-56-38, 517	44-26-02, 393	76-38-19, 928,	Portland
			280-40-01, 585	4,5146155	100-22-53, 731	44-11-31, 970	76-50-20, 591,	Olden
			334-55-59, 738	4,6430261	154-45-59, 402	45-02-47, 430	76-40-10, 680,	Lavant
Lavant	45-02-47, 430	76-40-10, 680	51-46-44, 047	4,9041047	232-21-05, 074	45-29-24, 300	75-51-49, 564,	King Mtn.
			201-39-06, 021	4,5607180	21-31-55, 544	44-44-31, 970	76-50-20, 591,	Olden
			220-15-24, 568	4,7687585	39-55-10, 453	44-38-32, 195	77-08-52, 368,	Kaladar
Olden	44-44-31, 970	76-50-20, 591	155-01-52, 775	4,5770235	335-10-18, 687	44-26-02, 393	76-38-19, 928,	Portland
			245-42-27, 215	4,4294606	65-29-25, 304	44-38-32, 195	77-08-52, 368,	Kaladar
			265-17-24, 620	4,6654674	84-52-49, 970	44-42-23, 500	77-25-16, 160,	Grimsthorpe
Portland	44-26-02, 393	76-38-19, 928	82-10-59, 939	4,7114835	262-37-56, 344	44-29-42, 670	75-59-52, 336,	Lansdowne
			220-08-51, 611	4,7634300	39-49-20, 058	44-02-02, 570	77-06-19, 340,	Hallowell
			256-31-40, 691	4,6635428	76-08-05, 711	44-20-09, 588	77-12-02, 834,	Tyendinaga
			299-57-05, 076	4,6684650	119-35-39, 825	44-38-32, 195	77-08-52, 368,	Kaladar
			347-13-20, 767	4,5366538	167-09-21, 359	44-20-09, 588	77-12-02, 834,	Tyendinaga
Hallowell	44-02-02, 570	77-06-19, 340	282-43-28, 191	4,6623584	102-20-05, 568	44-07-25, 607	77-39-55, 612,	Murray
			237-44-24, 520	4,6423668	57-24-57, 686	44-07-25, 607	77-39-55, 612,	Murray
Tyendinaga	44-26-02, 393	77-12-02, 834	337-01-36, 985	4,6507583	156-52-20, 721	44-42-23, 500	77-25-16, 160,	Grimsthorpe
			07-01-50, 725	4,5352091	187-04-04, 198	44-38-32, 195	77-08-52, 368,	Kaladar
			108-08-26, 643	4,3582241	288-19-59, 325	44-38-32, 195	77-08-52, 368,	Kaladar
Grimsthorpe	44-42-23, 500	77-25-16, 160	196-48-35, 264	4,8304040	16-38-19, 770	44-07-25, 607	77-39-55, 612,	Murray
			228-58-54, 366	1,7244246	48-37-46, 389	44-23-32, 196	77-55-23, 608,	Asphodel
			260-02-05, 588	1,6691686	79-47-39, 082	44-37-56, 490	78-00-02, 173,	Methuen
			310-05-30, 752	1,7529090	129-42-14, 911	44-07-25, 607	77-58-14, 657,	Faraday
			145-18-13, 687	4,5592766	325-29-01, 329	44-07-25, 607	77-39-55, 612,	Murray
Asphodel	44-23-32, 196	77-55-23, 608	201-19-37, 189	1,5242318	21-13-15, 595	44-06-42, 686	78-04-30, 450,	Haldimand
			235-17-52, 139	1,8047372	54-50-28, 662	44-03-48, 802	78-34-39, 862,	Clarke
			256-05-08, 195	4,6882744	75-40-15, 633	44-17-06, 580	78-30-59, 187,	Emily
			347-02-21, 018	4,4371094	166-59-08, 726	44-37-56, 490	78-00-02, 173,	McLaren

GEOGRAPHICAL CO-ORDINATES. CANADIAN DATUM. CONDITIONAL ADJUSTMENT.

Computed by E. E. Y., Checked by J. E. R.

Place	Latitude ϕ_1	Longitude λ_1	α_1	Distance	α_2	Latitude ϕ_2	Longitude λ_2	Place
Haldimand	44-06-42.696	78-04-30.450	87-32-40.845	4.5161546	267-49-47.535	44-07-25.607	77-39-55.612	Murray
			262-34-58.592	4.6086379	82-13-59.672	44-03-48.862	78-34-39.862	Clarke
			298-46-50.456	4.6041419	118-28-22.868	44-17-06.580	78-30-59.187	Emily
Clarke	44-03-48.862	78-34-39.862	234-13-28.484	4.8102377	53-46-25.092	43-43-18.524	79-13-41.349	Scarboro
			265-09-40.002	4.6023268	84-48-54.789	44-01-55.572	79-04-30.860	Uxbridge
			314-19-16.215	4.6312730	134-03-13.093	44-19-55.006	78-57-41.392	Mariposa
			11-14-20.848	4.3997597	191-16-54.621	44-17-06.580	78-30-59.187	Emily
Emily	44-17-06.580	78-30-59.187	238-01-24.806	4.7227071	57-38-03.370	44-01-55.572	79-04-30.860	Uxbridge
			278-29-01.920	4.5649769	98-10-22.743	44-19-55.006	78-57-41.392	Mariposa
			313-00-33.176	4.5826059	162-54-38.202	44-36-51.310	78-39-26.087	Somerville
			11-39-20.284	4.8827328	191-47-34.461	44-57-28.019	78-19-15.592	Monmouth
			46-35-55.891	4.7507971	226-57-36.547	44-37-56.490	78-00-02.173	Methuen
Methuen	44-37-56.490	78-00-02.173	325-04-48.110	4.6459779	144-51-15.438	44-57-28.019	78-19-15.592	Monmouth
			03-01-25.306	4.6495033	183-02-41.109	45-01-59.849	77-58-14.657	Faraday
			72-58-35.780	4.4603922	253-13-27.327	45-01-59.849	77-58-14.657	Faraday
Monmouth	44-57-28.019	78-19-15.592	214-59-53.768	4.6677807	34-45-41.016	44-36-51.310	78-39-26.087	Somerville
			258-29-57.494	4.6448065	78-06-46.124	44-52-38.215	78-52-06.115	Anson
Anson	44-52-38.215	78-52-06.115	150-09-17.484	4.5272895	330-18-12.517	44-36-51.310	78-39-26.087	Somerville
			186-59-20.402	4.7856770	6-55-24.966	44-19-55.006	78-57-41.392	Mariposa
			37-33-05.402	4.8663853	58-14-17.819	44-31-54.376	79-39-33.943	Oro
Mariposa	44-19-55.006	78-57-41.392	195-18-30.909	4.5979696	217-45-24.748	44-36-51.310	78-39-26.087	Somerville
			229-50-57.811	4.7976560	49-25-59.062	44-01-55.572	79-04-30.860	Uxbridge
			292-01-25.218	4.7770201	111-32-06.327	43-57-58.320	79-33-33.113	King
Uxbridge	44-01-55.572	79-04-30.860	199-40-24.756	4.5634955	19-34-03.204	43-43-18.524	79-13-41.349	Scarboro
			259-29-08.017	4.5966272	79-08-57.762	43-57-58.329	79-33-33.113	King
			320-10-31.559	4.8603833	139-46-03.187	44-31-54.376	79-39-33.943	Oro
King	43-57-58.320	79-33-33.113	135-27-05.057	4.5800910	315-40-50.591	43-43-18.524	79-13-41.349	Scarboro
			352-46-30.582	4.8017593	172-42-18.799	44-31-54.376	79-39-33.943	Oro
Muskoka						44-52-38.215	78-52-06.115	Ansen

GEOGRAPHICAL CO-ORDINATES. CANADIAN DATUM. CONDITIONAL ADJUSTMENT.

Computed by Rey, Checked by E. G. G.

Place	Latitude ϕ_1	Longitude λ_1	a_1	Distance	a_2	Latitude ϕ_2	Longitude λ_2	Place
Stanley	46-36-20.554	70-29-19.111			111-49-02.260	46-48-23.225	71-12-28.875	Quebec
Thetford	46-08-51.626	71-20-13.335			187-45-08.194	46-48-23.225	71-12-28.857	Quebec
Amelias	40-00-51.713	77-28-34.236	309-11-59.261			44-07-25.607	77-39-55.612	Murray
Sidney	44-13-48.977	77-33-52.648	120-52-20.468			44-02-02.570	77-06-19.840	Hallowell
Presqu	43-59-55.820	77-40-35.622	3-39-59.154			44-07-25.607	77-39-55.612	Murray
Scotch	43-54-01.614	77-32-32.606	338-21-22.077			44-07-25.607	77-39-55.612	Murray
Pt. Peire	43-50-22.765	77-09-20.250	10-33-51.626			44-02-02.570	70-06-19.340	Hallowell
West Pt.	43-53-59.944	77-16-44.265	270-13-51.243			43-54-01.614	77-32-32.606	Scotch Bonnet
Computed by J. McD.								
Observatory	45-23-39.949	75-42-53.069	40-54-40.221	4.5419538	221-07-11.469	45-37-51.206	75-25-20.030	Buckingham
			312-24-35.594	4.1980720	132-18-13.315	45-29-24.300	75-51-49.564	King Mtn.
			79-22-07.302	4.4052031	259-35-45.997	45-26-10.260	75-23-43.563	Navan
			322-51-04.194	4.1980783	142-45-51.384	45-30-27.103	75-50-12.012	Hull
			345-32-13.663	4.5612143	165-27-13.535	45-42-41.702	75-49-53.478	Wakefield
			66-53-08.252	4.5457807	247-10-53.675	45-37-51.206	75-25-20.030	Buckingham
			1-00-45.840	4.3556983	181-00-59.081	45-42-41.702	75-49-53.478	Wakefield
			328-50-50.776	4.4819798	148-42-11.880	45-44-27.410	76-02-17.973	Masham
			105-33-35.543	4.5202243	285-51-09.564	45-37-51.206	75-25-20.030	Buckingham
			356-29-59.673	4.4008046	176-29-08.523	45-56-15.272	75-51-04.795	Hincks
			315-41-23.330	4.5944071	135-26-08.674	45-57-50.613	76-11-08.484	Alleyn
			281-32-00.918	4.2155450	101-23-07.860	45-44-27.410	76-02-17.973	Msham
			33-32-45.992	4.4190079	213-40-48.922	45-56-15.272	75-51-04.795	Hincks
			335-16-36.110	4.4363606	155-10-15.439	45-57-50.613	76-11-08.484	Alleyn
			135-27-19.092	4.6758520	315-45-46.262	45-37-51.206	75-25-20.030	Buckingham
			4-14-39.659	4.3725516	184-15-38.200	46-08-56.898	75-49-43.474	Blake
			276-35-53.619	4.4164868	96-21-28.475	45-57-50.613	76-11-08.484	Alleyn
			53-11-42.464	4.5370834	223-27-07.708	46-08-56.898	75-49-43.474	Blake

GEOGRAPHICAL CO-ORDINATES, CANADIAN DATUM, CONDITIONAL ADJUSTMENT.

Computed by J. McD., and E. E. Y.

Place	Latitude ϕ_1	Longitude λ_1	α_1	Distance	α_2	Latitude ϕ_2	Longitude λ_2	Place
Scarboro	43-43-18.524	79-13-41.349	226-51-32.308	4.2410270	46-45-00.928	43-36-52.191	79-23-08.168	Gibraltar L H
Grimsby	43-11-29.370	79-34-05.170	17-24-00.232	4.6925490	197-31-31.677	43-36-52.191	79-23-08.168	Gibraltar L H
Barton	43-14-35.479	79-50-57.698	42-09-09.416	4.7465138	222-28-17.150	43-36-52.191	79-23-08.168	Gibraltar L H
Nassagaweya	43-30-25.547	79-55-39.650	74-34-24.906	4.6570078	254-56-49.723	43-36-52.191	79-23-08.168	Gibraltar L H
Scarboro	43-43-18.524	79-13-41.349	247-20-24.016	4.7874748	66-51-26.872	43-30-25.547	79-55-39.650	Nassagaweya
King	43-57-58.320	79-33-33.113	205-08-56.829	4.8130912	24-54-55.067	43-11-29.370	79-34-05.170	Grimsby
Grimsby	43-57-58.320	79-33-33.113	223-35-52.460	4.8643133	43-10-13.531	43-14-35.479	79-50-57.698	Barton
Nassagaweya	43-30-25.547	79-55-39.650	210-19-32.380	4.7709874	30-04-15.275	43-30-25.547	79-55-39.650	Nassagaweya
Murray	44-07-25.607	77-39-55.612	35-17-36.580	4.2484577	215-22-58.240	44-15-13.930	77-32-14.133	Oak Hill
Oak Hill	44-15-13.930	77-32-14.133	77-43-06.700	3.9648969		44-08-28.947	77-33-10.142	West Base
East Base	44-10-44.420	77-23-34.842	128-45-52.070	4.1527696		44-10-44.420	77-23-34.824	East Base

Computed by E. E. Y.

Orford	45-18-46.101	72-14-32.115	310-48-33.698	4.4712890	130-36-19.138	45-29-11.424	72-31-43.766	South Roxton
Carmel	46-30-01.714	72-37-41.048	130-43-40.385	4.8780875	311-15-44.524	46-03-17.130	71-53-48.642	Arthabasca
Belair	46-49-21.910	71-29-32.824	249-17-37.263	4.5357138	68-59-15.635	46-42-46.006	71-54-44.834	Port Neuf
Dusable	46-12-40.167	73-12-01.624	178-19-15.838	4.8656615	358-20-27.002	45-33-04.109	73-10-22.499	St. Hilaire
Orford	45-18-46.101	72-14-32.115	265-29-19.298	4.4937009	85-12-25.804	45-17-21.218	72-38-17.928	Brome
Yamaska	45-26-48.404	72-52-10.515	245-40-24.294	4.3367841	65-28-27.923	45-21-26.309	73-08-56.580	Johnson
Brock's Mon.	43-09-36-531	79-03-11.561	347-15-37.580	4.8054594	167-08-24.770	43-43-15.460	79-13-40.997	Scarboro
			274-48-07.850	4.6231873	94-26-59.814	43-11-26.284	79-34-04.767	Grimsby
			278-18-16.281	4.8151779	97-45-31.490	43-14-32.383	79-50-57.288	Hamilton
			298-46-01.014	4.9066819	118-10-40.904	43-30-22.454	79-55-39.256	Nassagaweya

Computed by H. B. K.

GEOGRAPHICAL CO-ORDINATES, NORTH AMERICAN DATUM, CONDITIONAL ADJUSTMENT.

Computed by F. W. O. W. and E. E. Y., Checked by E. E. Y.

Place	Latitude ϕ_1	Longitude λ_1	α_1	Distance	α_2	Latitude ϕ_2	Longitude λ_2	Place
Kilkenny	45-58-45.436	73-48-02.761	59-57-40.225	4.7284578	240-23-37.444	46-12-37.384	73-42-01.703	Dusable
Royal	45-30-31.591	73-35-25.200	162-14-28.044	4.7317225	312-23-30.599	45-30-31.591	73-35-25.200	Royal
	.....	.....	21-04-46.557	4.9224829	201-21-32.776	46-12-37.384	73-42-01.703	Dusable
	.....	.....	96-47-58.734	4.7542397	277-18-48.673	45-26-45.622	72-52-10.537	Yamaska
	.....	.....	127-17-12.909	4.9254948	307-53-28.826	45-02-47.117	72-44-22.844	St. Armand
	.....	.....	263-37-24.121	4.7463006	83-07-05.912	45-27-03.092	74-17-55.253	Rigaud
Covey Hill	45-01-05.026	73-47-46.115	87-27-30.649	4.9207161	268-12-21.518	45-02-47.117	72-44-22.844	St. Armand
	.....	.....	114-10-01.488	4.8017855	294-40-57.379	44-46-56.348	73-03-56.928	Bellevue
	.....	.....	320-48-39.547	4.7938997	140-27-15.056	45-27-03.092	74-17-55.253	Rigaud
Bellevue	44-46-56.348	73-03-56.928	41-09-05.270	4.5915835	221-22-54.235	45-02-47.117	72-44-22.844	St. Armand
St. Armand	45-02-47.117	72-44-22.844	347-06-38.422	4.6586258	167-01-06.292	45-26-45.622	72-52-10.537	Yamaska
	.....	.....	52-46-15.124	4.6901108	233-07-25.299	45-18-43.344	72-14-32.147	Orford
	.....	.....	86-52-46.041	4.5415209	267-11-30.014	45-03-45.410	72-17-54.818	Owl's Head
	.....	.....	09-02-55.669	4.4482541	189-05-19.447	45-18-43.344	72-14-32.147	Orford
	.....	.....	358-09-33.242	4.8964936	267-55-32.688	45-04-57.479	71-36-05.575	Hereford
Hereford	45-04-57.479	71-36-05.575	42-45-09.077	4.7435032	223-05-38.407	45-47-28.458	71-38-02.755	Ham
	.....	.....	297-05-04.413	4.7615347	116-37-47.803	45-18-43.344	71-07-15.043	Megantic
	.....	.....	41-30-23.917	4.8534372	221-56-26.904	45-47-28.458	71-38-02.755	Orford
Orford	45-18-43.344	72-14-32.147	79-51-52.202	4.9499736	260-39-45.777	45-26-51.562	71-07-15.043	Megantic
	.....	.....	287-04-48.315	4.7104837	106-38-00.855	45-26-45.622	72-52-10.537	Yamaska
	.....	.....	08-59-33.951	5.0741034	189-09-59.062	46-29-58.958	72-37-41.170	Carmel
	.....	.....	343-16-51.928	4.9482339	163-02-37.541	46-12-37.384	73-12-01.703	Dusable
Carmel	46-29-58.958	72-37-41.170	234-04-37.378	4.7367598	53-39-46.304	46-12-37.384	73-12-01.703	Dusable
	.....	.....	111-03-30.487	5.0288943	291-59-32.009	46-08-48.835	71-20-13.475	Thetford
	.....	.....	30-06-29.957	4.6603577	210-19-18.737	46-08-48.835	71-20-13.475	Thetford
Ham	45-47-28-458	71-38-02.755	133-27-55.968	4.7429103	313-49-56.556	45-26-51.562	71-07-15.043	Megantic

GEOGRAPHICAL CO-ORDINATES. NORTH AMERICAN DATUM. CONDITIONAL ADJUSTMENT.

Computed by F. W. O. W.

Place	Latitude ϕ_1	Longitude λ_1	α_1	Distance	α_2	Latitude ϕ_2	Longitude λ_2	Place
Honville	45-07-33.155	74-50-06.438	307-01-35.138	4.2496709	126-53-53.972	45-13-19.862	75-00-56.653	Roxboro
			45-05-18.086	4.3647481	225-14-11.995	45-16-22.148	74-37-33.987	Alexandria
Roxboro	45-13-19.262	75-00-56.653	248-11-17.198	4.6550167	67-48-37.693	45-04-10.903	75-32-54.398	North Mtn.
Navan	45-26-07.372	75-23-43.491	196-31-18.073	4.6271522	16-24-46.809	45-04-10.903	75-32-54.398	North Mtn.
			279-27-14.500	4.5695584	99-07-12.742	45-29-21.393	75-51-49.480	King Mtn.
			345-29-01.727	4.3372813	174-27-52.873	46-37-48.319	75-26-19.973	Buckingham
			74-22-25.196	4.4400067	254-36-56.137	45-30-05.870	75-03-21.747	Plantagenet
Ruckingham	45-37-48.319	75-25-19.973	116-24-28.737	4.5046218	296-40-10.025	45-30-05.870	75-03-21.747	Plantagenet
			245-44-27.105	4.5781775	65-25-32.225	45-29-21.393	75-51-49.480	King Mtn.
King Mtn.	45-29-21.393	75-51-49.480	151-56-22.445	4.7225279	332-09-48.982	45-04-10.903	75-32-54.398	North Mtn.
			197-57-19.478	4.7882639	17-47-06.244	44-57-48.006	76-06-13.310	Elmsley
			232-21-01.728	4.9041063	51-46-40.794	45-02-44.485	76-40-10.526	Elmsley
Elmsley	44-57-48.006	76-06-13.310	74-41-28.387	4.6564480	255-05-02.246	45-04-10.903	75-32-54.398	North Mtn.
			133-50-38.315	4.6413276	314-07-29.297	44-41-22.953	75-42-19.225	Elizabeth
			281-47-32.076	4.6584470	101-23-31.428	45-02-44.485	76-40-10.526	Elmsley
Elizabeth	44-41-22.953	75-42-19.225	16-18-20.675	4.6435456	196-24-59.232	45-04-10.903	75-32-54.398	North Mtn.
			227-02-19.537	4.6022819	46-50-00.315	44-29-39.748	75-59-52.162	Lansdowne
			269-14-05.205	4.4829769	88-57-54.278	44-41-07.480	76-05-19.869	Bastard
Bastard	44-41-07.480	76-05-19.869	161-09-49.148	4.3507438	341-13-39.207	44-29-39.748	75-59-52.162	Lansdowne
			270-38-27.444	4.4361741	90-23-55.672	44-41-15.505	76-25-59.540	Crosby
			311-18-11.552	4.7846600	130-53-36.694	45-02-44.485	76-40-10.526	Lansdowne
Crosby	44-41-15.505	76-25-59.540	210-05-14.657	4.5139601	29-56-35.296	44-25-59.442	76-38-19.726	Portland
			280-39-58.836	4.5146171	100-22-50.506	44-44-29.013	76-50-20.406	Olden
			334-55-56.489	4.6430277	154-45-56.150	45-02-44.485	76-40-10.526	Lansdowne
Lavant	45-02-44.485	76-40-10.526	201-89-02.768	4.5607196	21-31-52.319	44-44-29.013	76-50-20.406	Olden
			220-15-21.816	4.7687601	39-55-07.252	44-38-29.226	77-08-52.164	Kaladar
Portland	44-25-59.442	76-38-19.726	82-10-56.718	4.7114851	262-37-53.080	44-29-39.748	75-59-52.162	Lansdowne
			220-08-48.390	4.7684316	39-49-16.887	44-01-59.594	77-06-19.090	Hallowell
			256-31-37.470	4.6535144	76-08-02.530	44-29-06.612	77-12-02.693	Tyndunaga
			299-57-01.855	4.6684656	119-35-36.624	44-38-29.226	77-08-52.164	Kaladar

GEOGRAPHICAL CO-ORDINATES. NORTH AMERICAN DATUM. CONDITIONAL ADJUSTMENT.

Computed by F. W. O. W.

Place	Latitude ϕ_1	Longitude λ_1	α_1	Distance	α_2	Latitude ϕ_2	Longitude λ_2	Place
Hallowell	44-01-59.594	77-06-19.090	347-13-17.595	4.5366554	167-09-18.177	44-20-06.612	77-12-02.603	Tyendinaga
			282-43-25.020	4.6623600	102-20-02.428	44-07-22.610	77-39-55.348	Murray
Tyendin	44-20-06.612	77-12-02.603	237-41-21.340	4.6432684	57-24-54.546	44-07-22.610	77-39-55.348	Murray
			337-01-33.805	4.6507659	156-52-17.535	44-42-20.522	77-25-15.950	Grimsthorpe
			7-01-47.545	4.5352107	187-04-00.997	44-38-29.226	77-08-52.164	Kaladar
Grimsthorpe	44-42-20.522	77-25-15.950	108-08-23.457	4.3582260	288-19-55.124	44-38-29.226	77-08-52.164	Kaladar
Asphodel	44-23-29.192	77-55-23.355	145-18-10.549	4.5592782	325-28-58.189	44-07-22.610	77-39-55.348	Murray
			48-37-43.252	4.7244442	228-58-51.180	44-42-20.522	77-25-15.950	Grimsthorpe
			347-02-20.881	4.4374110	166-59-05.581	44-37-53.486	78-00-01.936	Methuen
			201-19-34.052	4.5242334	21-13-12.480	44-06-39.682	78-04-30.170	Haldimand
			256-05-05.058	4.6882760	75-40-12.540	44-17-03.550	78-30-58.905	Emily
			235-17-49.061	4.8047388	54-50-25.583	44-03-45.827	78-34-39.560	Clarke
Grimsthorpe	44-42-20.522	77-25-15.950	260-02-02.402	4.6691712	79-37-35.937	44-37-53.486	78-00-01.936	Methuen
			310-05-27.565	4.7529116	129-42-11.743	45-01-56.854	77-58-14.454	Faraday
			3-01-22.161	4.6495649	183-02-37.940	45-01-56.854	77-58-14.454	Faraday
Methuen	44-37-53.486	78-00-01.936	226-57-33.402	4.7507987	46-35-52.797	44-17-03.550	78-30-58.905	Emily
			325-04-44.965	4.6450795	144-51-12.294	44-57-25.007	78-19-15.368	Monmouth
			267-49-44.394	4.5161562	87-32-37.730	44-06-39.682	78-04-30.170	Haldimand
Murray	44-07-22.610	77-39-55.348	298-46-47.341	4.6041435	118-29-19.772	44-17-03.550	78-30-58.905	Emily
Haldimand	44-06-39.682	78-04-30.170	262-34-55.477	4.6086395	82-13-56.592	44-03-45.827	78-34-39.560	Clarke
			253-13-24.158	4.4603938	72-58-32.638	44-57-25.007	78-19-15.368	Monmouth
Faraday	45-01-56.854	77-58-14.454	11-39-17.140	4.8827344	191-47-31.319	44-57-25.007	78-19-15.368	Monmouth
Emily	44-17-03.550	78-30-58.905	191-16-51.528	4.3997613	11-14-17.769	44-03-45.827	78-34-39.560	Clarke
			343-00-30.080	4.5826075	162-54-34.098	44-36-48.281	78-39-25.824	Somerville
			278-28-58.824	4.5549785	98-10-19.675	44-19-51.961	78-57-41.096	Mariposa
			238-01-21.709	4.7227087	57-38-00.326	44-01-52.518	79-04-30.537	Uxbridge
			34-45-37.912	4.6677823	214-59-50.624	44-57-25.007	78-19-15.368	Monmouth
Somerville	44-36-48.281	78-39-25.824	217-45-49.643	4.5979712	37-33-02.333	44-19-51.961	78-57-41.096	Mariposa
			330-18-09.413	4.5272911	150-09-14.380	44-52-35.182	78-52-05.864	Anson

GEOGRAPHICAL CO-ORDINATES, NORTH AMERICAN DATUM, CONDITIONAL ADJUSTMENT.

Computed by F. W. O. W.

Place	Latitude ϕ_1	Longitude λ_1	α_1	Distance	α_2	Latitude ϕ_2	Longitude λ_2	Place
Observatory	45-53-34.016	75-42-52.984	40-54-36.888	4,541,955.4	221-07-08.104	45-37-48.319	75-25-19.973	Buckingham
			312-24-32.261	4,198,073.6	132-48-09.985	45-29-24.393	75-51-49.480	King Mtn.
			79-22-03.963	4,405,294.7	259-35-42.640	45-26-07.372	75-23-43.490	Navan
			322-51-00.861	4,198,073.9	142-45-48.051	45-30-24.196	75-50-11.928	Hull
			345-32-10.330	4,561,215.9	165-27-10.192	45-42-38.798	75-49-53.411	Wakefield
Hull	45-50-24.196	75-50-11.928	66-53-04.919	4,545,782.3	247-10-50.310	45-37-48.319	75-25-19.973	Buckingham
			1-00-42.507	4,355,699.9	181-00-55.738	45-42-38.798	75-49-53.411	Wakefield
			328-50-47.443	4,481,981.4	148-42-08.547	45-44-24.498	76-02-17.900	Masham
			105-33-32.200	4,520,225.9	285-51-06.199	45-37-48.319	75-25-19.973	Buckingham
			356-29-56.330	4,400,802.2	176-29-05.168	45-56-12.371	75-51-04.746	Hineks
Wakefield	45-42-38.798	75-49-53.411	315-41-19.987	4,594,408.7	135-26-05.339	45-57-47.698	76-11-08.424	Alleyn
			281-31-47.575	4,215,546.6	101-23-04.517	45-44-24.298	76-02-17.900	Masham
			33-32-42.659	4,419,009.5	213-40-45.567	45-56-12.371	75-51-04.746	Hineks
Masham	45-44-24.298	76-02-17.900	335-16-32.777	4,436,362.2	155-10-12.104	45-57-47.698	76-11-08.424	Alleyn
			135-27-15.737	4,578,533.6	315-45-42.897	45-37-48.319	75-25-19.973	Buckingham
			364-14-36.304	4,372,553.2	181-15-34.830	46-08-54.000	75-49-43.443	Blake
			276-35-50.264	4,416,488.4	96-21-25.140	45-57-47.698	76-11-08.424	Alleyn
			53-11-39.129	4,537,085.0	233-27-04.339	46-08-54.000	75-49-43.443	Blake
Alleyn	45-57-47.298	76-11-08.424	314-19-13.135	4,631,274.5	134-03-10.024	44-19-51.961	78-57-41.096	Mariposa
Clarke	45-03-45.827	78-34-39.560	265-09-36.922	4,602,328.4	84-48-51.744	44-01-52.518	79-04-30.537	Uxbridge
			234-13-25.404	4,810,239.3	53-46-22.071	43-43-15.460	79-13-40.997	Scarboro
			258-29-54.349	4,644,680.8	186-59-17.298	44-52-35.182	78-52-05.864	Anson
Monmouth	44-57-25.007	78-19-15.368	6-55-21.897	4,785,678.6	165-13-42.488	44-01-52.518	79-04-30.537	Uxbridge
Mariposa	44-49-51.961	78-57-41.096	195-18-27.840	4,538,274.5	111-32-03.233	44-31-51.306	79-39-33.636	Oro
			292-01-22.150	4,777,021.7	49-58-56.053	43-57-55.249	79-33-32.767	King
			229-50-54.742	4,797,657.5	139-36-00.154	44-31-51.306	79-39-33.636	Oro
			320-10-28.514	4,860,384.7	79-08-54.762	43-57-55.249	79-33-32.767	King
Uxbridge	44-01-52.518	79-04-30.537	259-29-01.973	4,596,628.9	19-34-00.186	43-43-15.460	79-13-40.997	Scarboro
			199-40-21.712	4,563,197.1				

GEOGRAPHICAL CO-ORDINATES. NORTH AMERICAN DATUM. CONDITIONAL ADJUSTMENT.

Computed by F. W. O. W.

Place	Latitude ϕ_1	Longitude λ_1	α_1	Distance	α_2	Latitude ϕ_2	Longitude λ_2	Place
Anson	41-52-35.182	78-52-05.864	238-47-38.046	4.8663869	58-14-14.746	44-31-51.306	79-39-33.636	Oro
Oro	44-31-51.306	79-39-33.636	172-42-15.765	4.8017618	352-46-27.572	43-57-55.249	79-38-32.767	King
Belair	46-49-10.211	71-29-33.019	249-17-33.579	4.5857153	68-59-11.982	46-42-43.287	71-54-45.004	Port Neuf
King	43-57-55.249	79-33-32.767	135-27-02.057	4.5600925	315-40-47.572	43-43-15.460	79-13-40.997	Scarboro
			283-40-35.621	4.6399710	103-18-31.764	44-03-25.218	80-05-18.141	Mono
			264-27-14.410	4.6790771		43-55-20.170	80-09-03.647	Amaranth
			242-13-33.132	4.6866709	61-51-20.996	43-45-36.908	80-05-35.214	Erin
			210-19-29.370	4.7709890	30-04-12.311	43-30-39.256	79-55-39.256	Nassagaweya
Oro	44-31-51.306	79-39-33.636	213-11-00.409	4.7980515	32-53-01.709	44-03-25.218	80-05-18.141	Mono
Amaranth	43-55-20.170	80-09-03.647	18-32-01.096	4.1984225	198-34-37.716	41-03-25.218	80-05-18.141	Mono
Erin	43-45-36.908	80-05-35.214	165-28-39.586	4.2693697	345-31-03.960	43-45-36.908	80-05-35.214	Erin
			39-37.447	4.5181742	180-39-49.287	44-03-25.218	80-05-18.141	Mono
Nassagaweya	43-30-22.454	79-55-39.256	66-51-23.908	4.7872764	247-20-20.997	43-30-22.454	79-55-39.256	Nassagaweya
Scarboro	43-15.460	79-13-40.997	140-07-57.412	4.6589711	320-22-45.998	43-43-15.460	79-13-40.997	Scarboro
Barton	43-14-32.383	79-50-57.288	205-08-53.810	4.8130928	24-54-52.096	43-11-26.284	79-34-04.767	Grimsby
			223-35-49.411	4.8643149	43-10-10.578	43-14-32.383	79-50-57.288	Barton
			104-00-34.494	4.3722561	284-12-07.825	43-11-26.284	79-34-04.767	Grimsby
Hereford	45-05-00.212	71-36-05.538	358-09-36.809	4.8964891	178-08-13.360	45-47-31.180	71-38-02.658	Ham
Orford	45-18-46.101	72-14-32.115	45-45-12.644	4.7435017	223-05-42.026	45-26-54.266	71-07-14.959	Megantic
			297-05-07.980	4.7615332	216-37-51.344	45-18-46.101	72-14-32.115	Orford
			41-30-27.458	4.8534356	221-56-30.511	45-47-31.180	71-38-02.658	Ham
			79-51-55.743	4.9499720	260-39-49.391	45-26-54.266	71-07-14.959	Megantic
			287-04-51.856	4.7104821	106-38-04.366	45-26-48.404	72-52-10.515	Yamaska
Yamaska	45-26-48.404	72-52-10.515	08-59-37.463	5.0741017	189-10-02.655	46-30-01.713	72-37-41.047	Carmel
			67-50-55.758	5.0158633	248-43-54.758	45-47-31.180	71-38-02.658	Ham
			343-16-55.440	4.9482323	163-02-41.082	46-12-40.167	73-12-01.626	Dusable

Computed by E. E. Y., Checked by J. E. R.

GEOGRAPHICAL CO-ORDINATES, NORTH AMERICAN DATUM, CONDITIONAL ADJUSTMENT.

Computed by E. E. Y., Checked by J. E. R.

Place	Latitude ϕ_1	Longitude λ_1	α_1	Distance	α_2	Latitude ϕ_2	Longitude λ_2	Place
Carmel	16-30-01.713	72-37-41.617	234-04-10.971	4.7367491	53-39-49.845	46-12-40.167	73-12-01.626	Dusable
			67-11-13.964	4.9731723	248-00-47.444	46-49-21.910	71-29-32.824	Behair
			111-03-34.080	5.0288927	291-59-35.652	46-08-54.536	71-20-13.335	Thetford
			491-34-03.295	5.1138483	110-26-26.805	46-12-40.167	73-12-01.626	Dusable
			316-04-36.189	5.0413756	135-21-35.696	46-30-01.713	72-37-41.047	Carmel
			30-06-33.564	4.6693561	210-19-22.383	46-08-51.536	71-20-13.335	Thetford
			87-04-43.684	4.9917721	267-58-59.410	45-49-48.102	70-22-22.270	Liniere
			133-27-59.575	4.7429087	313-50-00.172	45-26-54.266	71-07-14.949	Megantic
Computed by F. W. O. W.								
Aspohel	44-23-29.192	77-55-23.355	116-24-24.179	4.5367690	296-40-34.825	44-15-10.940	77-32-13.885	Oak Hill
Haldimand	44-06-39.682	78-04-30.170	69-39-51.530	4.6609796	250-02-20.655	44-15-10.940	77-32-13.885	Oak Hill
Oak Hill	44-15-10.940	77-32-13.885	185-41-13.385	4.0992027	5.40-34.411	44-08-25.981	77-33-09.886	West Base
			159-46-55.805		339-21-26.984	44-02-48.666	77-25-44.754	Amelias(Prim)
			125-45-49.085	4.1527704	305-51-51.669	44-10-41.433	77-23-34.596	East Base
			305-51-51.669	4.1527704	125-45-49.085	44-10-41.433	77-32-13.885	Oak Hill
			251-56-42.689	4.1287048	71-50-02.361	44-08-25.981	77-33-09.886	West Base
			191-13-55.379	4.1720919	11-12-24.604	44-02-48.666	77-25-44.754	Amelias(Prim)
			257-47-45.921	3.9648985	77-43-03.559	44-07-22.610	77-39-55.347	Murray
			238-23-34.021	4.1573982	316-28-43.934	44-02-48.666	77-25-44.754	Amelias(Prim)
			294-09-24.404		113-59-32.519	44-07-22.610	77-39-55.348	Murray
			301-11-28.552	4.6323776	120-52-17.314	44-13-55.985	77-33-52.395	Sidney
			265-57-10.685	4.4776858	85-41-36.056	44-00-48.724	77-28-43.971	Amelias (Sec)
			247-12-37.264	4.5807427		43-53-58.620	77-32-32.330	Scotch B
			190-45-53.983	4.3418776	10-33-48.468	43-50-19.785	77-09-19.981	P.L. Petre
Tyendinaga	44-20-06.612	77-12-02.603		4.4943590	68-22-26.536	44-13-55.985	77-33-52.395	Sidney

GEOGRAPHICAL CO-ORDINATES. NORTH AMERICAN DATUM. CONDITIONAL ADJUSTMENT.

Computed by F. W. O. W.

Place	Latitude ϕ_1	Longitude λ_1	α_1	Distance	α_2	Latitude ϕ_2	Longitude λ_2	Place
Murray	44-07-22.610	77-39-55.348	33-33-01.858	4.1635996	213-37-14.794	44-13-55.985	77-33-52.395	Sidney
			158-16-11.133	4.4265913	338-21-18.936	43-53-58.620	77-32-32.330	Scotch B.
			183-40-23.838	4.1433598	3-39-50.023	43-59-52.822	77-40-35.348	Presqu Isle
Amelias (Sec.)	44-00-48.724	77-28-43.971	314-16-11.298	4.4022250	164-12-36.568	44-13-55.985	77-33-52.395	Sidney
			201-56-05.945	4.1349129		43-53-58.620	77-32-32.330	Scotch B.
			263-51-19.385	4.2025341	83-43-05.167	43-59-52.822	77-40-35.348	Presqu Isle
Sidney	44-13-55.985	77-33-52.395	309-11-56.116	4.2847082	129-04-09.164	44-07-22.610	77-39-55.348	Murray
Scotch B.	43-53-58.620	77-32-32.330	117-13-54.467	4.5681911		43-53-58.620	77-32-32.330	Scotch B.
			102-07-21.175	4.5026301	282-23-26.098	43-50-19.785	77-09-19.981	Pt. Petre
			90-02-50.517	4.3256122	270-13-48.089	43-53-56.960	77-16-43.996	West Pt.
			315-28-18.518	4.18660168	135-22-43.289	43-59-52.822	77-40-35.348	Presqu Isle
West Point	43-53-56.960	77-16-43.996	124-01-05.950	4.0780069	304-06-13.660	43-50-19.785	77-09-19.981	Pt. Petre

REPORT OF COMMITTEE APPOINTED FOR COMPILING HEAD NOTES OF REPORTED LAND CASES.

Cook
vs.
Tate

Boundary Fence.—Mode of Construction.—
The Line Fence Act, R.S.O., 1887 c. 219, s. 3, provides that “owners of occupied adjoining lands shall make, keep up, and repair a just proportion of the fence which marks the boundary between them.” Held, per Ferguson, J., affirming the decision of Armour, C. J., that a boundary fence, under R.S.O. 1887 c. 219, should be so placed that when completed the vertical centre of the board wall will coincide with the limit between the lands of the parties, each owner being bound to support it by appliances placed on his own land. Held, per Boyd, C., contra, that if the boundary line be between the posts on one side of the fence, and the scantling and boards on the other, so that there is practical equality in the amount of space occupied by the posts and that occupied by the continuous boards, and if that method is sanctioned by local usage, neither owner has legal ground for complaint. Cook v. Tate, 26 O.R. 403.

Keeley
vs.
Harrigan
Raile
vs.
Cronson

Re-Survey—Straight Lines—Confirmation.—
in the first Government survey of a township (Loughborough) in 1797, the lines between alternate concessions only, as the 2nd and 3rd, 4th and 5th, 6th and 7th, had been run and staked out, numbering from south to north. These lines were not straight, but curved or bent southward in the centre of the township. It appeared (through not very satisfactorily) that several persons had, under government, settled according to these lines. Subsequently in 1832, a surveyor was employed by Government to run the concessions omitted in the first survey. He did so; but, instead of running them parallel to the lines formerly surveyed, he ran them in straight lines, thus cutting off part of the rear of the northerly concessions and adding them to the front of the southerly concessions. This survey was remonstrated against by petition, and was never definitely adopted or confirmed. Held, that the last-mentioned survey could not govern, or be regarded as confirmed by 12 Vict. c. 35, as

having been legally done under the former Acts. *Keeley v. Harrington*, 3 C. P. 173. Followed in *Raile v. Cronson*, 9 C. P. 9.

Original Line—Retracing—Evidence.—See *Spratt v. E. B. Eddy Co.*, 29 S. C. R. 411.

Spratt
vs.
E. B. Eddy Co.

Surveys Under Special Statutes.

Township of Binbrook.—Under the Statutes passed to remedy an erroneous public survey in Binbrook, 1 Wm. IV. c. 8, 7 Wm. IV. c. 59, an inhabitant living in the front concession cannot be dispossessed by ejectment after a prior submission to arbitration by the husband of a married woman owning land in the adjacent township of Saltfleet, the husband not being the owner of the land, to whom alone these Acts apply. *Doe d. Crooks v. Ten Eyck*, *Doe d. Crooks v. Calder*, 7 U. C. R. 5861.

Doe d. Crooks
vs.
Ten Eyck
Doe d. Crooks
vs.
Calder

Township of Cumberland.—23 Vict. c. 101 declares the mode in which the side lines of the 1st concession of Cumberland shall be run, and provides a method by which those injured by the change from the original plan of survey may obtain compensation. Held, that the general Statute, 20 Vict. c. 78, was thereby excluded, and that defendant was confined to this method. *Smith v. Sparrow*, 21 U. C. R. 323. See *Holmes v. McKechin*, 23 U. C. R. 52, 321.

Smith
vs.
Sparrow

Township of Emily.—See *Dyell v. Milage*, 27 C. P. 347.

Township of Fredericksburg.—See *Doe d. Clapp v. Huffman*, M. T. 5 Vict., R. & J. Dig. 1620.

Township of Hamilton.—See *Taylor v. Croft*, 30 U. C. R. 573.

Township of Kingston.—See *Murney v. Markland*, 6 O. S. 220.

Township of Monaghan.—See *Otty v. Davis*, 12 U. C. R. 454.

Township of Niagara.—See *Clement v. Clement*, 14 C. P. 146.

Township of Scarborough.—See *Palmer v. Thornbeck*, 27 C. P. 291, 28 C. P. 117.

Township of Vaughan.—See *Bernard v. Gibson*, 21 Gr. 195.

Bell's Asbestos
Co.
vs.
Johnson's Co.

Boundaries—Ascertainment.—Where there is a dispute as to boundary line between two lots granted by patents from the Crown, and it has been found impossible to identify the original line, but two certain points have been recorded in the Crown Land Department, the proper course is to run a straight line between the two certain points: R. S. Q. Art 4155. *Bell's Asbestos Co. v. Johnson's Co.*, 23 S. C. R. 225.

Sriver
vs.
Young

Original Survey.—In an action to settle the dividing line between the north and south halves of a lot on a broken front, it was held, that the words "the centre of the concession" meant the centre of the particular lot and not the centre of the concession where the lots were not broken. *Sriver v. Young* (1909), 14 O. W. R. 530, affirmed, 15 O. W. R. 27.

Carrigan
vs.
Laurie

Land—Title—Trespass—Conventional Boundary—Absence of Fences—Survey—*Possessio pedis*.—Action for trespass. Really a dispute as to a boundary line. Held, that plaintiff had agreed to the running of this conventional boundary line, and is bound by it. Plaintiff had no documentary title, only a *possessio pedis*. Action dismissed. *Carrigan v. Lawrie*, 7 E. D. R. 108.

Forrest
vs.
Turnbull

Line Fence.—Where persons have agreed to a divisional line between lands and have lived up to it for ten years, even without a fence, such division would be conclusive evidence of ownership. *Forrest v. Turnbull* (1909), 14 O. W. R. 478, affirmed, 14 O. W. R. 930, 1 O. W. N. 150.

Survey.

Plan of Block—Excess—Distribution—Buildings and Fences—Encroachment—Dispute as to Division Line—Remedy—Damages—Injunction—Mandamus—Compensation.—The plaintiff and defendant owned adjoining lands in block 21 in a city, and the plaintiff alleged that the defendant so constructed a certain building in his own land that the eaves and eaves-troughs projected over the plaintiff's land, and so constructed a fence that it encroached upon the plaintiff's land beyond the dividing line. The issue was as to the proper location of the dividing line between the southerly 10 feet of lot 15, owned by the plaintiff, and the northerly 15 feet of the same lot, owned by the defendant. The plaintiff based his claim on an excess in length of 3.3 feet shewn on the plan of a survey of the block made in 1894. He contended that this excess should be distributed over the whole length of the block; and that, by doing this along the northerly boundary of the block, one inch would be added to each 25-foot lot, with the result that the line in dispute, instead of being just 360 feet from the southern boundary of the block, on the basis of allowing 25 feet for each lot, would be moved 1.4 feet to the north. Held, that the main scheme, based on predetermined and fixed dimensions, was the staking out of the bulk of the block in 25-foot lots; and the rest of the block was treated as a remnant of yet undefined quantity, to be dealt with as further consideration would suggest; and the discrepancy would be thrown on the north end of the block, which would not affect lots 1 to 28. Held, also, that the plaintiff would not, in any event, be entitled to damages, an injunction or a mandamus, but only to compensation for the land encroached upon. *Thordarson v. Akin* (1910), 15 W. L. R. 115.

Thordarson
vs.
Akin

Village Lots—Authorisation—Statutory Requirements—Order-in-Council—Resolutions of Municipal Council—By-law—Cost of Survey—Assessment for—Proprietors Interested.—After a resolution of the council of an incorporated village

Sutton
vs.
Port Carling

in favor of a survey of certain streets and lots, and correspondence with the Crown Lands Department, an order-in-council was passed, by which C. was instructed to survey the village lots of the Bailey estate and to plant durable monuments at the front angles of each of these lots, on Joseph Street, Bailey Street, and a street south of Bailey Street, unnamed in the original survey, and he did as he was instructed. The village council then passed a by-law directing that the sum of \$299.77 should be levied on the proprietors of the lands surveyed, being the village lots of the Bailey estate. Held, that the surveys directed was not authorised and was illegal, the requirements of the Statute R. S. O. 1887 c. 152, s. 39) not having been complied with so far as to give the Lieutenant-Governor-in-Council jurisdiction to authorise the survey. 2. That the survey being illegal, the municipal council had no power to pass a by-law to levy the cost of it. 3. That if there was a jurisdiction to authorise the survey, it would only be at the cost of the proprietors of the lands in each range or block interested, and not of all the proprietors, whether interested or not. In re Scott v. Peterborough, 26 U. C. R. 36 followed. Regina v. McGregor, 19 C. P. 69, distinguished. Sutton v. Port Carling, 22 C. L. T. 139, 3 O. L. R. 445, 1 O. W. R. 67.

Surveyor.

Roy
vs.
Beaudry

Fees—Taxation.—Where a surveyor has done work at the request of the parties themselves, he is not an officer of the Court; and his fees are not subject to taxation by the Court. Roy v. Beaudry, 9 Que. P. R. 244.

Jutras
vs.
Mercure

Services—Rate of Remuneration.—If a surveyor is appointed by the Court, as in this case, to do certain acts in his capacity of surveyor, he has a right according to the tariff of surveyors to \$6.00 a day of six hours work, and \$1.00 for every additional hour, and, besides, to his travelling expenses. Jutras v. Mercure, 5 Que. P. R. 6.

E. Hawkesbury
vs.
Lochiel

Public Highways Between Townships—Survey—Road Allowance—Evidence—Departure from Instructions and Plan.—The Township of Lochiel forms part of the original township of Lancaster laid out and partly surveyed about the year 1784 or 1785, as composed of 17 concessions. Subsequently an 18th concession was added, and, in 1818, concessions 10 to 18 of Lancaster were detached as the Township of Lochiel. During the year 1798, the township of Hawkesbury (now divided into East and West Hawkesbury) was laid out and partly surveyed by a deputy provincial surveyor named Fortune, who returned his plan and field notes without the double lines generally in use to shew road allowances between Hawkesbury and the lands now lying upon the northerly and easterly limits of Lochiel. In completing the survey of portions of Lancaster and Hawkesbury, in 1816, a deputy provincial surveyor, named McDonald, planted posts in the ground, but also returned plans and field notes without indicating road allowances at the points in question. The departmental instructions, under which these surveys were made, directed that the mode of survey, etc., should be according to a model plan shewing rectangular townships surrounded by double lines. None of these reservations were shewn on the plan of Hawkesbury, and, in the Lancaster boundary, the rectangular form was broken. Held, that there could be no inference from the instructions and model, in view of the other circumstances, that road allowances were intended to be reserved on the eastern and northern boundaries of Lancaster where the rectangle was broken. Held, also, that, even if the work subsequently performed on the ground by McDonald or other Crown officers might afford some evidence of an intention on the part of the Crown to dedicate as a highway certain portions which may have been reserved for the purpose, yet, having regard to the decisions in *Tanner v. Bissell*, 21 U. C. R. 553, and *Boley v. McLean*, 41 U. C. R. 271, officers employed for the survey of an old line could not conclusively establish a road allowance along the boundary, if none had been reserved by the original survey.

Judgment in 1 O. W. R. 64, 1 O. W. R. 664, affirmed. *Lochiel v. East Hawkesbury*, 24 C. L. T. 261; *East Hawkesbury v. Lochiel*, 34 S. C. R. 513.

Pulkrabek
vs.
Russell

Evidence—Purchase of Land by Municipal Corporation—Land Becoming Vested in Crown—Subsequent purchaser for value without notice—By-law—Registry laws.—When land is purchased by and conveyed to a municipality under the Municipal Act for a road, and thereafter dedicated and used as a public highway, it becomes vested in the Crown by virtue of s. 622 of the Act, and a subsequent purchaser, although he bought without notice of the prior conveyance or of the existence of the road, and registered his deed before the registration of the deed to the municipality, acquires no title to the road as against the Crown, notwithstanding s. 68 of the Registry Act, R. S. M. 1902 c. 150, which does not apply to the Crown, and notwithstanding the failure of the municipality to register the by-law establishing the road, as required by s. 699 of the Municipal Act,—Such purchaser therefore, has no title to complain of the registration of the deed to the municipality as a cloud on his title. *Pulkrabek v. Rural Municipality of Russell*, 8 W. L. R. 8, 18 Man. L. R. 26.

Hay
vs.
Bissonnette

Plan of Survey—Lots Sold According to Plan—Establishment of Highways—Estoppel—Obstruction—Injunction.—Action for a declaration that certain streets laid down upon a plan of a subdivision of the Township of Hay, which was duly registered, were public highways, and to restrain defendant Bissonnette from occupying or obstructing the same. At trial Clute, J. (14 O. W. R. 279), held, that there should be judgment for plaintiff's declaring that the said highways were public, and that the defendant be restrained from occupying or obstructing the same, and be ordered to get out of possession and to remove all obstructions therefrom. An appeal to the Divisional Court was dismissed with costs. *Hay v. Bissonnette* (1909), 14 O. W. R. 1231, 1 O. W. N. 287.

Plan—Other Acts—Servitude—Violation.—The proprietors of certain land prepared an official sub-division plan of the property, dividing it into lots and tracing a street thereon. They registered this plan as the official plan, and sold lots described as fronting on the street indicated on the plan. They also constructed a sidewalk along the street, and permitted the public to pass freely without objection. They also petitioned the municipal council to annex the property in accordance with the plan, which petition was granted. Held, that there was a valid dedication of the property as a public street. 2. In any case, the acts above mentioned, constitute at least a servitude of right of way over and through the property, in favor of the purchasers of lots described as fronting on such street, and the erection of platforms thereon was an illegal obstruction, and a violation of the servitude. *Geoffrion v. Montreal Park and Island Ry. Co.*, 20 Que. S. C. 559.

Geoffrion
vs.
Montreal Park
& Island Ry.
Co.

Plan.—The plaintiff's predecessor in title bought a certain lot according to a plan (then unregistered), on which was shewn a strip 33 feet in width, running along one side of the lot. The plaintiff alleges that this strip had been dedicated, either as a public highway or a private way for the use of the owner of the lot, and claimed a declaration to that effect and an injunction. On the evidence, the Court found for the plaintiff and gave judgment accordingly. *Daly v. Robertson*, 1 Terr. L. R. 427.

Daly
vs.
Robertson

Plan—Registration Before Incorporation.—A plan shewing the locus in quo as a street was made and filed before, but practically contemporaneously with, the locality being set apart as an incorporated village, the former being on the 3rd of June, 1873, the latter on the 25th June, 1873. Lots were first sold under the plan in 1876. Subsequent legislation, which was retroactive, declared that allowances for roads laid out in cities, towns, and villages, fronting upon which lots had been sold, should be public highways. Held, that

McGregor
vs.
Watford

the road in question was a public highway and subject to the jurisdiction of the municipality. *McGregor v. Watford*, 13 O. L. R. 10, 8 O. W. R. 479.

McMenemy
vs.
Grant

Alleged Encroachment—Tearing Down of Fence—Original Survey—Error in Injunction—Damages.—Second Appellate Division gave judgment for plaintiff for \$25 damages, an injunction and costs of an action for damages for removal of a fence which defendant claimed encroached upon his land some four feet, but as to which the Court found the contrary. Judgment of Winchester, Co. J., York, reversed. *McMenemy v. Grant*, (1913), 24 O. W. R., 100; 4 O. W. R. 802; 2 D. L. R. 319.

Huckell
vs.
Pommerville

Building Erected Close to Line—Damage to adjacent property—Water from roof—Nuisance—Destruction of line fence—Injunction—Damage—Costs. *Huckwell v. Pommerville*, (1912), 21 O. W. R. 681; 3 O. W. N. 845.

Anticknap
vs.
Scott

Determination—Testimony of Surveyors—Hearsay Evidence—Mistrial—New Trial.—In an action to determine the boundary line between two lots, the trial Judge, having had a view of the locus and heard evidence, decided in favor of the plaintiff. Two surveyors were called as witnesses, but neither of them had personally made a survey; they spoke from notes and from the survey made by their articulated clerks, who ran the lines; and it appeared that their evidence had influenced the mind of the trial Judge. Held, that this was hearsay evidence, improperly admitted, and there should be a new trial. *Anticknap v. Scott* (1914), 26 W. L. R., 952; W. W. R. ; D. L. R. ; B. C. R.

Morissette
vs.
Brompton

Removing Landmarks—Boundary marks set by surveyor under resolution of municipal council—Boundaries settled judicially.—When a boundary between a highway and contiguous land has been settled by a judgment and the boundary marks duly placed, the municipal council has no

power or authority to appoint, by resolution, a surveyor to draw another boundary line. Any proceedings by him without notice to the parties, under the resolution, are illegal, and marks placed by him are not "lawfully" placed, within the meaning of the art. 532 Cr. C., and their removal does not amount to the offence therein described. A prosecution of the owner of the property, by the corporation, for the offence in question, is under the circumstances, without probable cause and is inferentially brought through malice, and makes it liable for the damages caused thereby. *Morisette v. Brompton* (1911), 40 Que. S. C. 224.

Removal of Line Fence—Connecting fences to protect land from cattle—Right to erect—Pulling down—Trespass—Injury to crops—Damages.—The proper place for the erection of a boundary fence is on the true line, and where it is so erected it becomes the property of the adjacent land-owners as tenants in common. But, in this case, the original line fence, being wholly on the plaintiff's land, was the property of the plaintiff, the fence being regarded as part of the freehold, and the ownership of the freehold determining the ownership of the fence. The fence being on the plaintiff's land, the defendant took down the main portion of it, and out of the material built a new line fence on his (the defendant's) land. The defendant also removed a portion of the southerly boundary fence on the plaintiff's land abutting on the highway, which had been originally built by the defendant wholly on the land now owned by the plaintiff, and incorporated the material therefrom in the new line fence. Shortly afterwards the plaintiff built small pieces of fence at the northerly and south extremities of his farm to connect with the new line fence. These the defendant pulled down, and cattle got upon the plaintiff's land and destroyed his crops. Held, that in the circumstances, the plaintiff was justified in building the small portions of fencing to connect with the new line fence. It would be unreasonable to expect the plaintiff to reconstruct a new line fence throughout on the true boundary

Botta
vs.
Pene

line, because the defendant wrongfully carried his new line fence beyond the true boundary line, and the defendant was liable for the consequences of his acts in pulling down the connecting fences. Damage assessed at \$100. *Botta v. Pene* (1910), 15 W. L. R. 508, B. C. R.

Williams
vs.
Salter
and
Karwick

Survey—Intention of surveyor—Lake not navigable—Dividing line between north and south halves of lot.—Action for a declaration that the plaintiff was owner of a certain portion of lot 12, 2nd Con. Tp. of Plummer, district of Algoma, and for an injunction restraining the defendant, Salter, from trespassing thereon. Plaintiff and defendant, Salter, were respectively the owners under Crown grants of the north and south halves of the said lot 12 on which was situate a small lake known as Caribou Lake, about $1\frac{3}{4}$ miles long with a depth varying up to 40 feet, and which had no navigable inlets or outlets. Defendant, Salter, had had his half of the lot surveyed without including in either half the land covered by the water of the lake, which gave him considerably more dry land than if the land so covered by water had been included, and this surplus was the land in dispute. *Stone, Dist. Co. J.*, held, that Caribou Lake was not navigable water within the meaning of 1 Geo. V. c. 6, and that therefore lot 12 should be divided having no regard to the land covered by water. *Ross v. Portsmouth*, 17 U. C. C. P. 195, followed. Judgment for plaintiff with costs. Divisional Court affirmed above judgment, holding that they could not consider any intention on the part of Mr. Kirkpatrick, one of the subordinate officers of the Government, no matter how clearly shewn; that they had to construe the patents as they appeared, and that the patents gave to each party the north half and south half of the lot respectively without any reference to water or land, and that each party, therefore, took exactly one-half of the total area of the whole lot, and the line must be drawn across the middle of the lot, and the parties were entitled to the waters of the lake. They found also that the lake itself could not be described as navigable within the meaning of s. 2 of c. 61 Geo.

V., there being no navigable outlet or inlet and the lake not constituting any part of the common highway. *Williams v. Salter & Karwick*, (1912), 23 O. W. R. 34.

Survey—Wall built on strip of land in dispute—Honest belief of ownership—R. S. O. (1897) c. 119, s. 30—Plan—Registration of agreement—Declaration of true line—Building not to be disturbed.—The dispute between the parties was over a strip of land eight feet wide more or less along the easterly side of land granted by conveyance registered as V. 6864, and plaintiff brought action for a declaration that a certain agreement in relation thereto was void as against plaintiff and to have it set aside and the registration cancelled on the alleged ground of misrepresentation. *Boyd, C.*, at trial, held, that judgment should be entered for plaintiff with a declaration that the true line of division between the lots was that laid down on the plan Newman filed; that the part of house that projected for a few inches was not to be disturbed by the plaintiff. Divisional Court, 17 O. W. R. 368, 2 O. W. N. 210, dismissed an appeal from above judgment with costs. Court of Appeal affirmed the judgment of Divisional Court. *Parent v. Latimer* (1911), 19 O. W. R. 461, 2 O. W. R. 1159.

Parent
vs.
Latimer

Party Wall—Buildings on city street—Evidence—Easement—Registered Plan of Original Survey—Boundary between Lots—Method of Ascertainment—Disappearance of Monuments—Surveys Act, R. S. O. 1914, ch. 166, sec. 40—Injunction.

Home Bank
vs.
Might
Directories

The defendant, the owner of lot 2 upon a city street, according to a registered plan of a survey made in 1837, began to erect a building thereon, and, treating the south wall of the plaintiff's building, immediately to the north, standing on lot 1, as a party wall, proposed to place girders and columns therein. In this action, brought to restrain the defendant from so doing, it was held, upon the evidence, that the wall was not a party

wall, and that the circumstance that, in erecting the building on lot 1, provision had been made for placing the floor-joists of a building to the south in the south wall and supporting them by the wall, and for fire-places and flues available for use in the building to the south, indicated at the most that the south wall was intended to be used for those purposes, and that all that the defendant had acquired was the right to use the wall for these purposes.

None of the original posts or monuments marking the angles of the lots could be found when surveys were made for the purpose of proving, at the trial of the action, the position of the side lines of the lots on the plan, and the surveyors adopted the course prescribed by sec. 40 of the Surveys Act, R. S. O. 1914, ch. 166; but it was held that the mode of survey was not authorized by the Survey Act. Section 40 being applicable only to original surveys in townships made by or under the authority of the Crown.

The statute not being applicable, the original posts or monuments not being in existence, and there being no direct evidence as to their position, it was necessary to resort to some other method of ascertaining the boundaries of the lots; and in such a case the best evidence is to be found in the practical location of the lines made at a time when the original posts or monuments were presumably in existence and probably well-known.

The statement of the law to that effect in *Diehl v. Zanger* (1878), 39 Mich. 601, was approved and applied to the evidence in this case to determine the proper inferences to be drawn from the facts and circumstances in evidence as to the position of the line between lots 1 and 2.

Judgment of Falconbridge, C.J.K.B., enjoining the defendant from interfering with the wall, affirmed; Magee, J. A., dissenting. *Home Bank of Canada v. Might Directories, Limited*, 31 Ontario Law Reports (1914) 340.

Your Committee appointed for the compiling of head notes on land cases, beg to submit the foregoing digest, and for head notes previously reported would refer the members to Report No. 11, of 1896, page 183.

H. L. ESTEN,

Chairman.

PAPERS

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HOME BANK VS. MIGHT DIRECTORIES.

By J. W. FitzGerald.

Gentlemen of the Association of Ontario Land Surveyors, I see I am down for some comments on the case of Home Bank vs. Might Directories, Limited.

I noticed when reading over this case that several Toronto Surveyors were professionally engaged in it. Among others Mr. A. T. Ward, Mr. C. J. Murphy and Mr. W. H. Browne. These Gentlemen are no doubt, far more familiar with the actual facts of the case than I am, and I would like very much to have their opinions so that all our discussions will be printed in our next report, as I am sure it will make very interesting and instructive reading for surveyors.

The case of Home Bank vs. Might Directories, Ltd., was chiefly as to the exact location of the line between Lots 1 and 2 in the plan of Block lettered B, which was granted by the Crown for the purpose of a gaol and court house for the County of York.

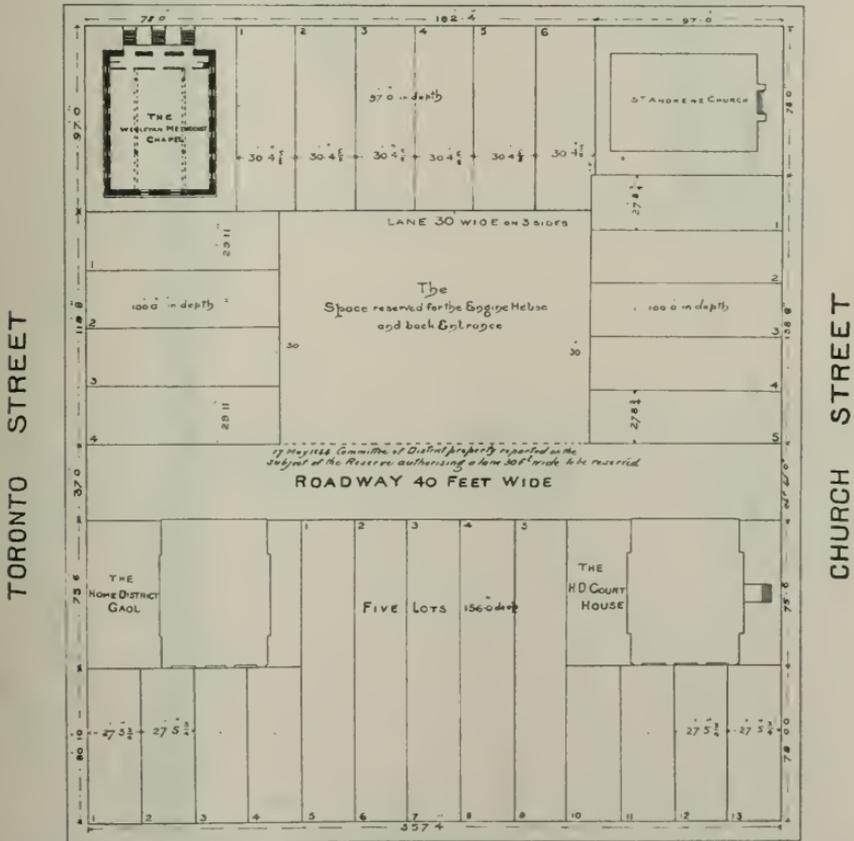
This block was surveyed into lots in 1837 by Thomas Young, architect and surveyor, and the plan was registered in the Registry Office for the City of Toronto on the 23rd of November 1870, you will notice here the lapse of 33 years between the making of the survey and the registration of the plan.

Upon this plan a tier of lots numbered from 1 to 5 inclusive. The lots numbered from the north and lot number one is shown as commencing at the south-east corner of a lot

marked "St. Andrew's Church" at a point 78 feet south of the southerly limit of Adelaide Street. Of course, we must look at this case purely from a Surveyors point of view, of the other questions involved we have nothing to say.

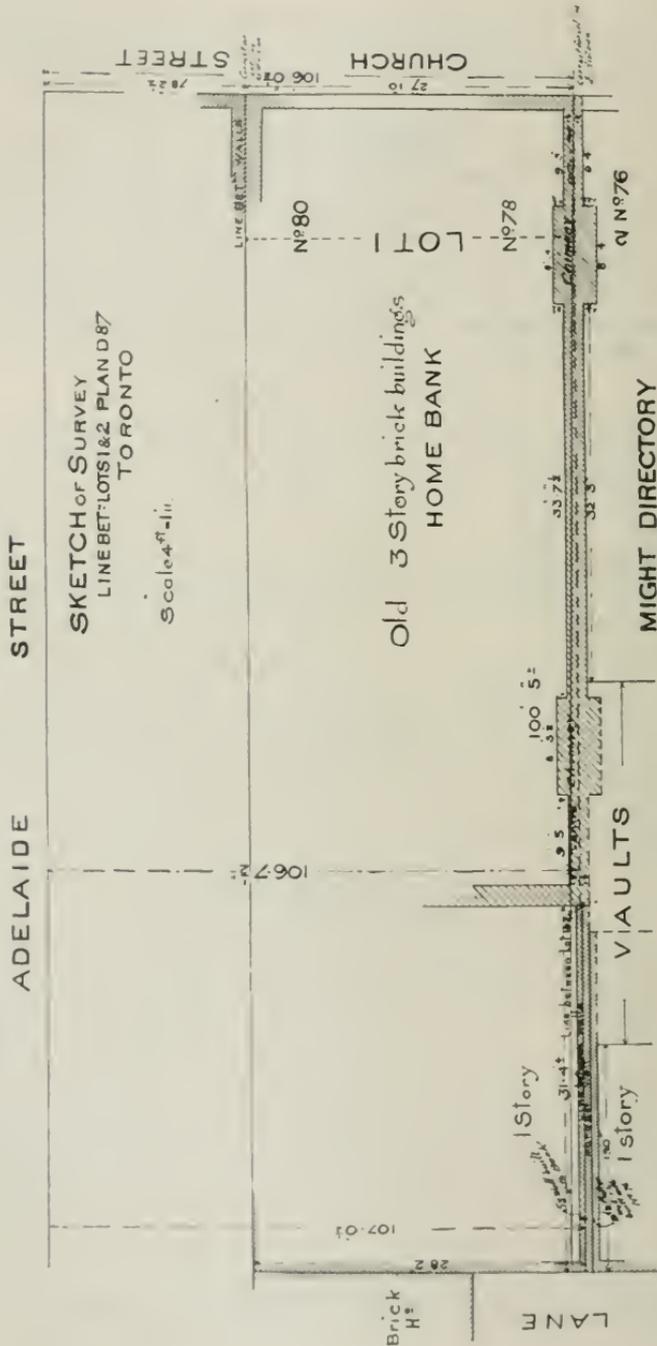
I am not vain or foolish enough to question the rulings of these learned Judges, but I have made a great many surveys under Section 40 of the Surveys Act, and if the last paragraph of Section 19 taken in connection with Section 40, is not applicable where a surveyor is called upon to re-establish the boundaries of any original lots in a City or Town laid out under any of the authorities mentioned in section 16 then I don't know where I am at.

NEWGATE STREET

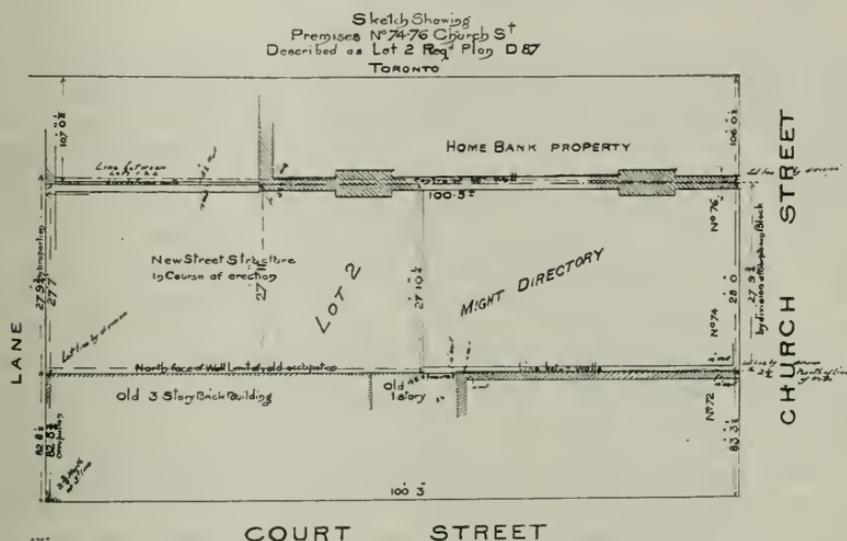


PLAN BY
THOMAS YOUNG
Architect 1837

KING STREET



Section 16 gives us a list of the different authorities under which certain surveys are made, Section 19 tells us that when we are called upon to make a survey in any City, Town or Village or any part thereof surveyed under any of the authorities mentioned in Section 16 that we "shall follow and pursue the same rules and regulations in respect of such survey as is by law required of us when employed to make a survey in a Township in other words we are to follow Section 40.



Of course in Section 40 the words "Side line," "Concession" and "Department" are used which indicates to some extent that this Section applies to surveys in Townships, but I certainly cannot agree with Chief Justice Meredith when he says that Section 40 is applicable to surveys in Townships, only. Another question which arises here is as to whether the surveyors on the case were actually working under Section 40 or not. For myself I think they were working under Section 44, Sub-sections 2 and 3 and were quite justified in doing so. You will notice that the Chief Justice says that "The Statute not being applicable, and the original posts or monuments not being in existence, and there being no direct evidence as to their position, some other mode of ascertaining the boundaries of the lots must be resorted to and in such a case the best evidence is usually to be found in the practical location of the lines made at a time when the original posts or monuments were presumably in existence and probably well known."

My interpretation of what the Chief Justice means when he speaks of the "practical location of the lines" is the old fences.

Now I cannot say what the general experience among surveyors is, but I find fully 80 per cent. of the men who purchase lots and fence them in encroach on the adjoining lots, and especially so if the latter are in the hands of the original owner and subdivider.

As an instance of this I can remember of a 10 acre lot sub-divided in the early eighties, the sub-division contained about 60 lots and practically all the lots had a frontage of 50 feet, immediately after the subdivisions was made, the owner sold off by auction about 18 lots, these lots were scattered here and there over the sub-division and all the sub-division stakes were plainly to be seen at that time, most of the purchasers of these lots built upon them and fenced them in. A good many years after another bunch of lots were auctioned off on the same sub-division, but the new purchasers could not, as a rule, find their 50 feet between the old fences built by the first purchasers, and, of course, they went back to the vendor to get their 50 feet. Well, what was to be done, the fences were up about 14 years, the original owner and subdivider could not get back the land taken possession of, and the new purchasers were threatening to bring suit against him to get their 50 feet, or in other words, to deliver the goods. The writer was finally called in and as I was chairman on the original sub-division I knew the ground and I made a complete resub-division from points well known to me. I found that 14 of the original purchasers had in building their fences, encroached on the adjoining lots, the encroachment in one case being as much as 17 inches, finally this case was settled out of court by each of the new purchasers paying "pro rata" for the exact frontage he got. I don't know where they would have landed if it ever got into Court.

I also noticed when reading over this case that Judges Maclaren and Hodgins agreed with Chief Justice Meredith in the finding, but Judge Magee dissented, however, as Judge Magee did not give his reasons for dissent in writing, I was, of course, unable to procure them.

The effect of the ruling in this case, however, is this, so long as it stands a plan or survey made by a surveyor under Section 40, except with reference to the re-establishment of lines in a Township surveyed by or under the Authority of the

Crown, is invalid, and if there are many of the surveys based upon Section 40 for validity I think it would be well to bring the matter before the Legislature for confirmation and adjustment.

[APPELLATE DIVISION.]

1914

Home Bank of Canada v. Might Directories, Limited.

Jan. 10.

May 1.

Party Wall—Buildings on City Street—Evidence—Easement—Registered Plan of Original Survey—Boundary between Lots—Method of Ascertainment—Disappearance of Monuments—Surveys Act, R.S.O. 1914, ch. 166, sec. 40—Injunction.

The defendant, the owner of lot 2 upon a city street, according to a registered plan of a survey made in 1837, began to erect a building thereon, and, treating the south wall of the plaintiff's building, immediately to the north, standing on lot 1, as a party wall, proposed to place girders and columns therein. In this action, brought to restrain the defendant from so doing, it was held, upon the evidence, that the wall was not a party wall, and that the circumstance that, in erecting the building on lot 1, provision had been made for placing the floor-joists of a building to the south in the south wall and supporting them by the wall, and the fire-places and flues available for use in the building to the south, indicated at the most that the south wall was intended to be used for those purposes, and that all that the defendant had acquired was the right to use the wall for those purposes.

None of the original posts or monuments marking the angles of the lots could be found when surveys were made for the purpose of proving, at the trial of the action, the position of the side lines of the lots on the plan, and the surveyors adopted the course prescribed by sec. 40 of the Surveys Act, R.S.O. 1914, ch. 166; but it was held, that that mode of survey was not authorized by the Surveys Act—sec 40 being applicable only to original surveys in townships made by or under the authority of the Crown.

The statute not being applicable, the original posts or monuments not being in existence, and there being no direct evidence as to their position, it was necessary to resort to some other method of ascertaining the boundaries of the lots; and in such a case the best evidence is to be found in the practical location of the lines made at a time when the original posts or monuments were presumably in existence and probably well-known.

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The statement of the law to that effect in *Diehl v. Zanger* (1878), 39 Mich. 601, was approved and applied to the evidence in this case to determine the proper inferences to be drawn from the facts and circumstances in evidence as to the position of the line between lots 1 and 2.

Judgment of Falconbridge, C.J.K.B., enjoining the defendant from interfering with the wall, affirmed; Magee, J.A., dissenting.

Action to restrain the defendant company from cutting openings into the south wall of a building known as numbers 78 and 80 in Church street, in the city of Toronto, and placing therein steel girders and columns in connection with the construction of a building which the defendant company was erecting upon land to the south of these premises.

November 13, 14, and 15, 1913. The action was tried before Falconbridge, C.J.K.B., without a jury, at Toronto.

E. D. Armour, K.C., and A. E. Knox, for the plaintiff bank.

Gideon Grant and D. Inglis Grant, for the defendant company.

January 10, 1914. Falconbridge, C.J.K.B.:—Owing to causes beyond my control, this judgment has been too long delayed.

The facts are little, if at all, in dispute, and the arguments have been extended with extracts from the authorities, to which I have added some marginal notes.

It is quite evident, and it is practically admitted, that the plaintiff's building was erected before the defendant's.

I am of opinion that the defendant has failed to establish that the plaintiff's south wall is a party wall.

First, the title deeds, lease, etc., favor the plaintiff's contention, reserving nothing to the defendant.

Second, so goes the general appearance of the buildings and of the wall in question.

Third, so also does the construction of the wall. Mr. C. J. Gibson, architect, called by the defendant, could not recall a case of a party wall being built like this one. It is plumb on the south (i.e. the far) side, with steps and jogs on the Home Bank side. The base is about 22 in. thick, the first floor 18 in., the second floor 14 in., and above that there is a parapet of 9 in. If then this were a party wall, and the line in the centre thereof at the base, the bank would own less and less of the wall as it goes up until the parapet would be entirely on the defendant's land.

The only matter which has given me any trouble is the fact that there are openings in the south side of the wall for the insertion of joists and timbers from the other building, and into these openings joists and timbers have been inserted. There are also spaces for fire-places leading to chimneys in two places—in one of these the fire-place has been used by the defendant or its predecessors. The other fire-place looks out into empty space, being above the level of the defendant's building.

There being nothing of record shewing a grant or reservation to the defendant's predecessors of any right to use the wall, it may be the case that the owner and builder thereof had in his mind the event of another building being erected to the south, the owner of which might pay for the privilege of using these appliances.

No doubt, the defendant has acquired an easement for the support of its joists, etc., and for its smoke, as matters stood when it began to erect its present structure, and the injunction, which I now make perpetual, does not affect this.

Judgment for the plaintiff with \$5 damages and costs.

The defendant company appealed from the judgment of Falconbridge, C.J.K.B.

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April 9. The appeal was heard by Meredith, C.J.O., Maclaren, Magee, and Hodgins, J.J.A.

R. McKay, K.C., and Gideon Grant, for the appellant company, argued that the wall in question was a party wall, but that the part of it affected by this action was entirely on the defendant's land. The trial Judge found that the respondent's building was built first, and we do not quarrel with that finding. There is no conflict as to the survey. [Armour, K.C., said there was a conflict as to a quarter of an inch.] The onus lying on the plaintiff to prove its title to the southerly 5 inches of the wall has not been discharged. Reference was made to *Waddington v. Naylor* (1889), 60 L.T.R. 480; *Halsbury's Laws of England*, vol. 3, p. 134; *Hunt on Boundaries*, 6th ed., p. 127 et seq., and cases there cited; also to *Matts v. Hawkins* (1813), 5 Taunt. 20; *Cubitt v. Porter* (1828), 8B & C. 257; *Watson v. Gray* (1880), 14 Ch.D. 192, 195; *Wiltshire v. Sidford* (1827), 1 Man. & Ry. 404, also in note to *Cubitt v. Porter*, supra, at p. 259; *Standard Bank of British South America v. Stokes* (1878), 9 Ch.D. 68, 70, 71; *Mayfair Property Co. v. Johnston*, [1894] 1 Ch. 508; *Adams v. Marylebone Borough Council*, [1907] 2 K.B. 822, 826; *Mason v. Fulham Corporation*, [1910] 1 K.B. 631; *St. Leger v. T. Eaton Co.* (1904), 4 O.W.R. 205; *James v. Clement* (1886), 13 O.R. 115.

E. D. Armour, K.C., and A. E. Knox, for the plaintiff bank, the respondent, argued that the judgment of the learned trial Judge was right and should be affirmed. There is sufficient evidence to support his finding that the wall in question is entirely upon the plaintiff's land, and this finding is not interfered with by the fact that the defendant company is entitled to use the openings in the wall for the purpose of placing joists and for fire-places. The lease to Hamilton strongly supports the plaintiff's contention. They referred to *Murly v. McDermott* (1838), 8 A. & E. 138.

McKay, in reply.

May 1. Meredith, C.J.O.:—This is an appeal by the defendant from the judgment dated the 10th January, 1914, which was pronounced by the Chief Justice of the King's Bench after the trial of the action before him, sitting without a jury, on the 13th, 14th, and 15th days of November, 1913.

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The action is brought to restrain the appellant from cutting openings into the south wall of a building known as numbers 78 and 80 on Church Street, in the city of Toronto, and placing therein steel girders and columns in connection with the construction of a building which the appellant is erecting upon land to the south of these premises.

The contest is as to the ownership of this south wall, which, according to the contention of the respondent, stands entirely on its land, but, according to the contention of the appellant, is a party wall and is owned by the parties in common.

The Chief Justice found in favor of the respondent's contention, and by the judgment in appeal it is declared and adjudged that the appellant, its servants and agents, be and they are restrained from further interfering with or pulling down the wall in question, and that the appellant's wall adjoining that wall "be allowed to remain as at present constructed."

Both parties derive title from the late The Hon. Christopher Widmer, who was the owner in fee simple of lots 1 and 2 in the plan of block lettered B, which was granted by the Crown for the purposes of a gaol and court-house for the County of York.

This block was surveyed into lots in 1837 by Thomas Young, "architect and surveyor," whose plan of the survey was adopted by the magistrates on the 6th January, 1837, and was registered in the registry office for the city of Toronto on the 23rd November, 1870.

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Upon this plan a tier of lots numbered from 1 to 5 inclusive was laid out. The lots number from the north, and lot number 1 is shewn as commencing at the south-east corner of a lot marked "St. Andrew's Church," at a point 78 feet south of the southerly limit of Newgate (now Adelaide) street. Each lot has a frontage of 27 feet 8¾ inches on Church street, and is 100 feet in depth.

The first registered instrument affecting the lots owned by Widmer is a lease dated the 22nd May, 1850, from Widmer to Alexander Hamilton, of lot number 2, which was registered on the 11th July, 1867.

The next is a conveyance dated the 18th November, 1870, from the trustees under the will of Widmer to James Stock and Dr. John Macdonell, the predecessors in title of the respondent, of lot number 1.

Lot number 2 was conveyed by the trustees under the will of Widmer to Western Canada Loan and Savings Company, the predecessor in title of the appellant, on the 10th June, 1880.

In each of these instruments the lots are described by their numbers on the plan of block lettered B granted by the Crown for the purpose of a gaol and court-house for the County of York. In the Hamilton lease and in the conveyance to the Western Canada Loan and Savings Company, the frontage on Church Street of lot number 2 is stated to be 27 feet 8 inches, or thereabouts, and in the conveyance to Stock and Macdonell the frontage on Church Street of lot number 1 is given as 27 feet 8¾ inches.

The front or main part of the respondent's building was erected prior to the lease of Hamilton, but beyond this there is no evidence as to when it was erected.

The south face of the wall in question is practically plumb from top to bottom, except possibly that part of it below the ground, which is said by one witness, McLeish, to extend about 4 inches

south of the southern face of the upper part of the wall. On the south face of the wall, openings were left so that they might be used to receive the joists of a building to the south, and in the wall there were two chimneys, in each of which were built, besides the flues for use in the respondent's building, two flues which would be available for use in the building to the south, and, on the first and third floors, fire-places projecting beyond the face of the wall were constructed on both sides of the chimneys, the projections extending about 10½ inches from the face of the wall.

The wall in question is about 22 inches in width up to the top of the basement. It then narrows to 18 inches and continues of that width up to the attic floor, and from there up to the roof is 14 inches in width, and above the roof the wall is continued as a parapet wall, 9 inches in width, for a few feet.

The south face of the wall is, as I have said, plumb from top to bottom, and the offsets occasioned by its width being narrowed are all on the north side.

An attempt was made at the trial to prove the position of the side lines of the lots on the plan. This was done by calling Ontario Land Surveyors to prove the results of surveys they had made. None of the original posts or monuments marking the angles of the lots can now be found, and no evidence of their position was obtained by these surveyors. The course adopted by them was that prescribed by sec. 40 of the Surveys Act, R. S.O. 1914, ch. 166, and the southerly limit of Adelaide and the northerly limit of Court street were assumed to be those limits, as the streets are laid out and travelled. The distance between these streets was divided into the number of lots which it contained in the survey upon which the plan was based, and there was assigned to each lot a breadth proportionate to that intended in the survey as shewn on the plan. The distance between Adelaide street and Court street was found to be 217 feet 4 inches, which is about 8 inches more

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than the distance as shewn on the plan. The result of this method of survey was to place the line between lots numbers 1 and 2, at its point of commencement on Church street, about the centre of the wall in question, and to continue it westward, trending gradually to the north, so that at the westerly limit of the lot it ran a few inches to the north of this wall, leaving it for a distance of 31 feet 4 inches wholly within the limits of lot number 2.

The mode of survey adopted is not authorised by the Surveys Act, sec. 40 being applicable only to original surveys in townships made by or under the authority of the Crown.

The statute not being applicable, and the original posts or monuments not being in existence, and there being no direct evidence as to their position, some other mode of ascertaining the boundaries of the lots must be resorted to; and in such a case the best evidence is usually to be found in the practical location of the lines made at a time when the original posts or monuments were presumably in existence and probably well-known.

That is the rule adopted by the State of Michigan and others of the United States.

In *Diehl v. Zanger* (1878), 39 Mich. 601, it was said by the Supreme Court that a re-survey, made after the monuments of the original survey have disappeared, is for the purpose of determining where they were, and not where they ought to have been; and that a long-established fence is better evidence of actual boundaries settled by practical location than any survey made after the monuments of the original survey have disappeared. After pointing out that the surveyor had reached his conclusion by first satisfying himself what was the initial point of the survey, and then proceeding "to survey out the plat anew with that as his starting point," Mr. Justice Cooley went on to say: "Nothing is better understood than that few of our early plats will stand the test of a careful and accurate survey without

disclosing errors. This is as true of the government surveys as of any others, and if all the lines were now subject to correction on new surveys, the confusion of lines and titles that would follow would cause consternation in many communities. Indeed the mischiefs that must follow would be simply incalculable, and the visitation of the surveyor might well be set down as a great public calamity. But no law can sanction this course. The surveyor has mistaken entirely the point to which his attention should have been directed. The question is not how an entirely accurate survey would locate these lots, but how the original stakes located them. No rule in real estate law is more inflexible than that monuments control course and distance,—a rule that we have frequent occasion to apply in the case of public surveys, where its propriety, justice and necessity are never questioned. But its application in other cases is quite as proper, and quite as necessary to the protection of substantial rights. The city surveyor should, therefore, have directed his attention to the ascertainment of the actual location of the original landmarks set by Mr. Campau, and if these were discovered they must govern. If they are no longer discoverable, the question is where they were located; and upon that question the best possible evidence is usually to be found in the practical location of the lines, made at a time when the original monuments were presumably in existence and probably well known . . . As between old boundary fences, and any survey made after the monuments have disappeared, the fences are by far the better evidence of what the lines of a lot actually are, and it would have been surprising if the jury in this case, if left to their own judgment, had not so regarded them.”

With this statement of the law I entirely agree, and I proceed to apply it to the evidence in the case at bar in order to determine what are the proper inferences to be drawn from the facts and circumstances in evidence as to the position of the line between lot number 1 and lot number 2.

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If it were not for the fact that, when the building on lot number 1 was erected, Widmer was the owner of both that lot and lot number 2, the only reasonable inference to be drawn would be that the south face of the building was co-terminous with the boundary line between the two lots. As I have said, the building was erected before 1850, probably some years before, and at a time when the original monuments were presumably in existence or their position was known. Notwithstanding the fact that Widmer was the owner of both lots when the building was erected, the proper inference upon the facts in evidence is, I think, that the south wall was built so that its south face was upon the line between lots numbers 1 and 2, and there is nothing to indicate that that wall should constitute a party wall for that building and a building which might afterwards be erected on lot number 2.

As the Chief Justice points out, according to the testimony of Mr. Gibson, who is an architect of long experience, he could not recall a case of a party wall being built like the wall in question, i.e., plumb on the north side with steps or jogs on the north side of it, and so constructed that, if it were a party wall, the respondent would own less and less of it as it goes up until the parapet wall would be entirely on the appellant's land.

Another circumstance which, I think, makes against the contention of the appellant is the fact that the lease to Hamilton contained a covenant on his part to "excavate and dig the ground hereby demised" (i.e., lot number 2) "upon Church street for the foundation or foundations of a messuage or messuages or building or buildings . . ."—indicating, as it appears to me, that the land demised was entirely unbuild upon and therefore not occupied, as, according to the appellant's contention, it is, to the extent of 11 inches, or one-half the width of the wall in question, by the south part of the wall.

It is also in evidence that the south face of the wall, so far as it is exposed, has been kept in re-

pair by the respondent, and that no contribution toward the expenditure for that purpose has been asked from or made by the appellant or its predecessors in title.

The inference I would draw from the evidence and the circumstances I have mentioned is, that the wall in question is not a party wall, and that the most that the circumstance that in erecting the building on the respondent's land provision was made for placing the floor joists of a building in the south wall and supporting them by the wall, and for the fire-places and flues, indicates, is, that the south wall was intended to be used for those purposes, and that all that the appellant has acquired is the right to use the wall for those purposes.

Upon the whole, I am of opinion that the Chief Justice came to the right conclusion, and that the appeal should be dismissed with costs.

See also *Barry v Desrosiers* (1908), 14 B.C.R. 126.

Maclaren and Hodgins, J.J.A., agreed.

Magee, J.A., dissented.

Appeal dismissed; Magee, J.A., dissenting.

DISCUSSION.

There were two streets, Court Street and Newgate Street (Now Adelaide Street). What the three Toronto surveyors did, Mr. Ward, Mr. Brown and Mr. Murphy, was to divide up proportionately. These two points were undisputed and they put this disputed line between one and two. At a certain point the three surveyors practically agreed. I will read you what the Chief Justice said. (Reads from Judgment, also reads Section 40 of the Survey Act.) I would ask Mr. Ward to tell us what he knows about this case. It is very plain to me these two points being disputed points, that the three surveyors who were called upon were perfectly justified in dividing it proportionately. I think if there were very many of our surveys dependent upon Section 40 for validity we would have to get something done right away.

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Mr. McMullen—Does the Chief Justice suggest what method should be adopted in fixing that point?

The President—Yes. It is a long item and I was going to suggest that the whole thing be printed in the report. He quotes an American case and agrees with it.

Mr. Ward—There is a sketch on the wall which defines this question. This is the Home Bank property and this is the Might Directory Property. The Might Directory wished to erect a new building and wanted to go up to their deed line, which was the line between Lots 1 and 2. They owned Lot 2, and the Home Bank title covered Lot 1, and in going up to their deed line as fixed by the survey dividing the surplus, which was eight inches, we found that the centre of the wall agreed within a quarter of an inch with the lot line. They wanted to channel into these walls to erect some steel work and the Home Bank objected on the ground that they were the entire owners of the building wall, and looking at the building from the front you would say that the Home Bank was built first. There is no division in the walls there, it is all one wall, but when you inspected the interior you found fire places on both sides of the wall showing it had been, or looked to have been built as a party wall. Not only that, but you found bricks so placed along the south face of the wall as if joists had been intended to be put in at some future time. However, the Home Bank contended they owned the whole wall and the Might Directory had no right to channel into that wall; although they could use it they had no right to disturb it in any way. Then we have the decision. Mr. Armour, acting for the Home Bank, asked both Mr. Murphy and myself how we had made the survey. We told him we had divided through the block in the usual way and nothing was said at the time, but in the summing up he pointed out that this survey was made under Section 40. The surveyors were not there at the time to prompt their own solicitor so that the Might Company's solicitor let it go unchallenged, and I presume it came into the evidence in that way, and now it is fixed that we don't know what to do, whether we are entitled to divide up and work under Section 40 or 44, sub-section 3, but I think we will continue to follow the old methods the next time and state we are not making it under Section 40. but under Section 44, sub-section 3.

Mr. McMullen—That doesn't affect Section 40.

Mr. Ward—It doesn't affect Section 40 and it should never have been quoted in this case, but it was quoted by the solicitor for the Home Bank and the attention of the Judge was not brought to the fact that the survey was not made under that Section but under Section 44, therefore, it went undisputed and the decision was given on that point.

Mr. McMullen—What was upheld? The centre line?

(Mr. Ward reads report of case in Ontario Law Reports.)

Mr. Lang—Where did the division line come in this case, Mr. Ward?

Mr. Ward—In the centre of the twenty-two inch wall.

The President—The chief question which I wish to bring before you is, if you think it wise to let the decision of the Chief Justice go or that we should apply to the Legislature to have Section 40 confirmed. Section 40 as I understand it, puts the work in connection with Section 16 and 19. Of course the decision of the Chief Justice in this case is now the law, so that we can't use Section 40 for any surveys of this kind at all. It is only applicable to township surveys. It rests in your hands whether we will apply to the Legislature to have this Section 40 confirmed or any surveys made under it. There may be some of your surveys at present which may come up under this Section, and if you wish to have them made valid we will get this Section 40 confirmed. The effect of the ruling in this case, however, is this, so long as it stands, a plan or survey made by a surveyor under Section 40 except with reference to the re-establishment of lines in the township, a survey by or under the authority of the Crown is invalid, and if there are many of our surveys based on Section 40 I think it would be well to bring the matter before the Legislature for confirmation or adjustment.

Mr. Dickson—I move, seconded by Mr. Wilkie, that the paper and the decision in this case be printed in the proceedings.

Mr. Ransom — If when the surveyors were making the survey there and located the lot line, say two feet from the centre wall, I would like to have the opinion of some of the men on the survey, do they think that would have altered the case? If that lot line had been located two feet north or south wouldn't it still have been the main point of the decision whether it was or was not a party wall? If it was

proven it was not a party wall the south face of that would still be the boundary even though the lot line was shown to be, for example, two or three feet from that particular wall. In that decision I don't see why the Judge referred to that Sub-section 40 or to the methods of survey, because he didn't seem to take that into consideration in his final judgment. He seemed to base his whole judgment on the fact that it was or was not a party wall.

The President—I think Mr. Ward would tell you it wouldn't make much difference whether the line was placed two feet above or below; the Judge has taken the southern limit of this wall as a lot line. Isn't that your idea, Mr. Ward?

Mr. Ward—I don't know, I don't think if it had been placed to the south the Might Directory would have undertaken to interfere with the party wall. They wouldn't have been entitled to have tampered with the wall. They were just going up to their lot line, their title limit, by channelling into the wall. If we had found the lot line to have been along the south face of the wall they would not have interfered with the wall in any way.

Mr. Fullerton—It appears to me it was very fortunate that Sub-section 3 of Section 44 was not mentioned during the course of the proceedings, because then we would have no law to use in surveys in cities at all. So far as I can see it happened to be incidentally that he referred to Section 40, and the merits of the case rested altogether on the matter of evidence that this was not a party wall, and therefore it was the best evidence as to where the line between Lots 1 and 2 had always been, and if Sub-section 3 of Section 44 had been quoted it would have been just the same.

The President—If that had been quoted that would probably have been wiped out too by the Chief Justice. The question is whether we are going to let this judgment go or not. As I understand Sections 16, 19 and 40, they always work in together and Section 40 is applicable to any survey made in a town or city, or any survey made under Section 16.

Mr. Fullerton—Is there any real difference between those sections? We still have the other one to fall back on.

Mr. Dobie—It seems to me that this is a case where either Section 44 or 40 would not have made any very great dif-

ference, that a survey made under either method might as well have been upset under that judgment, for this reason that the basis of all surveys is, to get back to the original evidence. If the stake is gone you have got to take the best evidence on the ground as to where it stood. The Judge bases his finding on the fact that the stake having disappeared, the best evidence that is available now is a wall that was presumably built at the time the original stood there, consequently he accepts that wall as the best evidence of the position of the stake, and throws out the survey whether it was made under Section 40 or 44.

There is a point that is not very clear in my mind, and in order to clear it up I want to read part of Section 40. Section 40 is divided into two parts and it appears to me that one part of Section 40 is being neglected and the other being acted on entirely. (Reads Section 40.) The second part goes on "But if the same cannot be satisfactorily ascertained then the surveyor shall measure the true distance between the nearest undisputed points, limits and monuments and divide such distance up," and so on. It seems to me that the method of survey that the Judge objected to has been made entirely under the second part. He objects to the method of proportioning the lots. Was that the method that was employed?

Mr. Ward—Yes.

Mr. Dobie—In referring to Section 40 you do not refer to it as covering that wall as the best evidence of the position of the original post, but as to the method of sub-dividing between the block corners.

Mr. Ward—That is it.

Mr. Dobie—If you accept that wall as the best available evidence as to the position of that monument, Section 40 governs that survey and the survey is correct under the first part, but if you take the other part and proportion the lot up and disregard the wall which is evidently the best evidence of the stake in the first place, the survey is upset under the first section.

Mr. Burwash—The party wall is not evidence.

Mr. Dobie—But the Judge accepted it as evidence. As I understand the Judge goes back and cites these American cases where a stake is gone and you can't find any other evi-

dence, if there is an old fence or building that was presumably there when the stake was there, that that is the best evidence that you can get as to where that stake originally stood.

Mr. Ward—I think the Judge first satisfied himself on the construction of the wall, that it wasn't a party wall, but there is room for argument. He has taken the stand that those set-ins on the north side and south face being plumb, that the wall was all on the property of the appellants, and, therefore, if the wall was all on their property that it was built to the lot line. but the first thing he decided was whether it was a party wall.

Mr. Ransom—Do I take your meaning to be that the Judge gave his decision really under the first clause of Section 40. that he really acted upon that?

Mr. Dobie—I think so.

Mr. Sewell—I don't think he did. It was a matter of occupation.

The President—The Chief Justice's decision with regard to Section 40 is this, the mode of survey adopted is not authorized by Section 40. (Reads from Judgment.) That is the only case in which you can use Section 40 in the future, and that is in original surveys in the township made by or under the authority of the Crown. The question is whether you are going to let that decision go or not.

Mr. McMullen—I don't think the Judge had very good reason for saying that by following the reading of Section 40 where it says any original survey as shown in the plan and field notes thereof of record in the Department.

The President—But there is Section 19.

Mr. McMullen—But still we have Section 44, which clearly covers city surveys.

Mr. Dobie—To my mind Gentlemen, as a general proposition Section 40, the latter part of it, and Section 44, also, only apply to cases or are to be used only after you have exhausted every other method to identify an original corner to discover the position of a monument, and if the monument is there well and good; if the monument is gone then you exhaust every means of trying to find where it originally stood. I think all precedent goes to show that buildings and fences and struc-

tures of that kind that were built when the posts were presumably there, are the best evidence that you can get.

Mr. Ward—Apparently so, because the Judge quotes that Michigan case.

Mr. A. J. van Nostrand—Mr. President, I don't wish to prolong this discussion unduly, but it seems to me there are some facts in this connection that were not brought out in Court, one I think I am clear upon is this, the piece of land covered by the registered plan was not privately owned, it was public lands; it was sub-divided in 1837 by Thomas Young, architect. His name does not appear in the list as a land surveyor. Then the lands were leased from time to time, and finally sold, and this wall in question must have been built many years after 1837, and it is quite an open question as to whether any original posts were planted to define the individual lots; therefore, it is rather going afield to assume that the wall was erected on the line of the original post between Lots 1 and 2. Of course, we don't presume to criticise in any way the actions of our Court in this free country. We may say what we like about the Sovereign, but not about the Courts. It would be unfortunate, it seems to me, if this case were to be allowed to stand as an interpretation of the Statute. The particular Section or Sub-section referring to it or intended to govern re-surveys in cities, towns and villages was designed by the land surveyors themselves. The Legislature has been good enough for the past thirty years I think, at least, to regard the land surveyors as knowing more about the Survey Act than the Legislature itself, and any suggestions that came from the land surveyors were taken in good faith, and if necessary, pared down a little, but were usually crystallized into a Statute. I remember very distinctly when the attempt was made to make it clear as to how we should make resurveys in cities, towns and villages of lands that had been sub-divided by private owners, that is to extend the provisions of Section 40 into the lands privately owned, and this Sub-section 3 was the result of the very careful consideration of some of the best and oldest surveyors. I think it was in 1897 it went in. I remember in 1887 we made our first attack on the Survey Act. The Association first had a turn at it, then the Board of Examiners and then some other body had its turn, the result was the decennial revision of 1887. In 1897 we went through a similar experience, and we hoped we had got everything straightened out. Since that we have had another attempt

at a more recent revision of the Statutes, and finding this case resulting from the Statute that we had ourselves passed upon it, is not to be wondered at that the candidate coming up for examination regards the Survey Act as a rather hopeless proposition. The fact that Sub-section 3 of Section 44 was not quoted as I understand it was not, may or may not affect the validity of the finding. I don't know whether it is the business of the court to apply the Statute whether it is quoted to the Court or whether it is simply read by the Court from the Statute, but in this particular case, I think it was Chief Justice Meredith and we would expect that he would have a thorough knowledge of the Statute, he was Chairman of the Revising Commission and was, therefore, conversant with all points in the Survey Act, and we must assume that his finding was with a full knowledge of what the Act contained. Then that finding went before the Court of Appeal, four judges sitting, three agreed with it, confirming it, and one dissented. That meant that the Court of Appeal sustained the original finding. Therefore, it is liable to be quoted to us as a precedent. In the meantime the question comes up are we as land surveyors to be governed by the Statute as we find it or by certain Court interpretations of the Statute? For myself, I think the Statute is our authority and that we make our surveys in accordance with the statute as we find it and stand or fall by that. It may be that the next case that comes along may be in different hands; it may be a similar case, but the Counsel may have changed and that may have an effect on the result. There is no doubt that the Counsel succeeding in this case was a very capable able man and that possibly had its influence on the result of the case. In the meantime I am for standing by the Statute as we have it and I don't see that we can mend matters very much by applying to the Legislature for any further change in that particular.

Mr. Routly there is one phase of this discussion that strikes me—I am not very familiar with surveys of this kind, but does not this touch our whole question of possessory title? According to the learned Judge's decision this wall was the best evidence of the position of that lot; that the lot line lies where the wall is, and we have had a great deal of discussion here regarding possessory title, and I think, although I am not perfectly sure, that very often we accept fences, or other people obtain possession or right to certain property by reason of having fences over the line, and you make the survey and determine where the proper line should be and you say the balance of the land has been gained by right of posses-

sion. According to the Judge's decision that would hardly be the case. The law really is that where the fence is that the original survey was more or less irregular and the man has not got the land by right of possession, but he has got it when he built his fence, and that fence is really the best evidence of where the stakes originally were.

Mr. Lang—I think the most of us would agree entirely with Colonel van Nostrand. I recollect one case where it was held that the interpretation by the judge is the best evidence obtainable, and we took it as a principle of equity that the least disturbance to be caused was the best solution, and I think that would apply generally no matter what changes might be made in the Act. The principle of equity which the Judge quoted in this foreign case was under a Survey Act which was not comparable to ours and was made applicable and he was guided somewhat by this. I think the best we can do is let sleeping dogs lie and not stir up any more trouble for ourselves in this connection than we can help.

The President—It seems to be the general consensus of opinion we had better leave this as it is and not make any application to the Legislature.

The President put the motion, moved by Mr. Dickson, seconded by Mr. Gaviller that the paper be received and printed in the proceedings, which was carried.

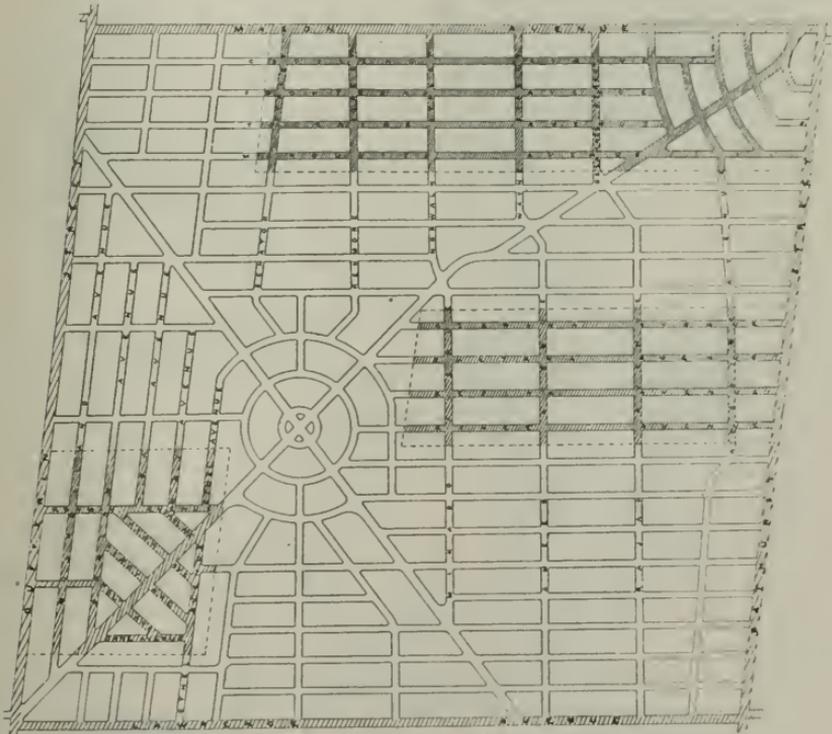
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CITY AND SUBURBS PLANS ACT.

By T. D. Le May.

While members of the Association of Ontario Land Surveyors are doubtless familiar with the provisions of the City and Suburbs Plans Act, yet a short summary may not be out of place. Passed in March, 1912, it seeks to give cities of 50,000 and over a voice in the planning of the lands adjoining the city limits, which, sooner or later, by annexation will become part of the city itself. The limit of this control is fixed at the arbitrary distance of 5 miles, regardless of everything, thereby creating a doubtful situation along the 5 mile limit itself, which naturally does not conform to property lines or anything else. Briefly, the machinery provided for the consideration of plans is as follows. The owner to file a copy of his proposed sub-division plan with the clerk of the municipality in which the land is situate, with the City Clerk, and with the Ontario Railway and Municipal Board, with a formal application for approval of the same. Twenty-one days are allowed to the Municipalities to file objections with the Railway Board. If no objections are filed the board is instructed to give consideration to any general plan of sub-division of the district that has been prepared by the city. Or, failing that to the general lay out of the adjoining lands, and when satisfied, to formally approve of the plan as submitted or as amended. If objections are filed the Board must appoint a time when all interested may be heard, and subsequently approve the plan as submitted or amended. The decision of the Board is final. From this it will be seen that a City is only able to secure the maximum benefits under the Act when it is in the position of knowing exactly what it wants, and of being able to show as a basis for its recommendations a comprehensive plan of the whole area within the 5 mile limit. In the case of Toronto the difficulties as first created by the new legislation may perhaps be appreciated if these two points are borne in mind. Firstly—That the area to be controled amounted to upwards of 150 square miles, of which topographically speaking, hardly anything was known except the general information that the whole district was more or less cut by the ravines of the Don and the Humber Rivers and their tributaries, none of which

were located more closely than was necessary for the purpose of the County map; and secondly—The real estate boom was at its height, had been in full swing for a year or so and the whole district had been dotted with sub-division plans designed obviously from a standpoint of frontage, the question of main roads (other than Government Road Allowances) and the connection even between adjoining plans had been practically ignored. It will be seen from the Act that the executive authority is the Ontario Railway and Municipal Board. The City's power being limited to suggestion by means of the preparation of a general plan to which the Board should require plans to conform as nearly as possible. This means practically a draft sub-division of the 150 square miles referred to above. Sufficiently accurate to locate any proposed streets thereon within a foot or so, for the purpose of comparison with and criticism of any plan submitted for approval. The first and most urgent step was the provision of Main and



PROPOSED STREET SYSTEM
 LOTS 6-10 CON 11 W. YONCE'S
 COUNTY OF YORK
 1867-1868

PLAN "A".



PLAN "B".

Radial Roads of adequate width for all future needs, and for these a standard width of 86 feet was adopted, allowing for a 20 foot track allowance with 33 feet on either side for driveway, sidewalks, etc. To carry out this first step, about 80 miles of Diagonal Roads were located and monumented at each intersecting lot line with reinforced concrete, 4 inches square and 3 feet long. As a general rule these roads were designed to connect diagonally, points of existing or probable local importance, with the most suitable main city streets, having due regard to proper grades and local centres en route.

A general plan was prepared, plan "A," shewing these roads as laid out, as well as all government road allowances and other main roads and calling for the widening of the two latter on all subdivision plans by the dedication on either side of half the land necessary to make the road 86 feet in width.

The next step was the survey of the blocks created by these diagonal and other roads, particular attention being paid to existing lot lines or possessory boundaries, which, of course, where powers of compulsory purchase are lacking, must have considerable influence on a draft sub-division covering a whole block. These surveys provide transit control for the third step in the preparation of the final plan, namely, a topographical survey by plane-table and stadia (plan "B"), locating contours at 10 foot intervals, all bush, isolated tress, creeks and other physical features, permanent buildings, and fences. In fact everything necessary for the satisfactory preparation of a sub-division plan of the block in question. The final plan follows and in it lies the chief difficulty. Troubles which previously have been physical ones now become personal, and an accurate knowledge of all title boundaries is necessary. While generally for town planning purposes we are accustomed to treat a 1,000 acre block as a unit, yet it must be understood that each such block is made up of many parcels which must be treated individually in such a way that each is an independent sub-division with proper facilities for communication with an established highway, and yet, fits in with a general scheme for the development of the whole (plan "C"). And further that each parcel has an owner who feels that he, of all others, is entitled to special consideration. As an instance I might state the following. Four 200 acre farms in a block are undivided while the fifth has been years ago cut up into 5 or 10 acre lots, these lots being sometimes held singly and sometimes 2 or 3 together. The trouble arises when owners insist on the same percentage of land should be taken from each

for roads. In some countries where the rights of the community are superior to the rights of the individual a problem of this nature is dealt with by pooling the land, laying out the road with a proportionate division of the balance amongst the original owners. We have not reached this stage yet, we have no powers of expropriation and must perforce respect title boundaries. The final plan for Toronto is not yet completed, but all those sections adjacent to the present city limits have been dealt with and the work on the remainder is proceeding as rapidly as possible. Since the passing of the Act some 350 plans have been considered and made to conform to the general scheme and while a great many of these have been situated in sections for which the final plans have not yet been prepared, yet we have been able, in most cases during the 21 days allowed for consideration to go deeply enough into the matter to secure a general idea of what was necessary to make any such plan fit in with what had gone before and what was to come after. At first some difficulty was experienced in respect of the Diagonals, and dedications for street widening but surveyors and owners now realize that we are planning a Toronto of the future, a Toronto of a million and more than a million that will need all the facilities we can give it for rapid transportation and direct communication between the city itself and the various suburban centres that will doubtless be established and that while these things must entail some small sacrifice yet they constitute a duty that is owed to prosperity. The Act so far as it goes is serving its purpose, but it does not go far enough. It is not only the big cities that need town planning but the small cities and towns, lest they in their turn have to face later on the expense that Toronto is facing now for necessary street extensions and widenings. Prevention is better than cure, and it is to be hoped that before long they too will be permitted to make some provision of this nature for the future.

DISCUSSION.

Mr. Le May—As far as the district around Toronto is concerned we didn't know anything of the topography; we had the county map and on it the rivers and so forth were just sketched in, but there was nothing to enable us to draft a plan for its sub-division.



The frontage was the first consideration with the owners and they laid their roads out in order to enable them to get a maximum frontage out of their lands.

This plan shows those diagonal roads. Toronto was laid out with a rectangular system, it was not a sectional system, but roads were run all around the mile and a quarter blocks in the lower part of the city.

These diagonal roads that we laid out as shown here on sketch connecting all of them with streets within the city itself which were virtually diagonals, for instance here is Vaughan Road which is an old travelled road, it goes so far in a diagonal direction and then stops, our idea was to carry that out and connect that with Thistleton.

The reason for the jog here on Bathurst Street is that this land in here was already subdivided, and as the Act only gave us power to deal with unsubdivided land we must perforce avoid this or resort to powers of expropriation which we haven't got. There are about seventy miles of those roads altogether.

Taking the blocks outlined by original allowances for roads, by diagonal roads we sought to run a traverse around those to provide some kind of control over the work that was subsequently done.

This is a section of our topographical plan; the scale renders it rather difficult to see at this distance, but the brown lines are the contour lines. We endeavored to locate everything inside, and we have been working on that for two summers and we are getting along. Eventually, I hope it will all be completed, there is so much of it to be done. This shows the Don Valley and this is York Mills here.

I have here a plan which would be a sample of the individual block plans covering a thousand acres, that we are preparing for different sections. The pink shows streets which are already laid out, the green shows streets we hope to get on sub-division plans, that is vacant land. The plans for the sub-division of those streets will have to be submitted and we shall insist as nearly as possible that the streets outlined in green shall be carried out. There are other streets shown in

blue; those are streets which are necessary to the proper development of this district, but which we can only get by expropriation, and one or two small portions of streets here we found necessary to recommend the closing of.

The President—Gentlemen, you have heard this splendid paper by Mr. Le May. I would like to hear it discussed.

Mr. Murphy—I think with a very interesting paper like that and the drawings which accompany it, it would be almost necessary for a person to read that paper and to see the drawings or a reproduction of them, if there could be some way of getting a reproduction to accompany the publication of the report, which I think would be a good thing. As it is now you have Mr. Le May's paper, and a description of the method, but it refers to streets and so on and I don't think any person could understand the thing unless they had a plan before them, so that if there is any way by which we could reproduce those things it would be a good thing, so that the people reading the paper could see just what was referred to.

Mr. Barrow—I think that question of town planning is one of the most important questions that is now before the people, but it seems to me it should go more deeply into the matter, and not only as to the condition of the streets and roads but also that of the parks, then the factory districts and other things of that sort should be included. I don't know whether the paper is merely intended to speak of the roads.

The President—Gentlemen, I think we should have those plans reproduced in our report.

Mr. Wilkie—Mr. Chairman, I have listened to this paper with a great deal of interest and some pleasure, as this matter is in a slight way affecting the work at which I am at the present time engaged. The matter is a very important one from a number of standpoints and it seems to me it was not taken up early enough. Of course, coming in as it did and our doing the best we can with it will do a great deal of good and prevent a great many difficulties which have taken place in the past. I would have a great deal of pleasure in moving a vote of thanks to Mr. Le May for this paper and I would like very much to have it printed in the proceedings. If it were possible I would suggest that photographic reproductions of these plans, if they could be taken and got in suitably, be in-

corporated with the paper. Possibly that is Mr. Le May's intention anyway.

Mr. Jackson—I have much pleasure in seconding Mr. Wilkie's vote of thanks to Mr. Le May for his paper. Mr. Le May mentioned that the City and Suburbs Plans Act affects cities of over 50,000, and while that can only affect some four or five cities in the Province, I think it is the hope of most of us that the Cities and Suburbs Plans Act will be extended to cities of less than 50,000 and possibly towns, because I think most of us in the country districts feel that damage is being done to-day in the smaller towns, which, as Mr. Le May remarked, will be almost irreparable when they grow to anything like the size of Toronto. I think the value of the paper we have had would be very largely lost if the Association is not able to have some form of reproduction of those maps in the next copy of the minutes.

The President put the motion, which was carried.

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A MODERN CRUSHING PLANT.

James S. Dobie, O.L.S.

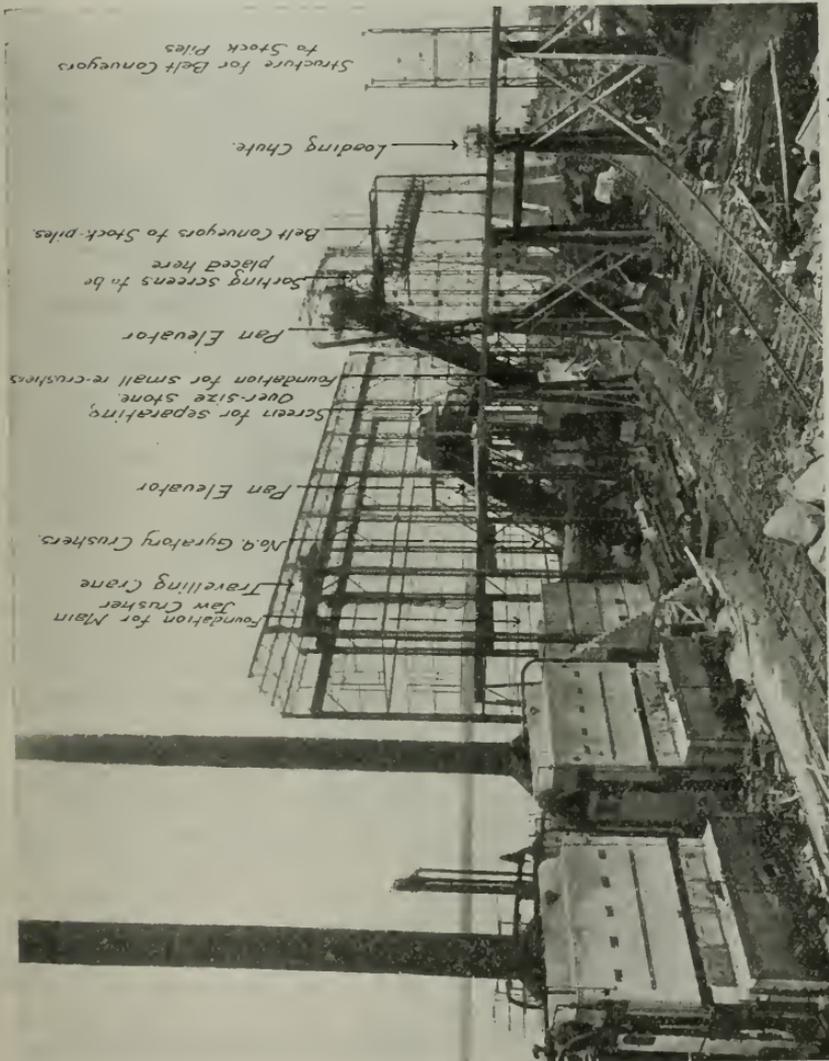
About sixteen years ago, a firm of paving contractors in the City of Cleveland, Ohio, were awarded a rather extensive contract for the construction of pavements and boulevards in the parks and suburbs of that city. These streets were all to be surfaced with trap rock, on account of the well-known wearing qualities of this material.

Extensive deposits of trap rock occur in the New England States, in New Jersey where they form the famous Palisades of the Hudson River, and in other parts east of the Alleghany mountains. No deposits, however, were available in the northern states, which could be reached from the lake cities, except at a prohibitive cost. Large deposits, however, occur near Bruce Mines, on the north shore of Lake Huron, where the copper mines, famous years ago, occur as veins in this material. The company, therefore, purchased a property near the Bruce Mines, and opened out a quarry for the purpose of supplying their own raw material.

This quarry was operated on a very small scale, the rock being broken with steam drills, and loaded into small cars by hand. These cars were then dumped direct into a steamer, and the rock taken to Cleveland, where it was crushed and screened. The United States tariff at that time practically prevented the crushing and screening being done in Canada. Notwithstanding the great cost of production resulting from this method of handling, the quarry was operated for a number of years, and the rock produced obtained a great reputation, on account of the excellence of the streets which were built from it.

About three years ago a syndicate was formed, known as The Martin International Trap Rock Company, Limited. This syndicate purchased the original quarry, and other trap rock lands adjoining, and proceeded to erect a modern crushing plant, intending to operate on a large scale, and supply the market for first class road surfacing material, which was developing so rapidly, under the impetus of the good roads movement.

A few words may not be out of place, descriptive of trap rock, and of the qualities which make it so very valuable for road and pavement purposes. Briefly speaking, the term



Martin International Trap Rock Co. Plant Under Construction

trap rock is applied to an igneous rock, the different varieties of which are known as basalt, diorite, diabase, gabbro and peridotite. They are all distinguished by their dark color, high

specific gravity, great hardness and toughness, and high cementing value. Wherever trap rock can be obtained for surfacing roads or pavements, it is used in preference to any other material. Its great powers of resistance to the wear and tear of heavy traffic, resulting from its extreme hardness and toughness, and the high cementing value of trap dust and screenings, make it an ideal material for surfacing any kind of roadway subject to heavy traffic. Engineering authorities place the relative desirability of the rocks available for road making in Ontario in the following order: 1, Trap; 2, Syenite; 3, Granite; 4, Limestone; 5, Schist; 6, Gneiss; 7, Quartzite; 8, Sandstone; etc. Concrete made from crushed trap rock is extremely tough and durable, and a concrete road made with crushed trap rock and cement makes an ideal highway.

On account of its extreme hardness and toughness, the handling of this material at a cost which will allow it to be extensively used is a matter of considerable difficulty. It is very hard to drill, takes a lot of powder to break, has a tendency to break out in irregular chunks hard to handle, and is very hard on crusher jaws and machinery in general. In quarrying a stratified rock such as limestone, it is generally possible to drill and break the rock so that one of the cleavage planes between the strata, can be used as a floor. The rock is blasted so as to break down to the level of this floor, and a steam shovel works with very little trouble. With trap rock it is different. Here we have a massive rock with no regular cleavage planes, such as exist between the strata in limestone, and the working of a steam shovel is a matter of some difficulty.

The method employed in drilling, blasting and loading on cars is as follows. Clipper drills are used. These are very heavy, the drill and stock weighing about 2250 to 2400 pounds, and operate on the principle of a well drilling machine. Each drill is driven by its own steam engine and boiler, the whole apparatus being mounted on traction wheels to facilitate moving about. These drills will only work in a vertical hole. The drill is raised about a foot and a half, and drops by its own weight, like a pile driver hammer. The speed is so regulated that the rebound of the drill is utilized to help raise it for the next blow. Each drill sinks a six inch hole, and averages about a foot and a half to two feet per hour. Two men are required for each drill, one man looking after the drill, and the other one attending to the engine and boiler. Each hole is drilled several feet below the level on which the shovel



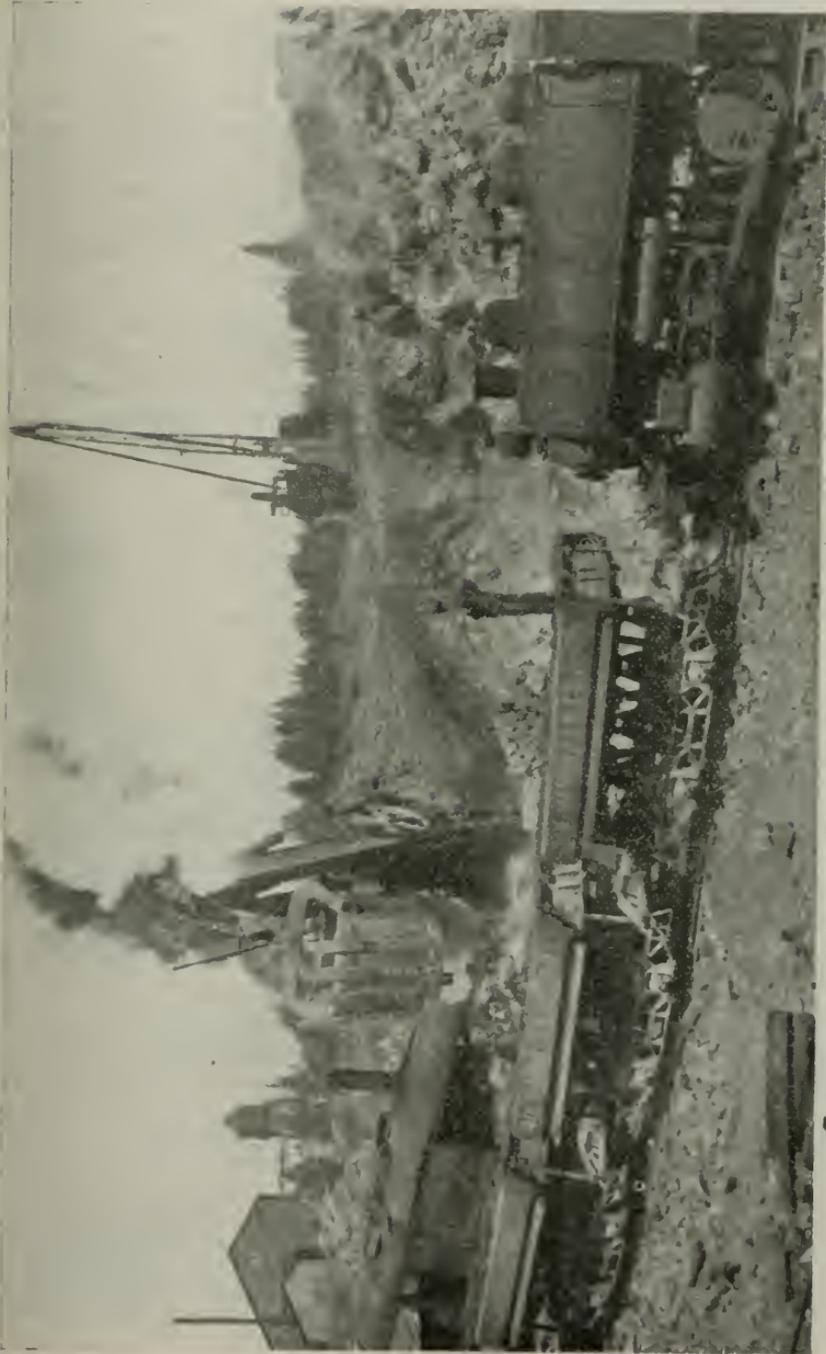
Quarry Face.

operates, as it is found that it is impossible to operate the shovel to the bottom of the hole, on account of the irregular manner in which the rock breaks out. The holes are drilled in a line several feet back from the quarry face, and are capped till ready to fire.

Several holes are fired together by a battery, after being charged with 60 per cent dynamite, in the form of cylindrical cartridges, 4 inches by 8 inches, weighing about five pounds each. The proper placing of the holes requires considerable judgment, as irregular seams in the rock affect the way in which it breaks out. About 25 feet is the average height of the quarry face, and the holes are set back about 8 to 10 feet from the face.

After blasting, the rock is loaded on side dumping steel cars, holding about ten tons each, by a 110 ton Bucyrus steam shovel, having a five yard dipper. The handling of this material with a steam shovel is the only way in which it can be done economically, but as stated before, on account of the irregular manner in which the rock breaks out, it is a very difficult matter to keep the shovel going continuously. Often a large mass will confront the dipper, on which it is impossible for the dipper teeth to catch a grip, and some sand blasting is necessary, to start these pieces, and also to break masses too large for the dipper to handle. Two of the drills mentioned above just about keep one steam shovel going, and one shovel will handle about 1,500 tons per day of ten hours.

After being loaded, the cars are drawn direct to the crusher by a 40 ton saddle tank locomotive, on a standard gauge track. The main track enters the crusher plant just above, and a little in front of the main crusher, and the cars are dumped direct into the crusher. This crusher is a massive affair of the jaw type, and has a receiving opening of 60 by 84 inches. It has an estimated capacity of 500 tons per hour, but the actual capacity depends largely on the size of the rock fed into it. The outlet of the crusher closes to ten inches and opens to 13 inches. If the rock fed into it is well shattered at the quarry, it goes through this crusher very quickly, but when large masses are fed into it, the action is slower. On the upper stringers of the main crusher building is a travelling crane of the ordinary type, which can be used, when, as occasionally happens, a large mass falls from the car in such a way as to lodge on top of the crusher without entering. It is not found to be economical to put very large



Steam Shovel Drill, and Cars.

masses through the crusher, and they are either broken down by sand blasting, or else left aside to supply the demand which exists for such masses for rip-rap and other purposes. The crusher is built of cast steel, and all the wearing surfaces are of manganese steel. Some doubt was expressed when the plant was being built as to the ability of this crusher to stand up under the strain of breaking such tough, hard rock in such large quantities, but it has given great satisfaction, and the faces of the jaws show surprisingly little wear, considering the nature of the material to be crushed.

The large crusher above described breaks the rock to a size that will pass through a ten-inch ring, after which it is fed by gravity into two No. 9 Gyratory crushers, which reduce it to about 3 inches and under. These crushers are also of cast steel, with manganese steel wearing faces.

After passing through these two crushers, the crushed rock is all elevated by a conveyor of the pan type, and emptied into a large revolving screen, where all rock of a marketable size is sorted out, and the oversize stuff sent to smaller crushers and rolls to be recrushed. The re-crushing of the over-size stone is done by a set of rolls, a small jaw crusher with a receiving opening of 13 inches by 24 inches, and a No. 6 gyratory. These smaller crushers turn out only small sizes, ranging from dust to one inch. The stone is now elevated in another pan conveyor to a system of screens, which sort it into six different sizes, and after which it is carried on conveyor belts, and dropped on the different stock piles.

There are six of these stock piles, each with an estimated capacity of 12,500 tons, or 75,000 tons in all, when each pile is full. The stock piles are arranged in two parallel rows of three each. One row is in the same alignment as the building containing the crushers and pan conveyors, and the steel framework supporting the conveyor belts is simply a continuation of the main building. The other set of three stock piles is parallel to this set, and connected with it by conveyor belts running at right angles to the main conveyors.

Under each row of stock piles is constructed a reinforced concrete tunnel, through which runs a rubber conveyor belt 40 inches wide, on which the crushed rock is carried to a hopper, from which it runs through a spout over the rail of the steamer in which it is finally shipped to the market. The outer end of each tunnel is inclined upwards so that the rock can be emptied into a hopper at a sufficient elevation to clear



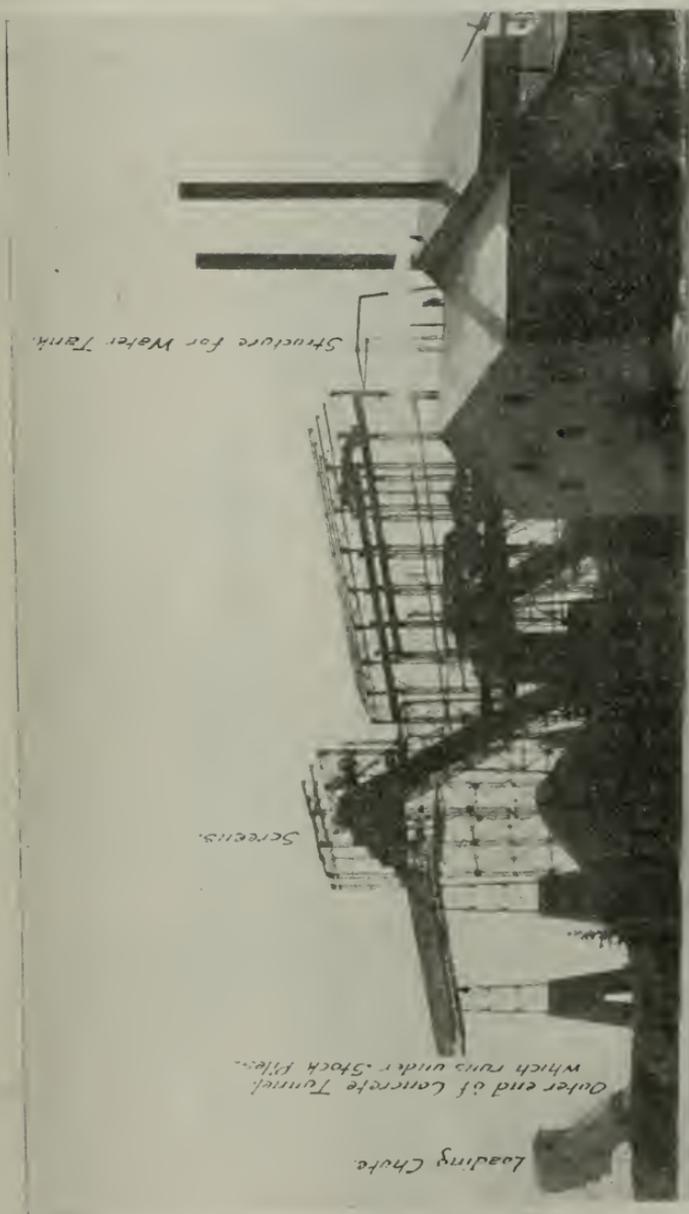
Clipper Drill.

the side of any ordinary steamer. The floor of each tunnel is just above the level of the water of Lake Huron. Trap doors have been built in the roof of each tunnel, under the different stock piles, and when a shipment is to be made, the trap door is opened under the stock pile required, the conveyor belt is started, and the rock is carried over an automatic weighing machine, which records the weight on a dial as the rock passes over, after which it passes through the hopper into the hold of the vessel. Each of these conveyor belts has a carrying capacity of about 1000 tons per hour. Steamers coming to load tie up across the end of these tunnels, at right angles to the conveyor belts, and can load from both conveyor belts at once if different sizes are being shipped. If only one size goes in a shipment, of course only one belt can be used.

This plant has a crushing capacity of about 5,000 tons per day. Only one steam shovel, having a capacity of about 1,500 tons per day is used at present, but it is the intention to add more shovels, and drills as the market develops. The total length of the crushing and loading plant, exclusive of the engine house is 520 feet. The highest point is 118 feet above the floor of the loading tunnels, this point being the roof over the conveyor belts leading to the stock piles. The extreme width of the structure over the stock piles is 84 feet. The crusher house and structure over the stock piles is all of steel construction covered with corrugated iron. The beds for the crushers are of exceptionally heavy concrete construction. The engine house is 76 by 106 feet, built of cement blocks, and the machine shop is 40 by 76 feet, built of the same material.

The power plant consists of two vertical water tube boilers, of 500 HP each, both equipped with Jones mechanical underfeed stokers, and Foster superheaters. A 1,000 HP Lenz patent cross compound engine is used, and rope transmission is employed throughout the entire plant. There is also a 250 KVA generator to supply electricity for lighting, etc., and for running the loading conveyors, each of which is operated by its own motor. The power plant is ample for the purpose, as is shown by the fact that the whole plant can be started with the crushers full, which is about as severe a test as could be imagined. Coal is used and is obtained very cheaply, as steamers coming up empty for stone bring it at a low freight rate.

The total cost of this plant is close to half a million dollars. Work was commenced on December 1st, 1912, and the



*Martin International Trap Rock Co
Plant, Partially Completed.*

first stone crushed about the first of September, 1913, although the plant was not completed until later. Crushing was started at the earliest possible date, as the company had a large contract on hand which called for only two sizes, and they started work on this contract before all the screens and conveyor belts were installed.

The sizes produced are as follows:

No. 1.....	Dust to $\frac{1}{4}$ inch.
“ 2.....	$\frac{1}{4}$ to $\frac{5}{8}$ inch.
“ 3.....	$\frac{5}{8}$ to 1 inch.
“ 4.....	1 to $1\frac{1}{2}$ inch.
“ 5.....	$1\frac{1}{2}$ to 2 inch.
“ 6.....	2 to any desired size.

each size being stored in a separate stock pile.

The stone as it goes through the crushers, under ordinary conditions, breaks in about the following proportions:

No. 1....	Dust to $\frac{1}{4}$ inch....	4 per cent.
“ 2....	$\frac{1}{4}$ in. to $\frac{5}{8}$ in.....	6 “ “
“ 3....	$\frac{5}{8}$ inch to 1 inch....	12 “ “
“ 4....	1 inch to $1\frac{1}{2}$ in....	18 “ “
“ 5....	$1\frac{1}{2}$ in. to 2 in....	25 “ “
“ 6....	2 inch to 3 inch....	35 “ “

These figures are, of course, only approximate, and vary greatly according to conditions, depending largely on whether the rock fed into the main crusher has been well shattered or not.

It will be seen at once that the greatest efficiency of the plant, as far as cost of production is concerned, would be obtained when the market conditions call for the production of stone in about the above proportions; as then each part of the plant would be fully occupied, and no stone would have to be recrushed. Unfortunately the market will not always work that way. Sometimes the demand for a considerable period of time is for fine stone only, and if the plant has to produce 35 tons of No. 6, which has to be stored, in order to get 4 tons of No. 1, to ship at once, the No. 6 pile will soon be filled up. It was to prevent the larger sizes piling up in this manner, while the market for fine stone was being supplied, that smaller crushers were installed. By utilizing these small crushers,



Martin International Trap Rock Co. General View.

the larger sizes can at any time be diverted before going to the stock pile, and sent back to be re-crushed into smaller sizes.

From the above description it will be seen that in New Ontario, an industry has been established which promises to become of very great importance to the country at large. Not only is a large industry being built up, which will afford employment for a large number of men, but a supply of road surfacing material of the very highest grade is now available at prices which will allow it to compete with softer stone, which does not begin to compare with it for wearing qualities.

DISCUSSION.

The President—Gentlemen, I am sure we are all deeply indebted to Mr. Dobie for his very interesting and instructive paper. Would any gentleman like to ask any questions.

Mr. Jackson—Could Mr. Dobie tell us anything, in the light of the experience at this plant, as to the relative merits of jaw and gyratory crushers, and also the names of the makers?

Mr. Dobie—The crushers were all manufactured by the Power and Mining Machinery Co. of Cudahy, Wisconsin. The largest crusher used here is the jaw crusher I described, with a receiving opening of 60 by 84 inches. This style of crusher was adopted because no other style would take the coarse rock as it comes from the quarry, on account of the large pieces which are sometimes loaded on the cars. I understand that very few crushers of this size and capacity have ever been built. The gyratory crushers work very satisfactorily after the rock has been broken down to a size which they can handle. For the re-crushing of over-size stuff, rolls were first used. It was found, however, that they were not satisfactory on rock over an inch and a half, as the larger pieces had a tendency to slip. The gyratory crushers have proven the most satisfactory for this purpose, but for handling the big stuff, the jaw crushers proved to be the best.

Mr. Grant—What are the conveyor belts?

Mr. Dobie—Rubber belts are used.

Mr. Grant—Do they have any trouble with weather conditions?

Mr. Dobie—None whatever, they do not operate in the winter. The rubber belts have given great satisfaction. After the belts in the loading chutes had loaded about 100,000 tons, when I last inspected them, they showed hardly any sign of wear, and were to all appearances as good as new. One reason is that the trap doors in the roof of the tunnel, through which the stone is fed to the conveyor belt, and so arranged that the stone is shot forward at about the same speed as the belt is moving, so that there is no drag on the belt, the friction is reduced to a minimum.

Mr. Grant—What about the conveyors from the crushers to the screens, are they of rubber too?

Mr. Dobie—No, these conveyors are not belts at all, they are pan elevators. The stone falls from the crushers into buckets which work on a sort of chain, operated by large sprockets.

Mr. van Nostrand—Of what material are the crusher jaws made?

Mr. Dobie—All manganese steel of the very best grade, and they have shown surprisingly little wear.

Mr. Jupp—What is the price of the stone at the plant.

Mr. Dobie—The price averages about 90 cents per ton f.o.b steamer. The larger sizes are cheaper and easier to produce, while the fine stuff costs more.

Mr. Jupp—Do you know what the freight would be from the plant to Detroit or Cleveland.

Mr. Dobie—They got a rate last season on cargoes of 1,000 to 2,000 tons of 35 cents per ton, and better rates should be obtained this year, because last year very little dredging had been done, and only small cargoes could be shipped. Last fall the dredging of the approaches to the dock was completed, and there is now a twenty foot channel right up to the dock, and large steamers can load without any difficulty. Until this dredging was done there was only about 14 feet of water. One further point I might mention with regard to the physical properties of trap rock, and that is that any mud that might form from powdered trap rock and water, deposited on the finest fabric, is reputed to dry and brush off without stain, which is a most important feature in road material.

Mr. Routly—Mr. Chairman, I have listened with a great deal of interest to this paper. I have had some experience with trap rock, and I certainly agree with Mr Dobie that there is no other material for surfacing macadam roadways that compares with it. One very fine feature is that it is always best in wet weather. Once you get your road built, the wetter it is, the better it is. You never get mud on a trap rock road as you do on one made of limestone. Dry hot winds are the hardest on it. I have much pleasure in moving a vote of thanks to Mr. Dobie.

On the motion being seconded by Mr. Speight, the same was carried with applause.

(This Association is not responsible as a body for the opinions expressed in its papers by Authors.)

DOUBLE FRONT CONCESSIONS OF THE EARLY THIRTIES.

By M. Gaviller, O.L.S.

When employed to make a survey of land in a township with which he had not formerly been acquainted, an O. L. Surveyor would naturally proceed to obtain from the Department of Crown Lands, a copy of the field notes of the original survey of that part required. He should inspect the instructions for the survey of the Township, and plan filed; also inquire as to any other surveys done under instructions from the Department, affecting the Township.

The plans of surveys of Townships, such as those under consideration, are familiar to surveyors, for the purposes of this paper, however, imagine a line drawn through centre of concession dividing into half lots, being the blind line.

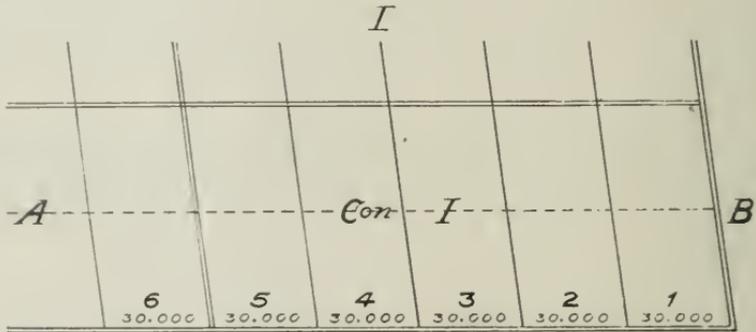
This line was not run in the Original Survey.

As a rule the method of sub-dividing, was, in the early thirties, to measure from one angle of Township, along the boundary, if formally run 66 chains 66 2-3 links, the width of a concession, and 50 links one half width of a road allowance. From this point a line was run for centre of a Concession Road Allowance. This line was blazed out on the trees and measured. At each 30 chains, for four lots, posts were planted, or trees marked at 50 links distant from the line, to define the angles of the lots on each side of the road, or in lieu of posts a tree was marked with the lot numbers, at angles of lots or on the centre line. Posts were planted, or trees marked for a Side Road Allowance at every fifth lot—These Side Roads were not run in the original survey. The intersections of hills, rivers, streams, lakes and swamps, and in some cases the growth of timber, were recorded in the field notes—This concession line having been completed to the opposite boundary from that of commencement, again the measurement for concession and road was made along this boundary and another concession line run parallel to, and divided in a similar manner to the preceding one. This mode of procedure was carried out until the survey was completed.

At that time the Surveyor's Compass was the instrument generally used for such surveys, and its use added "centre trees" to those blazed for the line.

The manner of chaining did not tend to as accurate work as required at later dates, and caused many variations as to the direction and the width of lots. In swampy tracts some parts of concession lines were not run.

To overcome the errors and omissions the Ontario Land Surveyor's Act, 1 Geo. V., C. 42, and amendments thereto provides instructions, the aim of which is, as nearly as the case will permit to carry out the intention of the instructions issued for the original survey.



Section 35 defines these Double Front Concessions as those "with posts or monuments placed or planted on both sides of the allowances between the concessions, and the lands have been described in half lots.

In proceeding to make a survey on the ground of the boundaries for one of these half lots, to define the width in front would probably be the first step considered. Section 35 states "that each end on such concession shall be the front of its respective half of such concession." Next comes the method of finding the corners, or angles, of the lot to be surveyed. Section 16 states that all boundary of Townships and all side lines and limits of lots surveyed, and all trees marked in lieu of posts and all posts and monuments marked, placed or planted at the front or rear angles of any lots or parcels of land under the authority of the Executive Government of the late Province of Quebec, or of Upper Canada, or of Canada, or under the authority of the Executive Government of Ontario,

shall be the true and unalterable boundaries of all and every such Townships, . . . lots or parcels of land, respectively, whether the same upon measurement be found to contain the exact width, or more or less than the exact width mentioned or expressed in any letters patent, grant, or other instrument in respect to such township, city, town or village, concession, section, block, gore, common, lot, or parcel of land." Section 17 states: "That every. . . lot or parcel of land shall embrace the whole width contained between the front posts, monuments or boundaries planted or placed at the front angles thereof respectively, so marked, placed or planted, and no more nor less any quantity or measure expressed in original grant or patent thereof notwithstanding."

When the above original survey posts or monuments cannot be found, Section 40, Sub-section 1, directs, that the surveyor shall obtain the best evidence that the nature of the case admits of respecting such side line, post or monument, or line between lots, but if same cannot be satisfactorily ascertained any original post or monument still standing, or the position of which is satisfactorily established on the opposite side of the concession road (or) on the centre line thereof shall constitute the best evidence within the meaning of Sub-Sec. 1, for the purpose of establishing the position of such missing post or monument."

The method of taking the evidence required is laid down in Sections Nos. 7, 8 and 9.

If none such points can be satisfactorily established the surveyor is directed by Section 40 Sub-Section 1, "to measure the true distance between the nearest undisputed points, limits or monuments, and divide such distance into such number of lots as the same contained in the original survey, assigning to each a breadth proportionate to that intended in the original survey as shown in the Plan and Field Notes thereof of record in the Department . . . having due regard for any allowance for road or commons set out in the original survey."

Having determined the position of the front angles, of the half lot, the next step will be to run the side lines. The method of ascertaining the bearing on which these side lines should be run is stated in Sections 21 and 22 and subsequent sections, pointing out what governing line shall be used to meet the case required, namely, "the course of the boundary line on that side from which the lots are numbered, shall be

the course of the division or side lines throughout the Township, provided such division or side lines were intended in the original survey to run on the same course as such boundary line," etc.

The manner of ascertaining such course is laid down in Section 39. "That it must be the same astronomical course, which shall be determined by astronomical observation or by other satisfactory method, as a straight line joining the front and rear ends of the governing boundary line."

The method of ascertaining the length of the side lines and to determine the rear of the half lot is laid down in Sections 35 and 36, which state: "The division or side lines shall be drawn from the posts or monuments at both ends to the centre of the Concession, . . . and a straight line joining the extremities of the division or side lines of any half lot in such concession so drawn shall be the true boundary of that end of the half lot which has not been bounded in the original survey."

This boundary is usually termed the Blind Line, and Section 35 the "Jog Section." This "Jog" occurs at nearly every lot, and on side roads in these surveys. When it is found on the ground that the front widths of the "half lots," of a full lot, as originally posted out differ considerably from each other it is easily seen how the "Jog" is caused. In some cases one half lot will "jog" entirely past the other half lot. As to the roads connecting side lines where the "jog" occurs in double front concessions see Section 663 of the Consolidated Municipal Act 1903. I consider that Section 42 applies only to the establishment of a Blind Line of surveys mentioned in Section 27, or where only every alternate concession line was run. Section 43 seems of doubtful wording. In some cases it may appear that no direct instructions are provided for the survey of lots of the kind being considered, but a solution can generally be found by endeavoring to carry out the intention of the original instructions.

As to the interpretation of Section 34, where "Any concession is bounded in front, or at either end, though not wholly, by a river, lake or other natural boundary, and no posts or other boundary marks were planted or made in original survey on the bank of such river, lake or natural boundary, etc., I think that the direction given might well apply to surveys where only the alternate concession lines were run; as in the case of Double Front Concessions, using the expression in the

rear would not apply, as a double front concession has no 'rear,' but only the half lots."

If the word any was eliminated, and special instruction given for the case of double front concessions, in a manner to carry out the intention of the original survey, much misunderstanding would be avoided. In drawing up descriptions for deeds conveying portions of lots in the surveys under consideration much care should be taken.

When it is found that "one half" of a full lot contains much more acreage than the other "half" and the whole lot belongs to one owner, who conveys one half or one quarter of the whole lot. Loose wording in a case of this kind has caused many a dispute.

DISCUSSION.

Mr. Dickson—I have much pleasure in moving that the paper be received and printed in the proceedings, but in connection with the jogs which Mr. Gaviller mentions sometimes in double front concessions one would almost overlap the other. I know of one instance where there is a jog of a lot and a half, 45 chains and some links, another instance in the same township where the west half of the fourth concession contains a width of 24 chains and the east half of the same lot in the same concession is 94 chains and something, and the west half of the same lot in the fifth concession is the same width, and it lacks a few links of being 24 chains. They talk about inaccuracies of surveys. I have had a good deal of experience but there is none that could make a patch to some that were made fifty or sixty years ago. I believe the law now is that they must employ an Ontario land surveyor and he has to fix the remuneration. I am very much pleased with that paper. Mr. Gaviller has had a good deal of experience and some tolerably strange surveys. I have much pleasure in moving the adoption of the paper.

Mr. Rorke seconded the motion that the paper be accepted and printed in the proceedings. (Carried.)

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POSSESSORY TITLES.

By F. N. Rutherford.

In the transfer of lands or other premises, the question of the validity of title is usually left for the consideration of a solicitor who will make search of all documents relative thereto and will advise the purchaser as to the right of the vendor to transfer such property, and as to the encumbrances, if any, that exist.

It would seem then, under such circumstances, that the services of an Ontario Land Surveyor were of very little importance, and that there was no field for his profession in the matter of investigating title; and such may be the case, with the possible exception of the title known as "Possessory Title" and then only in so far as he may place the matter clearly before the interested parties.

Possessory Title, or a title by occupation adverse to the owner, as shown by the regular conveyances, can only be ascertained by a survey of the land in question. The Land Surveyor requests and is given a deed on the property which may contain a description prepared many years ago, and the same description carried through to the present time, probably excepting various parcels of land thereafter conveyed to several parties. The conveyancer in passing on the title has made search of various recorded documents affecting the property and finds that the vendor has a right to transfer the land and that no mortgage or other adverse document exists. This is as far as the paper title relates. The surveyor goes on the ground and finds conditions which do not correspond with the descriptions contained in the deed and conditions of which the conveyancer or purchaser has no knowledge and of which he may have no method of knowing. The result will be that the purchaser may hold a deed to a parcel of land, the description of such parcel may not nearly correspond in area or limits to such area or limits as found on the ground by actual survey.

It would seem then that no title should be considered perfect unless a survey is made, and in this connection it probably would be a good idea if all transfers of land by deed should

have attached a plan showing accurately the land in question. Such plans should show all data as is required to be shown on any plan for registration. By careful checking by the Registrar of such plans, from information he already has available, he could request the filing of additional transfers, statutory declarations or other documents so that the paper or registered title may correspond with the actual conditions on the ground. The purchaser under such conditions will then have a reasonably positive assurance of ownership, and will know that there can be no question raised as to his right to occupy or transfer a certain area at a later date.

To deal with some of the instances where possessory title affects the surveyor in making such surveys, a division is made into two classes, viz.:—Public Highways and Private Properties.

Public Highways.

The public highway is necessarily an area set apart by the Crown for the convenience of the public generally, to be used by all persons in common with an equal interest therein, subject, of course, to any regulations that may be made governing traffic thereon and the use thereof. In the case of an unopened road allowance the owner of the lot adjoining has a possessory right to his portion of such road until such time as by-laws are passed making some other disposition of such land. This occupation might be termed a "limited possessory title." The ownership, owing to the land being originally intended as a public highway for the use of the public, cannot be acquired by length of possession. However, in preparing a description of such an adjoining lot, the portion of the road allowance should not be included nor should the area be included in the acreage, unless it can be shown that such area and acreage is also the exclusive property of the owner.

The public highway which has been opened and which may not be in its exact location, but has been in use and fenced as such a highway for ten years or more has the same status as if the Crown were an individual and the owner of the adjoining lot on which the road encroaches has lost his right to extend his boundary to the original limit. On the other side of the road, however, the owner of the adjoining lot is using a part of the original road for his benefit, but in his case he has no right by possession as against the Crown. Under these circumstances a road originally intended to be sixty-six feet in width may have an additional width acquired by the original

road and an addition by possession. However, in this latter case the three parties interested are the Municipality and the two lot owners. The Municipality should have no right to say that the road shall be left where it is unless improvement work has been done and public moneys expended on its construction or maintenance. The adjoining owners should be considered especially if by changing the road to its proper location no improved area is contained within its bounds. It would seem then that the only title in this case, so far as it concerns the surveyor, is a limited possessory title, and the placing of such road as near to its original position as possible depends, to a certain extent upon the judgment of the surveyor himself.

Private Properties.

In making surveys of private properties, especially in old settled districts great variations will probably be found between the deeds and what is actually found on the ground. The plans prepared some fifty or sixty years ago were not so clear in detail as they should be and land at that time was not of nearly so great value, and these facts have probably led to the preparation of deeds which, on survey, are found inaccurate. The duty of the surveyor when called on to make a survey from a registered plan should not try to justify the previous deeds so much as it should be to locate as nearly as possible by the correct method of location of the odd lot lines, and to show the relation thereto of the existing fences or structures which go to maintain possessory title. When this is done the duty of the surveyor is done and it is not a part of his profession to do other than report the circumstances to his client and let him take whatever steps may be necessary. The paper title to a certain lot may show that it was intended to be a certain owner and such owner has been under the impression that he owns such a lot as per certain plan; his fences and buildings were all erected within a certain limit which he considered as the boundaries of his lot. On survey it is found that his buildings and fences do not mark his lot and that he has lost any right to that portion thereof not used and has gained a portion of another lot. In making a description of an adjoining property it is quite right to include that portion lost from the other lot, but the fact of writing such a description does not affect or confirm the title thereto. It simply calls the attention of the purchaser to the fact that there is such a parcel of questionable land and gives him an opportunity to have the necessary steps taken to straighten

out the question of ownership. It is not the duty of the surveyor to interpret deeds, and although he may feel fairly certain as to what was the intention of the parties when the transfer was made, he has no authority to make a survey other than is expressed by the wording of the deed itself.

The case where there exists some substantial and evident limits of a property does not present such serious difficulty as does the case where there is only a partial marking of such limits. Occasionally it is found that a deed is given to a lot calling it by a certain number; a building is built supposedly embracing the whole frontage; behind the building there has been erected no fence nor is there any distinguishing mark of occupation. It is found on survey that the building is not on the said lot, but occupies a considerable frontage of the one adjoining and leaves at the other side a similar width of vacant land. The building has been erected for upwards of forty years and the surveyor determines the original lines of the lot and finds the building encroaching on another. In the rear of the building the correct lines will not include the area immediately behind it, and in the absence of any marks tending to confirm possessory title, it would seem that the true limits as per the plan should be located and the adjustment of the encroachment left to the owners of the two lots in question, and it is not the part of the surveyor's duty to attempt to justify for the owner any right to that portion of land immediately behind his building.

The area included for consideration for possessory title should only extend as far as there is open and visible occupation. If a fence line extends a certain distance and there ends that is also the extent of the part that can be claimed as being possessed, and from that point on the division returns as outlined by deed. This would be applicable in the case of many town lots where it is customary to run a fence from the rear of the lots forward towards the front a short distance and leave the remaining distance without any visible demarcation of the line and also with no visible line of occupation. It would seem reasonable that if the lateral fences to the rear were in place for ten years or more they could be taken as a fixed boundary even if they were not on the true lot limits. In the front, however, with no visible line of separation, it would seem that the limits should be placed where it is shown to be by the deed with reference to the registered plan to which it refers.

The fence line, however, should not be too rigidly adhered

to as constituting a basis for a survey. As an instance, a person builds a house; the parcel of land on which the house is situate has been enclosed to a much larger extent than is required for such house and to a much larger extent than the land enclosed has been visibly occupied, cultivated or used by the trespasser. In such a case only that portion visibly occupied should be considered and not the whole area enclosed by the fences.

The fence line as located by fence viewers appointed under the "Line Fences Act," also should not be too highly adhered to. The powers given to such fence viewers to change the location of a fence from the correct line if the nature of the ground is such, by reason of streams or other causes that the location on the correct line is impracticable, such location shall not in any way affect the title to the land.

The possessory title as a question of title entirely is a matter affecting the legal profession and the individual instances are so varied that it is impossible to formulate a general procedure in so far as the surveyor is concerned. The writer has attempted to show a few of the general characteristics of the questions which may be encountered and the reasonable attitude which might be adopted when such cases arise.

DISCUSSION.

After the reading of the paper Mr. Rutherford said:

Gentlemen, any discussion of this paper would be appreciated. The question of possessory title is such that the legal end of it is very far reaching, and it might be carried through from one Act to the other and some of those points might be cleared up, I think, by discussion.

The President—Gentlemen, you have heard this very valuable paper of Mr. Rutherford's. As far as I am concerned, where I come from nearly everybody who buys property comes to me about it, I always tell them that they should have their survey made. We would try to insist, and I think in Toronto it is the practice more or less, but down where I come from the people are very careless about buying property, and very often buy property which is not the property described at all. I would like to hear some of the members discuss this paper; it is a very valuable one indeed.

Mr. Speight—I have been deeply interested in this paper of Mr. Rutherford's and it ought to provoke a healthy discussion that we would all derive more or less benefit from. The question of possession is a wide subject to practising surveyors, especially in the old portions of cities that have been laid out many years ago and when imperfect plans were made at that early date. I don't know whether any of the members here know of any particular case, but there are a great many rulings. One of the last ones brought up by the paper was where a fence does not enclose anything. I know there have been two or three cases in the last few years in Toronto, but I can not at the moment recall them; they are more or less conflicting, but the last discussion I had with a member of the legal profession was that where a fence did not enclose anything it would not hold. It is a very wide subject, and I would like very much to hear some of the rest talk about it who are more able to speak than I am.

Mr. Dickson—I did not hear enough of the paper to be able to discuss it intelligently; I was very much pleased with what I heard of it, though. I would feel very much inclined to move a vote of thanks to Mr. Rutherford for the paper. On the motion being seconded by Mr. J. J. MacKay the same was carried and the paper ordered to be printed in the minutes.

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REMINISCENCES.

By A. L. Russell.

As your indefatigable Secretary would not be refused, and as the "Looking backwards" of other surveyors appear to have proved acceptable I am giving you a brief review of some of the incidents which appeared of most interest in my experience of nearly three score years on survey and kindred work.

Unfortunately, especially in a new country like Canada, my early education at U. C. College, Toronto, and High School, Quebec, consisted chiefly in obsolete languages and antiquities, etc. Technical education being very much in the background, and until I laid off work for a brush up at McGill University in surveying and engineering was receiving only a course in draughting in the Department of Crown Lands, with an occasional short trip with surveyor F. W. Blaiklock, P. L. S. of Quebec—a splendid all round man—to whom I was eventually articulated.

My first experience with him resulted in my getting nicely lost. He had asked me if I could safely be trusted to go back alone to the last camp, about five miles away, with only our footmarks to guide me, to hunt for a missing part of one of the instruments. Of course I could, I asserted, and trotted off boldly and by great care and good luck made the outward trip, found the missing article, and too confidently, started back. My absorption in the scenery alas took my attention from the trail and eventually I realized I was completely lost and as usual no compass or matches. As darkness was coming on and I was thoroughly exhausted I sat down, with my back against a large tree, and promptly fell asleep, awakened in the night by distant shots and yells. Both surveyor and pupil were "happy to meet again." It was our good fortune on this trip to come across a lost explorer who was devoid of food and matches and was wandering along on hands and knees with most of his clothing worn off. He would undoubtedly have perished but for our timely meeting.

My second outing was with P. L. S. Fletcher on the re-survey of the boundary between Upper and Lower Canada; from Lake St. Francis on the St. Lawrence to Point Fortune on the Ottawa. The recovery of the original initial monument, which, owing to the encroachment of the Lake on the shore by about 100 feet out in about 8 ft. of water and embedded in sand, by your humble servant who was, so to speak, the only amphibious member of the party, created for him a good impression, but his next effort very nearly caused a break up of the party and his utter disgrace. That night my chief instructed me to set up the transit over a certain hub and see that everything was clean and ready for an astronomical observation, which I proceeded to do, and, noticing some cobwebs in one end of the telescope, I promptly cleaned them out—I had never looked through a transit before and, having levelled and focussed the instrument and prepared the books and lamps summoned our chief who emerged from his tent and expressed his approval of the preparations and the weather. He appeared to be having some difficulty with the telescope and asked the first assistant to try his hand, but with no better result. Needless to say I collapsed when I found out that the crosshairs they could not find were spider web lines. As no one seemed to think it possible that they could be replaced in camp, a retreat appeared inevitable. Aided, however, by the 1st assistant, some beeswax and a spider I managed to restore them along the old markings so successfully that our chief asserted they were even better than the old ones and that he now felt safe for the future.

I was fortunately near by on another occasion when a surveyor on a big contract had the misfortune to have his crosshairs blown out and delay to him would be a serious loss. In less than half an hour his instrument was in good working order and he was trying to make me accept his valuable gold as a reward. Something like a case in point with a surgeon who charged \$5 for cutting a man's leg off and \$95 for knowing how.

Another experience I gained on this survey was the responsibility of a chainman. We had lost a chain pin, most likely in crossing a creek on a slippery log, and, as there was some uncertainty as to whether we had religiously compared notes for quite a distance back, we had to do the work all over again, arriving late at camp, wet and thoroughly tired out, and disgusted with each other.

I recollect a test made by the late Major Webb, O.L.S., who, as the chain was passing under his instrument, one day, closely noted the exact chainage and saying he wanted to be quite sure of the exact distance from the last tally, asked them to repeat the measurement and, when they were out of sight, moved the transit ahead a few links. The head chainman had also noted where the plumbob had been before and gradually pulling the rear man ahead to a similar coincidence, sang out "pull tight" and "all right." The Major remarked such work was "too good for anything" and asked them to sign the paylist and clear out. Judging from the surprised look on some chainmen, when sworn in according to law, I'm afraid all surveyors do not impress on their assistants the serious responsibility of their work. The worst case of chain practice to come under my observation was when a surveyor (every one from Nova Scotia or New Brunswick who could box the compass became a D. L. S. by Statute in those days) asked me, in all seriousness, if I believed a chain could become "enchanted." As I was not very busy and a little of the supernatural might prove a treat, I brought along my Quebec standard, discovered a fine long piece of square timber, and, with fine penknife blades, laid out a half chain length. On comparing his chain which he claimed was a "certified" one from Chesterman and "kept as a standard," I found an excess I'm afraid to mention. This chain was of the brazed link pattern with its hundreds of uneven contact surfaces and had been used on contract survey work in a sandy section of country and had never been altered. No wonder he could not then sub-divide into the expected number of lots a block of land he has surveyed with this same chain when first received. There were not many rings left in the chain when properly curtailed. The trigonometric survey from Fort Garry to Fort Ellice showed that the chainage had been throughout of a not quite similar, but too generous character.

My next experience in the field found me doing Topography, Photography and Fishing on a tour of investigation for the Government of the inhospitable and uninviting looking Island of Anticosti in the Gulf of St. Lawrence under the supervision of S. F. Gaudet, P.L.S. To be sent on a recuperating cruise of this nature after a severe attack of fever and be paid for it does not fall to the lot of many, and I shall ever remember with gratitude the thoughtfulness of the Hon., afterwards, Sir Alex. Campbell, then Commissioner of Crown Lands, for whom I had been acting private secretary.

During our sojourn at the Island a large full rigged ship piled herself up for keeps on the reef not far from where we were camped and as compasses have an attraction for surveyors I had an opportunity of examining the large ship's compass and was surprised to note its sluggish and eccentric behaviour. It seemed to me that the recovery of the insurance might possibly have not been too eagerly guarded against.

In connection with navigation work in this quarter I might mention the daring recklessness of the Anticosti fishermen who think nothing of setting out on a 60 mile traverse at night. Trimming their boats on a proper course, making due allowance for drift, tide, etc., they would coolly coil themselves up in a blanket, fall asleep and trust to Providence to save them from collision with passing boats, squalls, etc., on awakening in the morning they recognize the headlands and steer for their destination. These are the kind of men from whom the Mistress of the Seas enrolls her fearless and able-bodied crews. Our trip across occupied 3 days owing to a sudden severe storm driving the schooner out of its course.

For a considerable time I was engaged in the Draughting Division of the Surveyor-General's Office at Quebec, and I shall never forget a practical joke we—Eugene E. Tache, a son of the late Sir E. P. Tache, and myself—played on that estimable old gentleman, Joseph Bouchette, whose chief hobby and delight was the compilation of an extensive manuscript map of old Canada, which was eventually purchased by the Government for \$3,000. We took a large empty earthenware quart inkbottle, which he had been using as a paper weight, and, cutting out a large piece of black paper so as to resemble a huge blot placed it at the mouth of the upturned bottle over an important portion of his map. When we saw the effect of the shock on the old gentleman we were greatly alarmed and very much regretted our action. He kindly forgave us, but added that another such shock might prove fatal.

Confederation having caused the removal of the Upper Canada section to Toronto I accompanied that portion and my room mate went east to Quebec and was eventually selected as Assistant Commissioner of Crown Lands for that Province. He was a splendid draughtsman and artist and chiefly responsible for the new Canadian Coat of Arms at Confederation. While in Toronto I had the pleasure of compiling for S. J. Dawson, C.E., a map of the region between Lake Superior and

the Red River settlement to illustrate probable route of communication of which he was in charge, and shortly after in 1870, had the privilege and honor of accompanying the First Military Expedition, under Col. Wolseley to Fort Garry to maintain the supremacy of the British Empire in that important portion of our Dominion. The entire force numbered over 1,400, including regulars, volunteers, voyageurs and guides, and as due foresight had been exercised and no liquor allowed the entire trip of 600 miles and return, was a complete success and I often contemplate what might have happened had the result been otherwise. Would the "never setting sun" and "continuous roll of the drum" have thereafter figured so prominently across our vast continent? The time and conditions were critical. On my return to Ottawa I was asked by the Special Committee of the Privy Council to prepare the first projected map of the newly created Province of Manitoba. Long. 96° to 99° W. and Latitude 49° to $50^{\circ} 30'$ N., as it would appear were the U.S. rectangular block system of surveys adopted, as was subsequently approved for that region.

As the plan showed the Eastern terminus of the Fort Garry road on U.S. territory the, by no means welcome, "North-west angle" of the Lake of the Woods assumed a prominence which displeased my former chief, his contention being (contrary to subsequent final adjustment) that the "spirit" of the International Treaty meant that the boundary should run from the mouth of Rainy River to the 49th parallel, in the west side of the Lake of the Woods. The peculiarities revealed in connection with this debatable point have afforded matter for much learned discussion.

Shortly afterwards I was entrusted by the Postmaster General with the compilation of the first detailed Post Office map of Canada, a work which involved the collection of the most reliable data, and adapting the then, by no means, reliable local plans to this framework. This proved to be the initiation of a plan which was eventually published and is continually carried on by the Department showing details of much interest to the general public, all post-office, money order, savings bank, telegraph, and express offices being designated by distinguishing marks with all mail routes and distances given.

Shortly after its compilation I was offered, and accepted, from Sir Sandford Fleming an appointment on the engineering

staff of the C. P. Transcontinental Exploratory Surveys, which were to operate from Lake Superior westward and commencing at the Nipigon River, a section which many survey parties have tackled only to acknowledge defeat owing to lofty ridges and deep valleys running nearly at right angles to the desired direction.

The trip up from Ottawa was by no means devoid of interest. First of all our Grand Trunk train left the unreliable rails near Lansdowne with serious result and injury to some of the passengers. Although not seriously damaged our party's liberal allowance by the claims agent enabled us to have "the time of our lives" for a brief period in Toronto. Further on the steamer Cumberland bumped on the rocks in the Sault River at four in the morning, causing no little excitement among the not over attired passengers. The voyage across Lake Superior will ever remain as a pleasant memory, we had fine weather and a distinguished passenger list comprising the staff of several of the survey parties, who, like ourselves, were going out to forge links in the great chain which was to bind confederation. What with the fine weather, sextants, charts, nautical almanacs, etc., we managed to pick off the steamer's position on that inland sea with a precision which induced the captain to remark that he would gladly give anyone \$50 to teach him how to do the trick, but we conscientiously could not make the attempt.

On arriving at Prince Arthur's Landing all hands brought out and tested their instruments and there was a great scramble amongst the beginners to avail themselves of the chance to learn from their more experienced comrades.

The first effort of our party was to reach the west end of their division, working easterly from a point N. W. of Dog Lake, but this, chiefly owing to difficulties in transportation, had to be abandoned and a preliminary trial line commenced at Nipigon River working westward. When crossing the Great Dog Portage I made a sketch of those handsome falls, 118 ft. high, in my note book, also paced off the portage $1\frac{3}{4}$ mile, took difference of level by barometer, 2 readings, 350 ft. and took a latitude observation. The two parties working east and west from Nipigon River added little, if anything, to what was eventually adopted as the main line, the work being valuable, however, even if of a negative character.

On the withdrawal of the party in the fall the writer thought he saw an opportunity for "distinguished service,"

and requested to be allowed to remain and with two Indians and a small outfit of barometers, micrometer, prismatic compass and hand level, locate approximately the chief topographical features in advance of next seasons costly transit work. The assistant chief engineer not having authority—his orders being to withdraw the party—and there being no speedy means of communication with headquarters, the offer unfortunately could not be accepted and the result was expensive butting against impassable barriers with large parties in succeeding years.

A couple of years ago the Canadian Pacific Railway Co. had parties in the field looking over pretty much the same ground with a view of making a very important "cut off" from Nipigon to Savanne. The actual results have not leaked out and consequently no prophecy can be made as to when future railway competition may bring this about.

My years experience in the field convinced me that a University course was desirable and McGill appealed to me with its course in Surveying and Engineering. Amongst other classmates were H. K. Wicksteed, C. E. and O. L. S., now consulting engineer for the Canadian Northern Railway, and H. F. McLeod, now professor in the University. Our principal, the late Sir Wm. Dawson, was highly amused by the originality of our method of using the mariner's sextant, our artificial horizon being placed in a garden strip under our dormitory window where we were unaware it was visible from his residence or we would not have used, as a receptacle for the mercury, the discarded upper portion of a certain toilet article not generally put on exhibition. We again called for a remark as to our distinguished selves when we signed our plan of the University Grounds as surveyed and drawn by:

W. St. George Boswell,

H. King Wicksteed,

A. Lord Russell.

My stay at the University was terminated by a telegram which I received from Surveyor-General Dennis at Ottawa, which was as follows: "Surveyors Exams. in Quebec next month, if you pass can have charge of party in Manitoba at \$6.00 per day and all expenses." The bait was too alluring—a jump from \$2 to \$6 could not be resisted.

My examination for P. L. S. at Quebec required a survey of the Place D'Armes Square and as I had no instruments and knew no one there, I got up very early in the morning and with a tape, and two bradawls for pins, conducted the field work all by my lone self, checking the work by numerous diagonals and flattered myself that it would stand any test, but in placing my tracing over the standard of comparison the examiners heartlessly pointed out a small recess in a stone wall which I had overlooked. Having received my parchment I was placed in charge of township outline surveys south and west of Portage la Prairie, encountering a season of flies and mosquitoes which drove two other parties out of the field for several weeks.

I can recollect a very annoying slip I made when after running an equilateral triangle around some buildings on my first meridian and crossing a large slough, I observed for azimuth and, reading the vernier 10 minutes astray, used that bearing for a couple of days, when a fine night admitted of another check. There was great disappointment in the party owing to the extra 2 days of unnecessary hardship in that trying locality where 100F in the shade was registered during our stay.

A couple of Sioux Indians joined my party here who, it was rumoured, were not far off during the sensational "Minnesota Massacre." They were satisfactory assistants and it was their constant custom to have their blankets and guns on hand, and whenever horsemen appeared in sight, they would lay low and keep a watchful eye until the possible U.S. danger had disappeared. One of them was an exception to the usual unemotional Indian as he just loved excitement and enjoyed the amusing failures of all hands to master the various languages in camp, viz., English, French, Chippewa and Sioux.

While in Manitoba I was honored with an appointment as one of the two surveyors in H. M. British North America (49th Parallel) International Boundary Survey. My instructions were to proceed at once to the North-West angle of the Lake of the Woods and thence by water south to the 49th parallel and walk across, about 90 miles, to Pembina taking such notes as might prove serviceable to the Commission. As neither plans nor instruments accompanied my instructions, I had to depend on a box sextant, using molasses as artificial horizon, to approximate the latitude of my starting point, and

by a remarkable fluke started on my overland trip (sending my assistant by canoe via the Warpath River), almost exactly where ordered. The walk across was arduous, my packer and myself both carrying heavy loads, with only a small pocket compass as a guide. We arrived at Lake Rosseau and from there headed for Pembina where the main party were now encamped. While here I had the pleasure of being escorted over the U.S. camp by their genial Commissioner Campbell who instructed all the staff to afford me every facility to become acquainted with their instruments and methods, quite a contrast to the secrecy of the Royal Engineers on the British side. It was gratifying to have the senior officer of the Royal Engineers, when our first two tangents met, report somewhat as follows: "As at the same point, using the same reference mark (about half a mile west) Mr. Russell makes the azimuth 89-55-57.3 and my observation 89-55-57.5 we may consider these two observations as correct." Seeing that my transit read to 10 seconds only such accuracy was not anticipated by me. I found it hard to forgive this cultured officer for stealing, one evening, the reflector out of my transit telescope when the instrument was set up in a tent on my line. He absolved himself by saying that my party was of secondary consideration to his and his necessity urgent. I would have been pleased to give it to him had he asked for it and he was surprised to find my observation had not been interfered with. A 5-cent piece, a file and a small piece of wood produced a successful substitute in a few minutes.

As several learned dissertations on the many valuable results accruing from this important and extensive International work have been published I will not go further into details, except to remark that on the conclusion of the work I was pleased to receive a letter from H. M. Boundary Commissioner informing me that in reporting to H. M. Secretary of State, the chief astronomer had referred "very favorably" to my part in the undertaking.

W. F. King, now Dr. King, C.M.G., was one of the staff on the British side on this important work as well as on the "Special Survey" of the North-West Territories doubtless exhibited that taste for precision which characterizes the workings of his present distinguished staff in the Royal Observatory at Ottawa.

On retiring from this work I was asked to undertake the survey of the two townships immediately East of Pembina on

the boundary and as these were the days of high rates favoring certain local conditions of "bush," "dense bottom scrub" and weather, I am not now "letting the cat out of the bag" when I admit to occasional profits of over \$100 per day. As men and facilities increased these rates were so reduced as to bring about occasional losses. Dr. Deville, our eminently capable Surveyor-General, has had the superintendence of what is doubtless the most careful and extensive system of surveys ever under the control of one man.

My next work was the determination of the 1st base and a township outline (in connection with the first principal meridian), on the east side of the Lake of the Woods north of Rainy River, by a traverse from the well-known North-West Angle, and subsequently some block outlines involving over 1,000 miles of topography of main land and islands of Lac Plat, where Winnipeg's water supply will shortly be drawn from, and Lake of the Woods. All the surveys were in winter when lake work facilitates travel and frost bites. The greatest cold encountered was 50 below zero.

When at Rat Portage it dawned on me that a purely Canadian Transcontinental Railway was almost certain to cross the Winnipeg River at that point and that property there, especially a water power, would eventually prove very valuable, and on my return to Fort Garry commissioned a surveyor to lay out about 23 acres where the Keewaydin Flour Mills are now located, and as there was no dispute about provincial boundaries in those days I would have secured on unassailable title such as could not be attained for a long time afterward; but owing to errors by the surveyor and other complications I abandoned what would later on have become a small fortune.

On these works a couple of instructive incidents in connection with instrumental work occurred. First, one very annoying cause of non-closing topographic work was finally traced to a steel wire in the peak of a winter cap and had the courses not been plotted each day or so our final returns might have turned out very indifferent.

Another scare resulted from the overthrow of a Troughton & Simms transit by one of our horses. On picking it up and testing its adjustments I found it apparently impossible to get satisfactory results and proceeded to dismount it with a view of obtaining another from Fort Garry. As the cause of the trouble was a very minute "hold up" of the slow motion

attachment to the telescope, lifting one of the telescope axes in its V holding which dropped and made a slight "click" the moment it was loosened, I detected the trouble at once and escaped making an exhibition of myself at headquarters. There was no bent axis or sprung plate and everything worked like a charm.

Our next work was a triangulation survey of about 150 miles extending from Fort Garry to the 2nd Principal Meridian (Long. 102 west) about 30 miles west of Fort Ellice. This work was under the personal supervision of the Surveyor-General and those who were fortunate enough to be associated with him will ever feel grateful for the direct personal interest he evinced in each member of his staff, always ready and willing to assist in any matter bearing on the various problems which arose in connection with this very interesting work, and all deeply regretted the unfortunate accident, breaking of his leg by a runaway horse, which necessitated his withdrawal from field operations. The closing errors on this work were greater than anticipated, due, no doubt, to some station signals not being truly plumb and exactly centered also lateral refraction owing to low altitudes, smoke from fires, etc. Had the more elaborate quadrilateral, instead of the single system been adopted the probable error in any triangle would have been greatly diminished as pointed out in a recent paper by Dr. King published in D. L. S. Association Reports.

The following year our work consisted in running the 2nd Principal Meridian (long. 102 W) across one degree of latitude. By erecting high poles at prominent points in the line for backsights and taking numerous azimuth observations every fine day or night this line was run with a mean average deviation of $2\frac{1}{2}$ seconds, something which my staff, with the connivance of my picketman, put severely to the test one day, or rather night, when instead of placing my R. O. Lamp, about 30 chains distant, at the foot of the picket, he located it a short distance west and consequently my observations showed a grievous error which I resolved to correct for a couple of miles back.

When starting to work next morning, in reply to his usual eager question "How did you find the line, sir," I stated that I did not know which of us was to blame, but the line required correction. He then asked how much it was out and I replied he would not understand about seconds, well, he said,

how much would it be at the Lamp? The chainers furnishing the distance I figure it out as about 2 3-10 inches west. He then took a short stick out of his pocket which was exactly the length mentioned. I felt too happy to scold anyone and after that all did their best to keep the work up to standard.

I will never forget an experience I had, when returning home one fall. While my carts were trailing home from Fort Carlton I determined to explore the unknown Carrot River from a point a short distance south of Fort a la Corne on the Saskatchewan, where, near its headwaters, the stream was both narrow, shallow and tortuous.

You can picture our consternation when, at the end of the first day's very laborious efforts, we imagined we had made several miles to the good, we found not 200 yards from our starting point. It woke me up to the advisability of noting the bearings and distances, using a diminutive compass and estimating distances, also taking a few shots with a box sextant to approximate our latitude, in the event of a retreat becoming necessary. As starvation threatened us it was fortunate the navigation of the river improved daily.

At the end of 350 miles, by our estimate, we reached the main Saskatchewan River near the Pas Mission and I find in my diary: "Thank God, Saskatchewan at last." Here we outfitted with new canoes — \$20 apiece — and after losing time in Selwy's "Enastamosing" Channels into Cedar Lake and being ice-bound for a week at Mossy Portage into Lake Winnipegosis, finally reached Livingstone near Fort Pelly where I paid \$20 for a telegram home, which was forwarded one month after my arrival, the wires having broken down just as I left the North West Mounted Police Barracks.

That night I enjoyed immensely an all night's rest in a buffalo-lined toboggan driven by five dogs, finding myself 50 miles advanced at daybreak. This whole trip had occupied, owing to obstacles and weather, so much longer than anticipated that in some quarters we were given up as lost, an opinion, I was glad to find, not entertained by my chief and my wife, who had no doubt of the ultimate result.

As I had gambled on the possible outcome of the proposed Canadian Pacific Transcontinental Railway by investing in lands at Nipigon and Port Arthur the summer of 1881 found me at the latter place, which had always had an attraction for me and here, in partnership with my former university class-

mate, H. K. Wicksteed, C.E., we hung out our shingle just in time to do a little work for ourselves and accept employment on the C. P. Ry. main line eastward. This involved harbor location survey work as well as right of way surveys for 300 miles east.

Two strikingly unusual incidents occurred on this latter work which, surely, deserve a place in history and tend to undermine one's faith in the doctrine of probabilities and certainly indicate that, when you have checked your work rigidly and find that both the calculated and observed amounts agree with each other, there is still a possibility of a surprising error.

The chainmen who were checking the deflection angles of the traverse made two separate errors in addition, in a short distance, of exactly ten degrees each and as the one happened to balance the other the surveyor was deluded into believing that his work was faultless and was afterwards dismayed to find that some unaccountably suspicious curves appeared in the plotting which led to the discovery of the two gross blunders.

Another almost unbelievable coincidence was revealed where our survey crossed some township outlines in a manner to cause suspicion and I am told, on excellent authority, that the discrepancy was eventually unravelled when it was disclosed that on the township outline survey, which had been checked by two sets of computers, using different methods and logarithmic tables, one set of computers had made an error in their computation which had been, strange to say, exactly balanced by an error in the figures in the table of logarithmics used by the other set of computers! I do not expect this will ever be repeated, it is surely the ne plus ultra.

My next experience was among the extraordinary shaped and erratically described mining claims in the Michipicoton Mining Division and I'm afraid I incurred the displeasure of the then Director of the Mining Bureau by suggesting that any reference to matters involving surveys should pass under the careful supervision of the Director of Surveys before being O.K.'d

What came nearly being a striking incident occurred during one of these surveys and as such doings are, in a mining camp, classified with horse stealing out west, nothing but the fleetness of the criminal and the pursuer being handi-

capped with an axe, which he swore to use, saved the former. My survey proved that a corner stake had been intentionally moved so as to favor the wrong doer, who fled the moment his crime was revealed. What with this incident and my having to sleep on a bed under which dynamite, caps and fuses were stored, I did not intentionally prolong my stay in that nerve straining neighborhood.

Another episode occurred for which a brother surveyor, freshly arrived from the interior, was responsible. He innocently showed me a small specimen of iron ore which I inferred came from some place, easily found, adjacent to his work. After familiarising myself with the supposed locality and remarking that I would not forget him if anything worth while turned up, as iron was then the centre of interest and attraction, it was not many minutes before I had made preparations for a very early start in quest thereof, but found out, at the last minute, that my Indian had been bought off by an agent of the U. S. Steel Corporation, who, it subsequently appeared, had been watching my moves closely all afternoon. The upshot was that we both arrived at the spot where the surveyor's base line crossed a certain important river. It was then twilight and my rival, who had arrived a few minutes earlier was preparing to camp, so remarking that there appeared a good spot about 100 feet ahead we passed on and unloaded our canoe, audibly requesting the cook to hurry up the supper as we were tired and hungry. I know it is wrong to tell a lie but my partner and I filled our pockets with biscuits, matches, small pocket compass, and pocket tape, and as quietly and speedily as possible made tracks for the promised land, a couple of miles inland, over the basest of base lines — all windfall. A match eventually revealed the post we were in search of. It was a dark night, no moon, but the base line was evident enough for one side of our claim, so we chained our 20 chs., the forward man going ahead until signalled by pulls on the chain that a pin should be planted, after which the rear chainman followed along the chain until he reached his partner who then went ahead again. It took a long time in the dark to complete the circuit and we were thoroughly tired out and thirsty but did not dare to make a fire for fear of revealing our position and consequently put in a jolly miserable night of it, almost as trying as our rival, who had, he admitted, spent the whole night watching the door of our tent which the cook had wisely made ready. This "get rich quick" trip was a fizzle, daylight showed up the

"find" as N. G., and all hands returned to their own firesides, enjoying the joke immensely—the innocent specimen had been born miles away at the famous Helen iron mine.

One more interesting problem ends my reminiscences for the present. When returning from a trip inland from the North shore of Lake Superior, I noticed, in passing a certain locality, which, I believed, had been discovered, surveyed and patented some years before, a fresh survey line of presumably a new find which appeared to cut the eyes out of the three old locations. I reported the suspicion, but the new comers positively denied the existence of any old surveys and asserted that nothing short of an earthquake could produce such a result. My surmise was correct, and, presuming the late comer had acquired a guaranteed Torrens' title to his location, what would be the status of the original owners as regards their government patents? The matter would be more complicated, I presume, were transfers in existence from both parties.

As the Henry George Single Tax theory and certain socialistic propaganda are gaining ground I am reminded of a query put to me by one of these gentlemen who asked me "what was the use of so much trouble and expense in defining with such extreme accuracy sub-divisions of land when, under their proposed advanced state of affairs all land would belong to the State for the mutual benefit of the whole community, and no one could possibly either gain or lose by any number of inches or acres more or less?"

DISCUSSION.

The Secretary—Mr. President, in moving that this paper be received and printed in the minutes I think it would be in order to move a vote of thanks to the writer; he is one of the older surveyors, and I don't know that there is any body of men where the individuals have a more varied experience and where reminiscences of this kind are thought more of. Sometimes a surveyor is a lawyer, sometimes a farmer, frequently an arbitrator, but he is always a surveyor, and I would like to move a vote of thanks to the writer.

Mr. Dickson—Mr. President, I have very much pleasure in seconding that vote of thanks. I think it is a most in-

teresting paper. There is nothing gives me more pleasure than thinking over the things I have been through myself except reading things of the same kind that others of my profession have come through; they teach the young men what we have had to contend with and show people who do not understand the profession the great dangers and trials that surveyors undergo.

The President put the motion, which, on a vote having been taken, was declared carried.

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

AVIATION.

J. A. D. McCurdy.

Mr. President and Gentlemen, I am sure it is a great honor indeed to be asked to speak before you on a subject in which I have been interested for a number of years now, practically since its inception, a subject which has come before us all now in face of the war, the use of flying machines. The subject of aviation may seem to most of us to be a very comparatively late subject. As a matter of fact it dates away back in history. If you allow me for a few moments I would like to outline very briefly a few of the incidents which took place years ago. Away back in Greek mythology we read of stories where people thought of flying, and there is a story told of an old man and his son who were captured and escaped and landed on an island in the Aegean Sea. There was a great quantity of wax and the old man proposed to his son that they make wings out of wax and mount them on their shoulders and fly away, but in doing so he also cautioned the son that if they flew too near the sun the wings would melt and they would drop in the sea and be drowned. While the old man followed his own advice the son did not, the wings melted and he fell into the sea and was drowned. That is about the first story we have in Greek mythology. Then we come up to the practical time which started about the middle of the 15th century, Leonardo da Vinci—he was the first man of any engineering knowledge and skill who gave any time to the subject—and a large number of his sketches show the knowledge he possessed at that time and the insight he had into the probable future. He limited himself more to the lighter than air machines, or the balloon type. Then as we come on to 1782, in France there were two paper makers, who conceived a very pretty idea which was more or less handed down to them by the ancients, that the clouds which we see overhead consisted of a peculiar form of gas, and that they could capture these clouds and put them inside of a paper bag and they would have some sort of balloon which would rise. They therefore made a very large balloon out of paper and underneath the opening to the balloon they made a smudge fire of chopped straw and wool and collected large quantities of this smoke which they thought was a very peculiar form of

gas, and when the time came they released the thing and it rose and went up. It was not until some time after that they discovered there that the property was not in the form of a gas at all, but was simply due to the rarity of the air. Next year, in 1783 the first hydrogen balloon was tried, and this was rather an amusing incident. It was made in Paris under the auspices of the authorities there; they knew that the people had never seen a balloon before and they were very timid as to what should happen, they were afraid there would be a row, so in the dead of night the thing was filled with hydrogen and carried down the streets of Paris, the balloon floating overhead, held by a company of soldiers, and marched down to the Champ de Mars and in the early dawn the entire population witnessed the ascension of the hydrogen balloon. It floated off over Paris and about 60 miles out into the open country, over the farmer's fields. The farmers saw this curious animal coming down out of the clouds and they thought it was a devil, and the gas becoming more and more dissipated it finally landed in one of their fields. They rushed away and armed themselves with pitchforks and other implements and finally came cautiously through the fields, hiding behind the trees, and witnessed the thing writhing in agony on the ground, and then finally one man a little bolder than the rest stuck a hole in the side of this devil, then the gas was emitted with a peculiar hissing sound and they thought they had wounded the animal and he would then die. They rushed away and came back later and found the animal entirely dead, nothing left but the skin, and no bones. To make sure that the animal was entirely dead they got a horse and a pair of traces and hitched the skin to the traces and dragged it through the town triumphantly. That is the history of the first hydrogen balloon.

The world at this time was divided into two schools, the lighter than air school and the heavier than air school. By the lighter than air school we mean balloons supported by static pressure, and the heavier than air by dynamics, they depend upon their motion through the air for their support.

There was a great deal of gliding done in Germany by a man by the name of Lillenthal, an engineer. He made a great number of long glides by jumping off a high sand hill he had made artificially, and the breeze blowing along the ground would have an upward trend, so that when the machine was launched it would glide on up. He made many glides of over one hundred yards or more and it was really his experiments

that started the world along the real lines of aerial flight. However, at that time a great many people thought anybody who was interested in flying machines was a little bit touched in the head, and you had to be very careful to whom you spoke, and it wasn't until later on, around 1896 I think, when men of the world, practical minds, and men who stood high in the scientific world gave their attention to it. Among these men was Sir Hiram Maxim, Professor Samuel Pierpont Langley of the Smithsonian Institute and Dr. Alexander Graham Bell, inventor of the telephone. The experiments in England under Sir Hiram Maxim didn't lead to very much. The machines were tried on a very large scale and tremendous money expended and nothing practically came of them. However, he compiled a very large quantity of valuable data on the action of the air on planes and surfaces and Professor Langley probably did more than Sir Hiram Maxim, and finally he arrived at the stage where the War Department were interested and appropriated \$60,000 wherewith to build an aeroplane. This aeroplane was built first in a quarter sized model, fitted with small steam engine, and actually flew in 1896 on December 8th; among those who witnessed the experiment at that time was Dr. Alexander Graham Bell who wrote a paper in which he said nobody who witnessed that experiment could fail to see that the practicability of mechanical flight had been demonstrated. The machine that was constructed right after that on the same basis of that model, which was actually tried by Professor Langley, flew over the Potomac River at Washington, but the fatal error made was not in the machine, but in the method of launching. They felt so sure that such a machine would fly that they fitted up a catapult with strong springs on the top of a house boat and they wound up this catapult machine and let the machine rest on it, and when the catapult was released the thing was supposed to shoot off instantly at the necessary velocity required for its support. We think that was rather impracticable. The machine in both experiments caught in the launching ways and was tipped over into the water, and therefore was considered by the whole world as a ridiculous idea and probably Professor Langley's experiments deterred others from trying rather than encouraging them at that time. Since then, during last summer that identical machine with the same motor, propellers, surfaces and everything was taken over by the company in which I am interested and a sum of \$2,000 was appropriated by the United States for a fair trial of that machine. We took it to Lake Cayuga, 110 miles south of Buffalo and put three little

pontoons under it and gave them a weight of 300 pounds; there was a machine, which with these pontoons, had an additional weight of 300 pounds, not only that but additional resistance to the forward motion, and yet under these conditions the machine not only flew but flew well, which showed that Professor Langley had actually the first machine capable of flight.

After his failure, so-called, at that time there were two boys in Dayton, Ohio, whom we all know by reputation by the name of Wright; they were bicycle makers and interested like a lot of other people in flying. They had read a great many pamphlets and books on the subject, and in 1900 with Octave Chanute, a very prominent civil engineer, I believe they went down to Kittyhawk, in the State of Carolina, and experimented there with gliders, and their gliding experiments were remarkably successful, much more so than any of the others. The reason for their success was because they realized that a machine had not only to be able to be started to the right and left and up and down, but to be balanced. The basis of their invention was when a machine was going along and it tips up you must have a greater lift purchase on one side than on the other, therefore they did what was called a warp, they warped a wing. If the rear end of one wing is warped down and this one warped up in the rear it will make a greater lift on one side than the other, which will tend to bring the machine back to the level position again. That was the basis of Wright's idea and it worked out very well. Of course their machines were well known the world over, and the first flight they made in a power machine was the first flight in the world, which was on December 17th, 1903. The date practically marks really the first practical flight of a man in a heavier than air machine. Their flights, however, were conducted absolutely in secret and they were very much discredited not only here, but also in Europe. It is rather amusing to read over the French and American papers at that time and even some of the Canadian papers and see the comments on these two crazy balloonists, as they were called out in Dayton, who claimed to have done this thing. They made such a success of it, however, that Chanute took designs of their machines and authenticated results over to France and was about to make a contract with the French Government for the sale of their machine and the patent rights at a million francs, having previously offered it to the United States and were refused. Just before the contract was about to be sign-

ed a man in France, by the name of Santa Dumont, the first man to fly a balloon with a propeller on it, rigged up a couple of kites like the kids fly around, a most atrocious looking thing, and got a propellor put upon it and made a flight of something like 75 miles and won a prize offered in France of 10,000 francs. Then the French Government said to themselves, why should we buy these patents, and the result was the contract was never signed.

Shortly after that Dr. Graham Bell organized in Nova Scotia an association for scientific investigation of the character of air and its action on planes and so on, and I had the honor of being a member of that association, together with another Toronto boy by the name of Casey Baldwin; we were joined later on by a United States army officer by the name of Lieutenant Salvage, who was detailed by President Roosevelt to be there for the purpose of observation. We reached the stage where the motor was required. They were very scarce at that time, but in the State of New York was a man by the name of Glen Curtiss and we asked him if he wouldn't come up and bring some motors up to Nova Scotia, we wanted to try them in these machines. He did so, he brought two motors, which were really ridiculous, they would run for about two minutes and deliver about half the power they were supposed to. We then asked Curtiss if he would also come and join the association, which he did. We worked up there for about six months and when winter set in we decided to move to a place in New York, and there the first machines were developed in this country which made public flights. On March 12th, 1908, we made a flight in a machine called Red Wing, which was made by Casey Baldwin. It was 319 feet long, measured on the ice with a steel chain. He therefore has the honor of being the first man to make a public flight on this continent, the Wrights had made theirs in secret, and he was also the first British subject to have done so, and I think that is very creditable.

We then built four other machines after that, all of which flew, the most notable of which was the June Bug which won the first trophy offered in this country by the Scientific American. The association which we formed lasted about eighteen months and was then dissolved, having accomplished its purpose, which was to get a machine into the air, Dr. Bell having declined to enter into any commercial organization. The association then became a commercial one and a company was

formed or organized, which we called the Curtiss Aeroplane Company. That Company to-day is supplying to the British Government a very large quantity of machines which they are now using. We have developed over here the biplane type, which I think is superior to the monoplane, for two reasons, one reason is that the construction is much more solid and can be made larger and will carry greater loads than a monoplane which has to be artificially trussed up from the centre pole. The question has often been raised as to which is the best kind, a monoplane or biplane. If you analyze the different characteristics that go into the efficiency you will see this point stands out, a machine to travel over air has to have an angle of incidence, it cannot be horizontal, it has to be tilted up a little in the front. If you can make a machine where your man and your engine and all your wires and so on are enclosed inside of a body of some sort you can get a much cleaner machine than a machine which has all those parts exposed. When the biplane was brought in in its earlier days, however, it was exposed and the motors and all these struts and wires were not so neatly arranged as the monoplane, but now we have developed the biplane. The man sits inside the body, and the motor is inside the struts and wires are all cleaned up, so that the result is the biplane is much more efficient than the monoplane. Furthermore, as in war, the machines are used purely for scouting purposes and not so much for bomb dropping, which is a mere ruse to divert attention, because the destruction due to the dropping of one bomb is nearly nothing, but the information they get is of inestimable value, and that is after all the chief function of the aeroplane in war. The monoplane wing is so much wider from the front to rear that a man sitting in the centre cannot see down underneath him so clearly as he can if the wing is narrower. If the wing is narrower the load is more distributed, the man has a better view down from either side of him than he has in the monoplane and he can see much more clearly.

There are two kinds of machines used, two different families, one belongs to the military and the other to the navy, the function of the military machine is to carry as much weight as possible, and to go as fast as possible and to go as slow as possible, two characteristics that are very important are the different ranges of speed; in the military system the speed varies from 33 up to 90 miles an hour. The reason in the military machine for this range of speed is twofold, one

is that when the machine is flying over the enemy they have first to get the range and a very careful flyer will not maintain his machine at a constant rate of speed, but he will vary it from 33 miles an hour and jump up to 90 miles an hour and then jump back to 45, and it is very difficult to get an accurate range on a machine in the air, especially if it is very high. Its altitude of 5,000 feet is out of range of any shot at all. The most effective weapon which they have is the bursting shrapnell shell. You come to figure out in a machine what are the vulnerable points, and there is only one, and that is the man himself, so directly underneath the man is a conical shaped steel plate; the bullets can go through the machine and go into any part; supposing they puncture the gasoline tank or go through the propeller it doesn't stop the man from gliding from where he happens to be; the gliding power is about five to one in the least efficient, in the more efficient it may be seven to one, so that if you are up 5,000 feet in the average machine you can glide six times that distance without any power; you have got a very great range to work on; you can glide really twice that because you can go six times through the air, so that you can glide inside of a circle of 30,000 feet a range which is quite a little distance, so that you can probably glide back to your own lines out of danger. I was talking the other day with a man who came from England, one of the commanders in the Royal Flying Corps, Spencer Grey; he is quite a little hero; he was the man who led the first aerial raid at Dusseldorf and Cologne in the opening of the war; his entire squadron went in and dropped their bombs and returned and did considerable destruction there, and he was telling me what they do is they want to fly inland a certain way and they will probably pick as cloudy a day as they can and rise up above their own lines and go through the clouds and then fly along until they feel they are in the position they want to be and then drop down through the clouds and see what is happening. They may have to go along a little further, so they use the clouds as a screen from the enemy. Then when they get over the point they want to see they drop down through the clouds again and get what information they can, and if the Germans are on the alert they will probably be just about their machines, so that one of the chief functions of the military machine is not so much speed in a horizontal direction, but climbing ability. Therefore, that is made the hardest thing in any Government contract to fulfill. The Government require a machine that will carry two men, 350 pounds, fuel and gas for six hours; they must go a maximum of seventy and a mini-

mum of forty, and they must climb 4,000 feet in ten minutes and carry an additional weight of 140 pounds. So that the climbing is really a very difficult thing to perform and in competition that is one thing that is most difficult for all. Now, as a matter of fact, these machines the Government get will climb 4,450 feet in ten minutes, which is 450 feet over the contract requirement.

The other machine is the navy machine and that is characterized not by wheels underneath the body on which you land, but by a long boat hull; it is to be used in the English Channel, we will say, where the sea is sometimes very rough. It happened over here that we were the first people to fly off the water, land on the water and come off the water again, and we developed from that type what we call the flying boat, that consists in the hull of a boat, the smallest one is about 26 feet long and the largest one about 36 feet long; it is shaped like a regular boat; it has a cockpit in the front, the beam of the smaller boat is about four and a half feet and the freeboard about three feet. The larger type are built on the design of the boat called the America, a boat which we built to fly across the Atlantic Ocean last summer; that was 36 feet long, about 7 feet beam and about 4½ feet freeboard. That is quite a substantial boat if you compare that with the motor boats which are used to-day. Those very large machines have a spread of 100 feet from tip to tip, they are biplanes; each of them has two motors of 100 horse power each, each motor is capable of flying the machine by itself and carrying a surface weight of 2,000 pounds over and above operator and observer. These machines are used now so far as we know; we have sold several of them to England since the war began and they are using them to patrol the English Channel. The function there is a very important function; the submarines seem to be unable to protect themselves from that attack from the navy standpoint. The submarine travels along and has this periscope sticking up out of the water, they have to see by that, and the hydroplane can fly along twenty feet above the water and they can see the periscopes, and they have mounted on the bow of them a little gun with a three pound shell and they can seek out these periscopes and do considerable damage. You noticed the other day that there was a report in the newspapers about 34 aeroplanes which had left England and gone to Europe for some purpose, ostensibly for a bomb raid. I don't know absolutely whether that was so or not, but it seems to me from

the knowledge that when many English troops went to France first they were escorted by aeroplanes and hydroplanes a distance of ten miles on each side of them to give warning of submarine or battleships, it is very probable this raid the other day was really acting as an escort for the Canadian troops; it was just about that time. When they have these transports loaded down they have to be very particular that they are not attacked by submarines, it would be rather annoying, so that they probably have these machines flying on both sides of the line of passage. I think it has been demonstrated in this war that the aeroplane, from a practical standpoint, has been vindicated. Prior to this there was a great deal of skepticism. People thought it was a mere fancy or an article of pleasure to be bought by the extremely wealthy and so on, but it seems apparent now that the aeroplane in the army is just as important to the success of the army as the artillery or cavalry or even the infantry. We remember in the Russian-Japanese war when the Japanese lost thousands and thousands of men and a considerable amount of money in the capture of 203 Meter Hill, with only one object in view, to gain an observation point to direct their shell fire into Port Arthur; if they had had at that time an aeroplane as they had at Tsing Chao they could have hovered over Port Arthur and directed their fire without the expenditure of life and money. Some of the military machines are equipped with wireless, which is, of course, a very great advantage.

Another thing an aeroplane does, it goes in over a plain and they discover a battery of guns which is hidden and they want to let their own lines know they have located something to be fired at. If it is a very bright day they have a lot of little tinsel balls which they drop and the sun reflects on them, as they are dropping down the tinsel opens up and drops in a long stream and the reflection will give the range finders the range of the concealed guns. Another method is smoke balls. But, that is one of the functions of the aeroplane, to point out and give the range to the gunners of the object to be fired at, which is a very important function.

From the standpoint of pleasure I think the flying boat stands supreme. You get in this little machine, you have got a lot of power behind you, you can sit down in the cockpit of the boat and you can hover around over the water at a speed of half a mile an hour if you want to, perfectly dirigible, or you can open up your throttle, you can gain speed and you

can remain on top of the water at a speed of over 50 miles an hour without leaving the water, but why do that when you can leave the water? So after attaining a speed of 45 miles the machine is capable of leaving the water, and by a slight pulling back of the steering wheel, about half an inch, the machine leaves the water so gently that the passenger riding with you does not know when you have left the water. I have often taken out a man who thought he knew a lot about it and I have said to him, Now, you tell me when you leave the water. He said, Certainly I can tell; it is a ridiculous idea to think I can't tell. We go along, gain a little speed, ride on top of the water and then just lift her off the water, fly her about two feet high and you can fly for about a quarter of a mile and he will never know it. I tell you that to illustrate the ease with which you can leave the water, and then in making a landing again you come down and land on the water and the passenger does not know when you have touched the water. It can be done as easily as that. That is of course by a man who has had considerable experience. Once you have touched the ground you are supposed not to leave it again. I don't know anything that gives as much pleasure as to get out on a large body of water in one of these flying boats, a standard boat which will go in perfectly calm water 70 miles an hour. If you have a breeze of wind behind you you simply add to that speed the velocity of the wind, so that you can cover ground very rapidly. You can fly around and in and out among the motor boats, turning to the right and left, up and down, and it gives you a feeling of exhilaration that cannot be equalled as far as I know in any other method of locomotion. You can probably go up to about 10,000 feet. With the military machines you can climb higher—29,000 feet. Curiously enough the world's records in altitude, in duration and distance are all held by the Germans. The French hold the speed record. The Germans did not enter the aviation field until just about a year ago. They spent almost their entire time and money on the Zeppelin balloon, but it seems now that it has not worked out to their satisfaction and they probably realized it. Slightly before the war the Government built large factories which were capable of turning out under normal conditions about a thousand machines a year. They are working under pressure now and we don't know what they are turning out. The entire production of the world of the aeroplane industry in 1914, leaving out entirely war orders, which are probably five or ten times the normal amount, the production was about seventeen million dollars. That will give you an idea of what

the industry really is. For a thing which has developed as slowly in previous years I think that is significant. Over across the border we had a little factory employing about 150 men before the war. Since the war started we are employing over a thousand men, so that shows you the demand there is not only for machines in England, but for machines over here.

I have been very much interested over here in trying to get the Canadian Government to establish a corp of some sort in connection with the army, possibly with the second contingent. I feel it is a thing they ought to do, because it is necessary, and there seems to be some indication they may do so, although you never can tell what the Government is going to do.

(The speaker then gave an interesting account of a flight which he had personally made from Key West in Florida to Havana Harbor in Cuba in connection with a prize of \$10,000 which had been offered; and in conclusion he said: I think we may therefore say the aeroplane has a very brilliant future; I think some day we will all have the pleasure of having rides, and, perhaps, owning boats ourselves.)

DISCUSSION.

The President—Gentlemen, I am sure the Association would not have missed Mr. McCurdy's interesting discussion on the development of the aeroplane for anything; also the beautiful description of the plane leaving the water without a jar.

Mr. Dobie—I am sure I am only voicing the sentiments of this meeting when I try to express my thanks and gratitude to Mr. McCurdy for the excellent address he has given to us to-night on a subject in which we are all interested. It is not very often we run across a man who not only has the ability to master and run these machines, but also has the ability to describe his sensations and the manner in which the thing works, in eloquent language. I for my part have enjoyed his address and I don't know of any class of men who should be more interested in aviation than surveyors. I know for my part I can recount tens and hundreds of times when I have been trying to climb over some brush pile when I wished I had a flying machine of any kind. I don't know whether I would care whether it was a Zeppelin, a biplane or something else as long as it would do the trick.

I have much pleasure in moving a very hearty vote of thanks to Mr. McCurdy for his efforts in entertaining us to-night.

Mr. van Nostrand—I have much pleasure in seconding the motion of a vote of thanks to Mr. McCurdy for his most informing and interesting lecture to-night. The subject is becoming more and more interesting to everybody. Every time we pick up the morning newspaper we learn something new about it, but to-night we have learned a great deal, I for one. I think a good many here had no idea of it before, although it has been told very modestly by the lecturer. We can realize that Canadians have played a very large part in the development of this new mode of locomotion; and while it is taking a large place in the strife that is now going on in Europe we may look forward to that particular thing making more rapid advance than anything else that is being used in this war, and when the war is over it will still go on advancing and be useful in peace time. I have much pleasure in seconding this vote of thanks.

The President put the motion, which was declared carried, with applause.

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

A SUGGESTED AMENDMENT TO THE LOCAL IMPROVEMENT ACT, BEING PART OF THE MUNICIPAL ACT.

By George Smith.

A paper on this Act, although not along the general lines of those read at these meetings, may not be uninteresting to us and should, at least, attract the attention of our Legislative Committee.

The works for which this Act gives authority to cities, towns, villages and townships to construct, or carry out, are very extensive, some of which are as follows: (a) opening, widening, extending, grading, altering the grade of, diverting or improving a street; (b) opening or establishing a new street; (c) constructing, enlarging or extending a sewer; (d) constructing bridges, etc. These and many others would suggest the idea that a municipality would require the services of a capable and experienced engineer, and the writer turned his attention to this feature of the Act and was rather startled to find that the term, Engineer, therein "Shall include an officer or person authorized or required by the Council to perform any duty, which under this Act is to be or may be performed by an engineer."

From this interpretation it would appear that a Municipal Council may appoint any person to act as their engineer if they feel inclined to do so, which appointment might easily lead to serious results through the ignorance of that Hon. body in engineering matters.

Some years ago the writer was asked to advise a Municipal Council in the matter of a troublesome sewer serving a densely populated public building. The line of this sewer had a heavy fall from the building for over 2,600 feet across farm land to a street at which a manhole was constructed. From that point for a distance of 1,000 feet to the outlet, the fall was only 3 feet. Over a year after construction and in the middle of winter, the discovery was made that the sewer was full of sewerage including the manhole. From the manhole to the outlet the construction of a new line became necessary in which the 3 feet of fall was reduced to a uniform grade in the usual manner. When the bottom of the manhole was thus

tapped by a properly built sewer the results proved quite satisfactory.

This was clearly a case in which the Council "manufactured" the engineer as authorized by the Local Improvement Act for the construction of this work, and the result might easily have been the death of several of the more or less feeble inmates of this building.

The writer might refer to other cases where Municipal Councils have placed sewerage or drainage works in the hands of men who know nothing of designing grade lines, and it is clearly the duty of the Legislative Committee of this Association to direct the attention of the proper authorities to this very unaccountable oversight in the Act and also to its probable consequences. Municipal councillors, who know nothing of engineering, can scarcely realize the folly of allowing laymen to design sewerage works, etc., in which occupation they have not been trained.

Would it not be well to have the Act so amended that the word "Engineer" shall mean any Civil Engineer or Ontario Land Surveyor of at least five years standing in practice.

The services of the O. L. S. would appear to be especially required as many of the old plans from which frontage measurements are taken are so faulty, and the question of correct frontage is important in this Act for assessment purposes, so much so that the Court of Revision might have some difficulty in getting on without them. The writer has had to do with one case in which the errors in the town plan amounted to as much as thirteen feet in five hundred.

DISCUSSION.

I think you will understand what this means. Anybody that the Council choose may act for them if they pass a resolution authorizing them to do the work. I have several cases on hand that I need not go into, but you can all see what this amounts to, and I think it is worthy of the attention of this Association, Mr. Chairman, to take it into consideration.

The Vice-President—You have heard this paper by Mr. Smith. What is your pleasure?

Mr. Jackson—I have had similar experiences to that which the writer of the paper mentions, and I have much pleasure in moving the adoption of the paper, that it be printed in our minutes, and that the resolution carry with it a request that the Committee on Legislation look into the matter.

On the motion being seconded by Mr. Fairchild, the Vice-President put the same, which was carried.

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THE LAND SURVEYORS OF ANCIENT ROME.

By J. L. Lang.

It may be of some interest to this Association to hear a few details about a similar body which existed many centuries ago. With its roots in the remote antiquity of Etruscan civilization and its growth throughout the glorious period of Imperial Rome, there flourished a professional corporation of *agrimensores* or land surveyors. It became extinct and its literature and records for the most part lost, in the dark ages that succeeded the fall of the Empire. But enough remained for the patient and laborious researches of a few scholars to reveal a comparatively clear picture of our professional ancestors.

Among the Etruscans, who were the predecessors of the Romans, the division and limiting of lands was a part of the work of the augurs (or priests). Their chief work was to interpret the will of the gods by various sacrificial methods, but, as amongst most early and pantheist peoples, all institutions and actions of importance partook of a religious character, and the division and definition of the limits of land, closely affecting as it did the interests of the people, was a most important and highly prized function.

When the Romans conquered and displaced or assimilated the Etruscans, they adopted to a large extent the religion and other institutions of their victims. The Roman augurs were thus the direct inheritors of the Etruscan priests and had similar powers and functions. Their religion was not, as in its later stages it so often is, an incident, a habit, an ornamental convention, but was a deep seated motive governing conduct and belief both public and private. The augurs, as interpreters of the will of Heaven, were all powerful, the real rulers of the early republic, and land surveying, the delimiting and division of lands and the replacing of bounds, was a highly important function. The taking of auguries and auspices could only be done in a temple or consecrated place. Hence the practical side of the augurs' work in land surveying extended, not only to towns and villages, but to military camps.

But, as time went on, the augurs or priestly caste began to lose their mysteriousness and influence. Their archives were available eventually to scholars and lawyers. Soon a class of practical men arose who were employed by the magistrates in an advisory capacity as experts on land questions. This was the beginning of the practise of land surveying as a profession separate from the priestly ceremonies and may be placed roughly at about the time of Julius Caesar. It must be noted, however, that the profession never entirely lost its religious tinge. This to some extent is probably responsible for the high esteem in which it and its members were then and subsequently held.

There were, however, causes other than the decay of religion for this development. From about this time dates the real growth of the Roman Empire. Vast areas, not only in Europe, but in Asia and Africa, were conquered by the legions and placed under the rule of Rome. In these areas, vacant, sparsely settled or often depopulated by war, were planted colonies both military and civil. Grants of land were made to veterans both as rewards for service and as a protective measure for the newly acquired territories. In addition civil colonies both of voluntary emigrants and forced settlement to relieve overcrowding and distress in Rome, were planted throughout the Empire. As a necessary preliminary these areas were surveyed and sub-divided. The conditions were in fact not dissimilar to those obtaining in Canada at present and in North America generally during the past century.

As a result, there was a great demand for land surveyors and they were soon a large and prosperous body. Instead of a religious rite, whose execution was, so to speak, by guess and by God, the practise of land surveying became a definite profession whose standard of training gradually rose till there were well equipped colleges for its students.

To these in Rome repaired youths from the provinces and provincial cities as well as, of course, from Rome itself. Their training was like ours, twofold, first theoretical, in mathematics (principally geometry), in the official technique, and in the laws governing the use and holding of land; and second practical, in actual service. The colleges were, of course, a secondary development. The earlier training of recruits was an apprentice system.

The instruments in use were the *groma* and the *decempeda pertica* or measuring pole. The *groma* was practically

the surveyors' square of the present. It consisted of a frame with two lines of sights marked by threads and at right angles, set on a pivot and mounted either on a single support or as usual, on a tripod through which a plumb-bob was suspended. It was an instrument probably as accurate for running lines as the surveyors' compass, until comparatively recently in extended use here.

The agrimensores were employed in two capacities, in work for the state and in work for private parties. The work for the state may be grouped in three divisions, the delimitation and survey of public lands for the foundation of colonies, the compilation and maintenance of land registrars not only for Rome, but for the provinces, and the design and construction of military encampments and fortresses.

In the formation of a colony, a law was first passed by the Senate specifying the locality and dimensions of the lands to be used, and the number and character of the colonists together with the size of the parcels to be allotted to them. An expedition under charge of a commission of varying numbers or under a single legate, set out with the colonists under military escort and the surveyors. On arriving at the location the first step taken by the surveyors was the determination of the meridian (by a solar observation) and the running on the ground of the two main axes of the township, one north and south and the other east and west. These were run in each direction to the extremities of the plot and marked with monuments. Secondary lines (or *limites*) were then run parallel to these and the area thus divided into squares (of about 1,000 feet to a side) or into oblongs whose length was double their breadth. This was continued to the boundaries of the lands of the colony, the space between the last lines and the boundary, which was usually an irregular line, being left unallotted, title to it either remaining in the state or being transferred to the colony to be held in common. This course was also followed with blocks unfit for cultivation and with fractional remnants.

The blocks thus marked out varied in size according to the system employed, from fifty to two hundred jugera, that is from about thirty to about one hundred and twenty acres. The blocks were further divided into the individual holdings, which ranged from two to ten jugera—though sometimes as high as seventy jugera. The various parcels thus determined were then divided by lot among the colonists, not so

much with the idea of fairness as because it was thought that by leaving the allotment to chance the gods superintended it.

The *limites* of the blocks thus established were fixed and immovable just as our original township lines. It may be added that the *limites* were not lines but spaces, intended probably for road allowances. The widest were those along the two main axes. Of the secondary *limites* every sixth one was usually forty feet in width and the others twenty. This idea of a space instead of a line holds throughout Roman land laws.

The surveyors in this as in other work were not paid regular fees but honoraria. This was due partly to the professional idea, but largely to the religious tinge still inhering. It is probable that in actual practise the distinction was largely formal. Of course, as in many cases, as in the second two lines of work for the state, the surveyors were often paid regular salaries by the state. In the colony or township surveying outlined before, the surveying was usually done under contract. It was not, however, the surveyor but an entrepreneur or middleman, usually probably a politician, who received the contract and who paid the honoraria to the surveyors.

The second line of state work, that of the compilation and maintenance of land registers, was of great extent and importance. Records were kept of every holding in the colonies throughout the Empire and were in duplicate, one copy being in Rome and the other in the local archives. In addition, frequent general surveys were made. Augustus Caesar, for instance, had a survey made of the entire Empire, under the direction of Balbus, who may be styled the first surveyor-general.

The third class of state work, that of the design and construction of military encampments, which was a function of certain surveyors, was practically military engineering. It is probable that they had also charge of the design and construction of roads and bridges. This activity appears to have started about the time of Julius Caesar and Lucius Decidius Saxa is the first name that is recorded.

As for the private functions of the surveyor, Frontinus, author of some of their text books says:—"In the survey of lands the main thing is the consideration of disputes." This is not an ancient condition only. The underlying fact in this connection is that in the complex system of Roman civil law,

the principles of surveying practise the *ars mensoria*, forms a series of exceptions. Their writers continually contrast the ordinary law and the practise of surveying, the lawyers and the surveyors. Even after making allowances for their one-sidedness and natural egoism, the fact remains that the *ars mensoria* occupied a high and exceptional niche in Roman law.

The surveyors officiated in two ways in connection with land disputes. In matters of small import and those lacking acrimony between the parties, the surveyor acted in an independent judicial capacity, investigating and settling the disputes unaided. In more important affairs he acted as expert adviser to the judge. The different disputes that might arise were classified into fifteen varieties which may be briefly outlined.

The first was *de positione terminorum* the question as to whether a monument was an official one and if so whether it had been moved. In this connection it may be said that in the later stages, particularly, of the profession, the system of monuments became highly complicated. They were made either of wood or stone, usually stone, and as time went on they were made with innumerable small variations in shape, size and position and with mystic marks. The avowed intention was that a qualified surveyor might easily see whether a given monument was official and if so whether it had been moved. It was probably carried to absurd extremes (the technique is unintelligible in the remaining fragments of the textbooks) and was intended, partly at least, to impress the general public with the immense complexity and difficulty of the craft. Some developments for use in this direction might not be amiss to-day. It is a condition quite analogous to that pertaining in some of the learned professions of the present, whose descriptions are so compounded of technical phrases either polysyllabic or in a foreign tongue, that they are models of mystery; whereas if their technicalities were reduced to the vernacular, they would often be quite clear even to the layman.

The next four controversies deal with the position of the boundaries and with the area. The third *de fine*, deals with the boundary of the individual holdings, usually an irregular line or rather strip. For according to the laws the boundary between two holdings of land, or between two houses, consisted not of a line, but of a strip of neutral territory five feet in

width. Various reasons have been assigned for this provision. One claims that the strip was to remain uncultivated and sacred. Another that it was to serve as a footpath but not necessarily uncultivated. A third view, and perhaps the most probable, is that the intention of the strip was to permit cultivation to the last inch and that each owner could plough his two and a half feet to the centre of the strip without trespassing on his neighbor, but by using the other two and a half feet to turn on.

In the settlement of these and other controversies the surveyor had not only to take the evidence on the ground, both by surveying and the actual hearing of witnesses, but if necessary to search the records and statutes. He thus required a thorough knowledge of the laws relating to land.

The next two matters of controversy were those of ownership and possession. With these the surveyor had no direct concern except when a survey was ordered by the judge.

The eighth deals with riparian rights. In officially surveyed lands (since the lot areas were fixed and invariable) the owner had no right to alluvial increase or to islands formed by subsequent recession of a stream or lake, unless it were expressly conveyed in the original grant. If, however, the increase or decrease was not the result of a gradual and natural process, but of a sudden convulsion (*vis major*) the owners rights were unaffected.

The ninth dealt with large areas or territories. In Italy this would usually be a dispute between two colonies or municipalities, but in the provinces, principally in Africa, where there were large private holdings, the controversy could arise between individuals.

The next three controversies were with regard to the unsurveyed portions of the colony or township, the public lands therein, and the fractional remnants—that is the parts not assigned to private ownership. The surveyor's functions in these cases were to examine and ascertain the status of the parcels by reference to the records, to establish them on the ground and to determine the nature and extent of encroachments thereon.

The thirteenth dealt similarly with grants which had been made for religious purposes.

The next referred to damages to lands from rains. The surveyor's function was not only to replace obliterated boundaries, but to provide for drainage.

The last controversy cited by Frontinus dealt with road allowances.

From this catalogue of cases it may be seen that the surveyor's functions in their private capacity, were quite similar to our own. It is rather startling, moreover, to think that nearly two thousand years ago there existed a corporation analogous in many ways to our own. If one were to mark the most decided difference it would be that the Roman surveyors occupied a somewhat higher position than ours. Their status was more secure and their emoluments were probably much higher. They were paid not in the ordinary way of commerce but by honoraria (though there was little actual difference in practise). In addition before undertaking a commission, they received earnest money corresponding to the retainer given counsel to-day with his brief. And the fees were large. For making an ordinary survey of the line between two properties, the surveyor received two aurei—gold coins each about \$3.00 of our own money. To obtain their real value in present terms we would have to multiply by at least ten and perhaps more.

One other matter which illustrates the position of the Roman surveyors perhaps better than any other may be cited. That is the protection afforded them by the law in the event of their having made mistakes in the course of their work. The first point is that a party injured by an improper survey had no ground for action against the surveyor, unless it were a case of fraud or gross error allied to fraud on the part of the surveyor. If it were merely a case of lack of skill or of ordinary negligence, the law took the stand that it was the client's fault for not having made a proper choice. Further, the injured client had no recourse against the surveyor until he had exhausted his means of recovery from the other party. To exemplify, if a man purchased a field said by his surveyor to contain fifteen jugera, and if the field actually only contained ten, the purchaser could only recover from the surveyor if he could prove that the latter had been guilty of fraud or of gross fault allied to fraud, and even in that case only after he had been able to recover from the vendor, that in the case the vendor were insolvent. It did not affect the surveyor's liability, however, if his honorarium had not been paid, nor

did it matter whether the order for the survey had been made by a judge or by the client himself. It was further provided that the surveyor was equally responsible whether he made the survey in person or by a subordinate agent. Despite these latter restrictions, no better idea can be gained of the high position of the Roman surveyor than from his legal position in the above respects.

It may be mentioned in conclusion that the profession had a direct representative in the Roman Pantheon (the only one to be thus represented if we accept what Kipling calls the oldest profession in the world), Terminus the god of boundaries. His statue was the survey monument of wood or stone, and he was thus, in addition to the ordinary converse, a divinity whose ends were shaped. It might not be out of the way when we drink the toast to the profession to pour a sad libation to this dead god who was once the protector of the craft.

Note authorities:—deTissot-Etude Historique des Agri-
mensores.

Niesukis History of Rome.

Mommseris History of Rome.

DISCUSSION.

The President—Gentlemen, you have heard this beautiful historical review of our profession. As I see my friend Mr. Chipman enjoyed it very much I would like to have a few remarks from him.

Mr. Chipman—Mr. President, I take much pleasure indeed in moving a vote of thanks for this most valuable acquisition to our proceedings. It is something a little out of the ordinary. I only wish we had more of it and oftener. The time is late and I will not enlarge upon the matter, but I am sure you were all as much pleased with this paper as I was.

Mr. Dickson—Mr. President, I have much pleasure in seconding that. I was very much pleased not only with the information given, but the interesting and amusing manner in which it was given. There was one point and that is the

great mistake the client makes when he doesn't employ the proper man; if he employs a man that is inefficient he should be held responsible. I know what it is to have people around the country employing men that don't know their business, and if those men were punished for not being proper men it would mean considerable in the pockets of the surveyors sometimes. I am sorry my friend didn't make it a little longer, it wasn't very long, not long enough to suit my fancy. I hope we will hear from him again, and I have much pleasure in seconding the motion.

The President put the motion, which was adopted.

O. L. S. PRELIMINARY EXAMINATIONS, 1915

MENSURATION.

Maximum 50; Minimum 30.

1. Give the rules and formulas used in determining the following: —

Diameter of a sphere D given.

Find area of surface, volume and circumference.

In an ellipse D is the length of long diameter and X the length of the short diameter. Give rule for finding the circumference.

The diameter of a circle is given. Find the circumference and area.

Find the area of a triangle ABC when the two sides and contained angles are given; also when the three sides are given.

2. The sides of a rectangular field $ABCD$ measure 8 chs. x 20 chs. It is required to divide the field among 3 men who have paid respectively \$300, \$400 and \$500 each to have a frontage on the long side of the field. Find the frontage to each man.

3. A field in the form of a circle contains 100 acres. Find the diameter and circumference in chains and links.

4. In a right angled triangular field ABC having a base BC 10 chs. in length, the angle at B 60° , at A 30° and at C 90° . It is required to divide the field into two equal areas by a line DE parallel to BC . Find the distance DE is from B C measured from C .

SPHERICAL TRIGONOMETRY.

Maximum 160; Minimum 50.

1. Define a sphere and a spherical triangle.
 - (b) How is a spherical triangle formed?
 - (c) How many parts must be known for the solution of the triangle?
 - (d) For what purpose is spherical trigonometry used?
2. Give Napier's rules for solving all right angled spherical triangles, illustrate by means of a figure and write out the formula which may be derived directly from those rules.
3. Give rule or formula for solving a spherical triangle when three angles are given.
4. Give the formula for solving spherical triangles when three sides are given, also when two sides and included angle are given.
5. What is the polar triangle and in what way is it applied in the solution of triangles?
6. In the solution of right angled spherical triangles—right angled at C. Given the hypotenuse $C = 140^\circ$ and side $A = 20^\circ$, solve the triangle.
7. Given $A = 80^\circ 10' 30''$, $B = 155^\circ 46' 42.7''$. Solve the triangle.

EUCLID.

1. The angles at the base of an isosceles triangle are equal to one another; and, if the equal sides be reproduced, the angles on the other side of the base shall be equal to one another.
2. To bisect a given rectilinear angle, that is to divide it into two equal angles.
3. If one side of a triangle be produced, the exterior angle shall be greater than either of the interior opposite angles.
4. Define a right angle, an obtuse angle, an acute angle, a scalene triangle, trapezium, hypotenuse, isosceles.

5. If a straight line be divided into any two parts, the rectangles contained by the whole and each of the parts, are together equal to the square on the whole line.

6. If from any point without a circle two straight lines be drawn, one of which cuts the circle, and the other touches it; the rectangle contained by the whole line which cuts the circle and the part of it without the circle shall be equal to the square on the line which it touches.

7. To inscribe a square in a given circle.

8. To describe a square about a given circle.

ARITHMETIC.

Maximum 100; Minimum 60.

1. Describe briefly:—Fractions, square root and cube root.

2. A person has $\frac{3}{7}$ of an estate of 4,000 acres left him, he sells $\frac{2}{3}$ of his share, how many acres has he remaining, and what fraction of the whole estate will there be?

3. A and B can do a piece of work in 15 and 18 days respectively, they work together at it for three days, when B leaves, but A continues, and after 3 days is joined by C, and they finish it together in 4 days; in what time would C do the piece of work by himself?

4. If I can travel 198 miles by railway for \$11.88, how far at the same rate of charge ought I to be carried for \$38.61?

5. If a workman earns £17 6s in $102\frac{1}{2}$ days, how long will he be earning 50 guineas?

6. Multiply .0431, separately, by 100 and 1,000,000.

Divide 378.0186, separately, by 1,000 and 1,000,000.

7. Extract the square root of 53,111.8116; .000,001.

Extract cube root of .15,625; .000,000,001.

ENGLISH GRAMMAR.**Maximum 50; Minimum 25.**

1. What is an infinitive? How many kinds of infinitives are there? Give an example of each.

2. Explain clearly the likeness and unlikeness of prepositions and conjunctions, using the following sentences as a basis for your answer:—(1) The boy is in the garden. (2) The boy and girl are here. (3) He came home, but his brother remained there. (4) There are flowers in the garden and in the forest. (5) I do not know that he is right.

3. Into what three classes may the parts of speech be divided? Justify your classification.

4. What are the five inflections of the verb? Give an example of each in sentence form.

5. Write out (a) the plural forms of the following:—folio, crisis, chimney, chief, hobby, John, knight-errant, tableau, brother-in-law; (b) the possessive forms singular and plural of:—lady, thief, James, man, church; (c) the corresponding gender form of Kaiser, earl, man-servant, fox, abbot, executor, tailor, Czar, Sultan.

6. What are the four classes of sentences, classified as to form? Give an example of each.

7. Give the three main periods of development of the English language from the Anglo Saxon time to the present day.

CANADIAN HISTORY.**Maximum 50; Minimum 25.**

1. Give a brief account of each of the following explorers in Canada:—(a) La Salle, (b) Verendrye, (c) Hearn.

2. Give a concise account of Champlain's dealings with the Indian tribes, Hurons, Algonquins, Iroquois.

3. Describe the work of Simcoe in opening up and developing the Province of Upper Canada.

4. How, and when did the Dominion Government acquire the Northwest Territory?

5. Describe concisely the main events which led to the Confederation of Canada by the British North America Act. (b) Mention the chief clauses of the Act. (c) Distinguish between a Legislative Union and a Federal Union. (d) What act in Canadian History established a Legislative Union?

6. What is approximately the breadth of the Dominion from the Atlantic to the Pacific? What is the area of Ontario? What is the population of Quebec?

7. Explain the following terms:—Adjournment of Parliament, Coalition Ministry, Constituency.

8. What Act established our present Municipal System of Government? Explain this system.

9. Write notes on any four of the following:—Sir Guy Carleton, Elgin, Laura Secord, Wolfe, Durham, Riel.

GEOGRAPHY.

Maximum 50; Minimum 25.

1. Define clearly the difference between Commercial, Political and Physical Geography.

2. Name the chief waterways of the Dominion of Canada.

3. Name the Provinces of the Dominion of Canada and three important exports of each.

4. Name three products or by-products of (1) the forest, (2) the mines, (3) the waters of Canada. (b) Name the facilities for transporting these products.

5. Define:—Constellation, meteor, aurora borealis. latitude, longitude, Sargossa Sea.

6. Name five of the largest seaports in the world, and tell where each is situated.

7. Name the different large colonies of Great Britain, giving two chief products of each.

8. Name and locate four great mountain ranges of the world.

Answer either question 9 or 10.

9. Draw a map of France and Belgium and mark on it five places of note in the present war.

10. Name five of the chief imports that come to Canada from Europe, and mention the country of Europe from which each one comes.

LINEAR DRAWING.

Maximum 50; Minimum 25.

Marks.

6. 1. What do you understand by the expression "drawn to scale?"
6. 2. Show 3 feet 5 inches on a scale $\frac{7}{8}$ inch = 1 foot, by using the set square.
8. 3. Show a line 25.5 centimetres long, the scale being 1cm = 3cms.
5. 4. Construct a diagonal scale of 1 inch to a foot, which shall measure feet, inches and tenths of an inch.
6. 5. What is a protractor? What is meant by degree? How many kinds of angles are there?
5. 6. Make an angle of 60 degrees with a given line A.B.
6. 7. Illustrate by diagram to scale a rhombus, rhomboid and pentagon. Show manner of construction.
8. 8. What is the meaning of "representative fractions." Express as representative fractions the scale of map drawn at 4 miles to an inch.

TRIGONOMETRY.

Maximum 100; Minimum 50.

1. Find the number of degrees in the circular arc equal to radius, also the number of grades equal to radius.

(b) Convert $7^{\circ} 15' 2''$ in grades to degrees, minutes and seconds.

2. Given the log sin of $6^{\circ} = 9.019,235$ and log cos = $9.997,-614$ find the logs tan, cot and secant.

(b) Find the circular measure of 1° of arc.

3. The mean distance of the moon from the earth is 60.3 times the earth's semidiameter, equal say 3,960 miles, and the semi-diameter of the moon when observed from the earth subtends an angle of $15' 32''$, find the diameter of the moon in miles.

4. The circular measure of an arc between 0° and 90° is greater than its sine and less than its tangent.

5. Prove the theorem "The sides of a plane triangle are proportional to the sines of the opposite angles."

6. In order to find the distance between two points A B I took a station C 500 yds. from A and 300 yds. from B and observed the angle A C B $126^\circ 30'$, find the distance AB being given the natural Cos. $53^\circ 30' = 0.5,948,228$.

7. $a=6053$, $b=4082$, $c=7068$, find the three angles. A B C.

8. Derive the formula

$$\frac{\text{Tan } \frac{1}{2} (a+b)}{\text{Tan } \frac{1}{2} (a-b)} = \frac{a+b}{a-b}$$

ALGEBRA AND LOGARITHMS.

Maximum 100; Minimum 60.

1. Find the numerical value of $bc (c-a) (a-b) - ca (a-b) (b-c) + ab (b-c) (c-a)$ when $a=10$, $b=.01$ and $c=0$.

2. Find the H.C.F. of $3x^3 - 13x^2 + 23x - 21$ and $6x^3 + x^2 - 44x + 21$.

3. (a) Give the definition of the terms:—Power, root, index, coefficient, simultaneous, equation and identify.

(b) What value of m makes $(x-3)^2 - (x-1)(x-5) = m$ an identity? Can any value of m make it an equation?

4. (a) Solve the equations:—

$$\frac{8x+23}{20} - \frac{5x+2}{3x+4} = \frac{2x+3}{5} - 1$$

(b)

$$\frac{x}{2a} + \frac{y}{3b} = a + b$$

$$\frac{3x}{a} - \frac{2y}{b} = 6(b - a)$$

5. A vessel travels 110 miles with the current and 70 miles against the current in ten hours. On a second trip it sailed 88 miles with the current and 84 miles against the current in the same time. What is the rate (1) in still water? What is the rate (2) of the current.

6. (a) Show by examining the square of $a + b$, how the square root of an algebraical quantity may be found.

(b) Find the square root of

$$25x^4 - 30ax^3 + 49a^2x^2 - 24a^3x + 16a^4$$

Logarithms.

1. (a) Give the definition of Common Logarithms, characteristic and mantissa.

(b) Write down from inspection the characteristic of 20735, .87, .035 and 23.7.

2. Find by the use of tables, the value of

$$\frac{6.12}{.41312} \times 5\sqrt{5417.17}$$

$$3. \sqrt[3]{\left(\frac{294 \times 125}{42 \times 32}\right)^2}$$

4. Find the value of x from the equation:— $.0178345 x = 21.85632$.

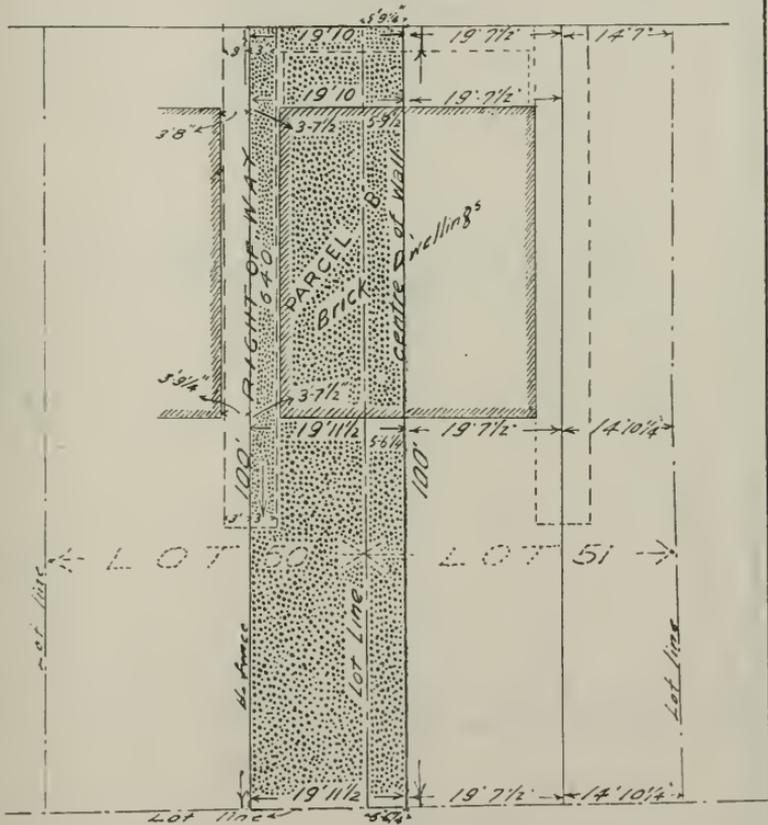
N.B.—The correct solution to 9 of the above problems will be considered full valuation for this paper.

2

Describe by miles and bounds
Parcel B. Giving & reserving Rights
of Way.

Sketch showing
Parts of Lots 50 & 51
Registered Plan 445E
TORONTO

VICTOR AVE.

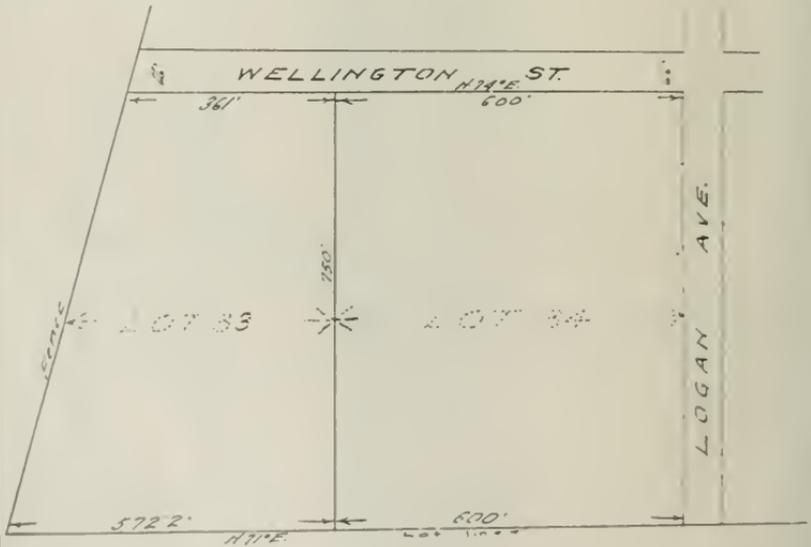


February 1915

3

Describe the southerly 1/2 acres
of lot 33, the north boundary to
be parallel to Wellington St.
Assume missing lengths & courses

Sketch Shewing
Lots 33 and 34 on south side Wellington St.
Town of Bronte
Township of Trafalgar

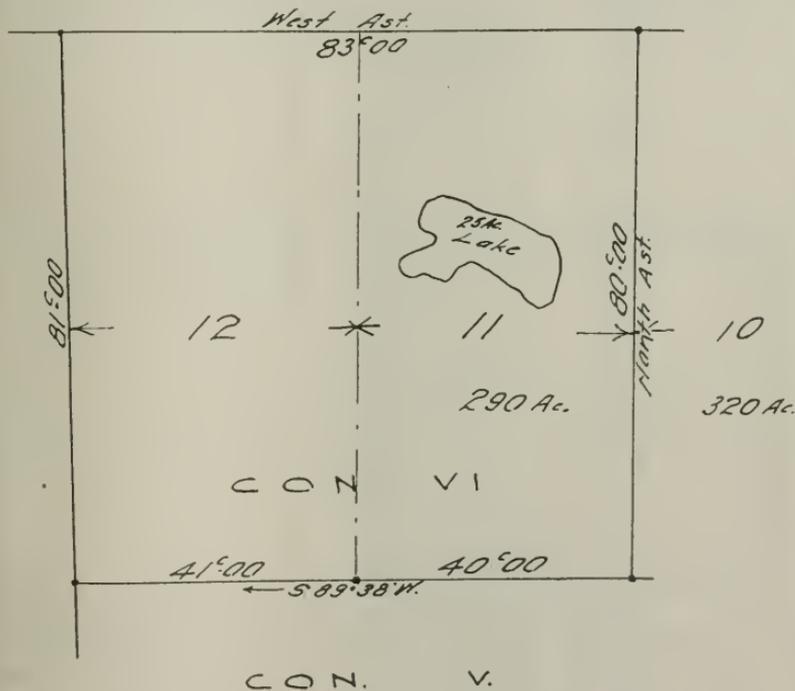


February 1915

4

Describe the west half of Lot 11

Sketch showing
Lots 11 & 12 Concession VI
Township of Smith
District of Alberta

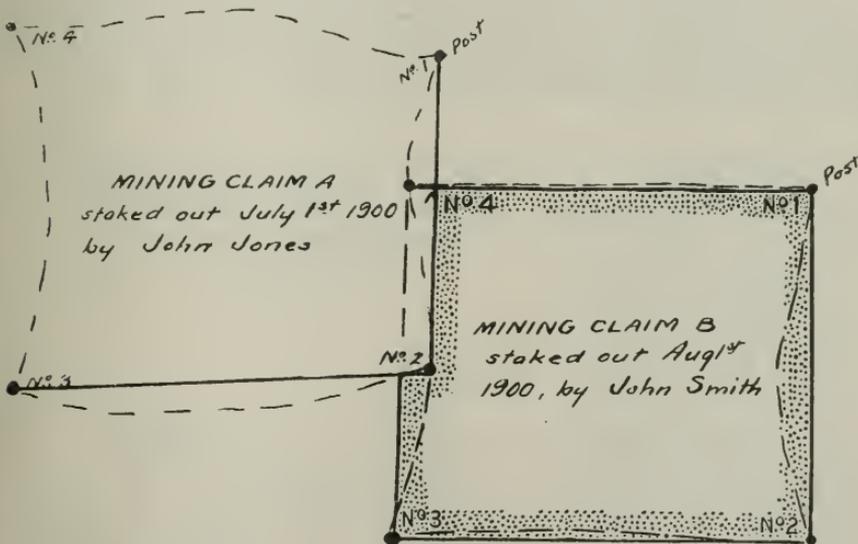


February 1915

MINING ACT OF ONTARIO, INCLUDING DESCRIPTION OF MINING CLAIMS.

Maximum Marks 75, Minimum Marks 50.

1. Describe Mining Lands, Mining Rights, Surface Rights, Valuable Mineral in place.
2. What Crown Lands are open for staking into mining claims, and what lands are not open?
3. Distinguish between Mining Location and Mining Claim.
4. Describe the dimensions of a corner post of a claim required to be planted by the licensee. What point on the post would a surveyor use as the angle of the claim?



5. Write out a description by metes and bounds of Mining Claim No. 11, as shown on diagram hereto attached.

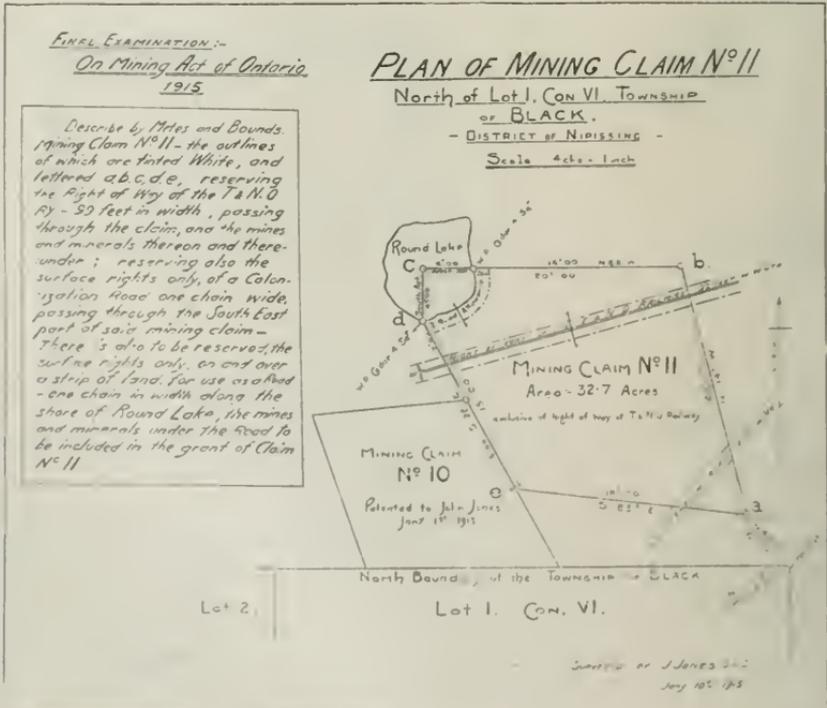
6. On the diagram or plan hereto attached is shown three Mining Claims, 1, 2 and 3, staked and recorded on the dates shown on plan; the dotted lines are those blazed out on the ground by the licensees, and the posts shown planted by them; the claims are in unsurveyed territory and were assumed to be staked out into regular claims of 40 acres each, the out-lines North and South and East and West, 20 chains by 20 chains.

Question—(a) Define the true boundaries of each claim by lines etched or colored, so as to illustrate clearly the limits of each claim.

(b) Describe by metes and bounds Claim No. 2. Assume distances, bearings and area.

7. The attached diagram shows Lot 1, Con. 3, Township A, surveyed into sections of 640 acres. The West $\frac{1}{4}$ of the lot was patented to J. Jones, January 1st, 1915, by designation as the West $\frac{1}{4}$ of the lot contains 80 acres, more or less. The East part described as the East part, having a depth of 10 chains throughout, contains 80 acres more or less, was patented on the same date to W. Smith. On January 20th, 1915, the South $\frac{3}{4}$ of the residue of the lot, containing 120 acres more or less, was patented as herein described to A. Black.

Question—Describe the residue or balance of the lot by metes and bounds, assuming that the boundaries of the lot are North and South and East and West.



GEOLOGY AND MINERALOGY.

Maximum 60; Minimum Marks 30—Value Same For Each Question.

1. Name the most important economic minerals of Canada and the most important non-metallic mineral in Old Ontario.
2. Describe briefly the Sudbury and Cobalt mineral fields, giving the names of the different minerals associated with nickel and cobalt.
3. What mineral found in Ontario is used in the manufacture of sulphuric acid and sulphite pulp? Where found in greatest quantities?
4. Name the different geological formations found in Ontario and briefly outline them.
5. Explain by diagrams or otherwise the following terms:—Fault, Fold, Strike, Dip, Vein, Anticlinal, Synclinal, Outcrop.
6. Into what three great classes are rocks divided? Give short description of each.
7. Name the different mineral and geological samples before you.

EUCLID.

1. To describe a square on a given straight line.
2. In any right-angled triangle, the square which is described on the side subtending the right angle is equal to the squares described on the sides which contain the right angle.
3. If a straight line be divided into any two parts, the squares on the whole line, and on one of the parts, are equal to twice the rectangle contained by the whole and that part, together with the square on the other part.
4. The opposite angles of any quadrilateral figure inscribed in a circle are together equal to two right angles.
5. If from any point without a circle two straight lines be drawn, one of which cuts the circle, and the other touches

it; the rectangle contained by the whole line which cuts the circle, and the part of it without the circle, shall be equal to the square on the line which touches it.

6. To inscribe a circle in a given triangle.

7. Similar triangles are to one another in the duplicate ratio of their homologous sides.

MEASUREMENT OF WATER POWERS.

Maximum Marks 100; Minimum For Pass 50.

1. Describe the different methods adopted in measuring the discharge of streams. What information as to the character of the watershed would you require before you could make a report on the probable capacity of the stream?

2. Draw a diagram explaining the "Miner's Inch Measurement;" also the "Weir Dam Measurement."

3. Find the pressure in lbs. on a dam 100 feet long, 5 feet in height from the surface of the stream above the dam to the bed of the stream.

4. A stream 60 feet wide is divided into three sections having cross section areas 32, 65, and 38 square feet, and the surface velocities near the middle of these are found to be 1.3, 2.6 and 1.4 feet per second. What is the approximate mean velocity of the stream?

5. What is the approximate annual rainfall in Northern Ontario? What conditions are most favorable for a large run-off? In a comparatively level well timbered country, what would you estimate the run-off available for development purposes?

6. A stream delivers 500 cubic feet of water per second to a canal which terminates in a forebay where the water level is 8.1 feet above the tail race; the wheels deliver 335 horsepower and their efficiency is known to be 75 per cent. How much H.P. is lost in the forebay and penstock?

7. Calculate the effective H.P. that can be developed on a stream where H is the total head, W is the number of cubic feet of water per second entering the flume, assuming that the efficiency of the wheel to be .75, and that of the approaches .96 and of the plant .92.

8. Give the following fundamental hydraulic constants:— Pounds per square inch due to one atmosphere; Pounds per square inch due to one foot of head; Cubic feet in one U.S. gallon.

DITCHES AND WATER COURSES ACT.

1. (a) State the restrictions with reference to length of drain, drainage area, and cost of a ditch to be constructed under the Ditches and Watercourses Act.

(b) What proceedings are required to be taken to authorize the extension of a drain beyond the prescribed limits?

2. (a) What proceedings are required to be taken to construct a drain across the lands of a railway company?

(b) How is the cost of a ditch constructed across the lands of a Railway Company to be borne?

3. What steps are required to be taken against an owner who is in default in the completion of a drain under the Ditches and Watercourses Act?

4. An owner, party to an award, desires to have the ditch constructed under an Engineer's award changed in certain portions of its course, and also enlarged. What are the proceedings he must take to procure the change in the award?

LAYING OUT OF CURVES.

Maximum 50; Minimum Marks 30.

1. Illustrate by diagram the meaning of long chord, tangent, distance, sub-chord, external distance and deflecting angle.

2. Find the external distance of a $7^{\circ} 30'$ curve when the central angle is 60° .

3. The angle at the vertex is $24^{\circ} 30'$ and the curve passes 66.75 feet from the vertex. Find the degree of curve joining the two tangents.

4. Show how you would locate a railway curve by offsets from the tangents.

5. A 12° curve having a central angle of $76^{\circ} 30'$ commences at station 56 + 55; find the total length of curve and the station at P.T.

6. It is required to run in the track centres with a 33' tape, what correction must be added to the length of tape so that the track centres may coincide with the original centres as laid out with a 100 ft. tape.

7. Show how you could locate a curve when the vertex is inaccessible.

8. Connect two parallel tangents 24 feet apart by a curve with a radius of 800 feet.

9. A 4th curve joins two tangents having a vertical angle of 38°, it is necessary to bring the middle point of curve 25' nearer the vertex, find change in radius and P.C.

REGISTRY ACT.

1. Where land is surveyed and sub-divided and sold in lots by reference to a plan that has not been registered, what must the owner do to make the sub-division to comply with the Registry Act?

2. By whom shall this plan be signed if a mortgage has been registered before the registration of the plan? Is it necessary to have the signatures verified?

3. If your client desires to lay out a registered plan, a street less than 66 feet wide, what must be done before the plan will be accepted by the registrar?

4. What is necessary to have endorsed on a plan of sub-division land, for which the Crown patent has not been issued?

5. In what cases is it unnecessary to have the approval of the municipality signified before a plan may be registered?

Municipal Act.

6. In case a person is in possession of any part of an allowance for road or street laid out immediately adjoining his lot and enclosed by a lawful fence, and which has not been opened for public use. State briefly the method to be adopted to open such road or street for public use.

7. Give a brief summary of the more important provisions of the "City and Suburbs Plans Act."

ALGEBRA.

Maximum Marks 100; Minimum Marks 50.

1. Find the numerical value of the quantity:
 $bc(c-a)(a-b)-ca(a-b)(b-c)+ab(b-c)(c-a)$ when
 $a=10$, $b=.01$ and $c=0$.

2. Find the H.C.F. of
 $6x^4-7x^3-13x^2+19x-6$ and x^3+2x^2-1 .

3. Show by examining the square of $a+b$, how the square root of an algebraical quantity may be found.
 Find the square root of $4x^5+9x^6-12x^4+16x^2+9-2x(6x^6-8x^4+9x^2-12)$

4. (a) Define the terms root, index, coefficient surd, quadratic and simultaneous equation and give one example of each.

(b) Find the relations between the roots and coefficients of the equation $ax^2+bx+c=0$.

5. Solve the equation:—

(a) $2x+3y=37$

$$\frac{1}{x} + \frac{1}{y} = \frac{14}{45}$$

(b) $\frac{\sqrt{x+y}}{x-y} + \frac{\sqrt{x-y}}{x+y} = \frac{34}{15}$

6. Out of 17 consonants and 5 vowels, how many words can be formed each containing 2 consonants and one vowel?

7. A man borrows \$5,000 at 4 per cent. compound interest. If the principal and interest are to be paid in 10 equal annual instalments, find amount of each instalment.

Define arithmetical, geometrical and harmonical progression.

(a) How many terms of the natural number beginning with 4 will give a sum of 5,350?

8. Show how to find the sum of a number of terms in geometrical progression.

(a) The sum of three terms in G.P. is 38 and the product is 1728, find them.

9. A cyclist has to ride 75 miles, he rides for a time at 9 miles an hour, and then alters his speed to 15 miles an hour, covering the distance in 7 hours. At what time did he change his speed?

SURVEY ACT.

Maximum 150; Minimum 90.

1. When a municipal corporation desires to have certain road allowances established in such a way that these boundaries will not be questioned in court, what is the method of procedure?

2. What do you understand by the aliquot part of a lot or parcel of land in a township, city, town, etc?

3. What is the governing boundary line in a "single front" concession? State how lines are to be run therein. When would you use a "proof line?" Illustrate by diagram.

4. State how lines are to be run in those townships south of Lake Nipissing and the French and Mattawa Rivers?

5. Describe briefly the two systems of township surveys lying north of the main line of the Canadian Pacific Railway, in the districts of Nipissing and Timiskaming.

6. How would you run lines in "double front" concession townships in which each alternate concession line only was run in the original survey?

7. Where the undisputed points on the side lines in two adjacent sections or blocks are more than 20 chains apart, how would you establish the angles of the sections or blocks?

8. Where any concession is bounded in front at either end, in part, though not wholly, by a river or lake, and no posts were planted in the original survey on the banks of such river or lake to regulate the widths of lots broken thereby, how shall division or side lines be run in such broken lots? Illustrate by diagram.

Oral examination also required.

MUNICIPAL DRAINAGE.

1 Interpret the meaning of the following terms as used in the Municipal Drainage Act—Initiating Municipality, Owner, Drainage Act, Drainage Area, Referee, Court or Revision, and also distinguish between injuring, outlet and benefit liability.

2. (1) When a drain passes through two or more municipalities, what proceedings must be taken before the by-law may be finally adopted by the several municipalities.

(2) What proceedings are required to be adopted when a drain is carried through land of a Railway Company.

3. Make an assumed estimate of cost—(1) for the construction of a new drain, (2) for the repairs to an old drain which shall include cost of construction and the various allowances enumerated for allowances to owners, land drainages, etc, as required by the Municipal Drainage Act.

4. State the class of appeals over which the referee and judge have jurisdiction, respectively.

5. If an Engineer in his report for the repairs to an old drain should recommend that a new outlet drain should be constructed of about 40 per cent. of the capacity of the present drain, what lands would you assess for the cut off drain, stating whether it should be injuring, outlet or benefit liability, giving your reasons therefor.

6. Calculate the cross section of a drain required to carry off a maximum run of 400 cubic feet per minute, the inclination being 6 feet per mile.

EVIDENCE.

Maximum 70; Minimum 35.

1. When were surveyors first empowered to administer oaths?

2. How would you compel an unwilling witness to give evidence as to boundaries and to produce plans or documents?

3. Where a surveyor is in doubt as to the true boundary of any range or lot, what is the method of procedure?

4. State fully your understanding of the meaning of the term "Evidence," as used in the "Survey Act."

5. What constitutes the "best evidence the nature of the case admits of?"

6. What are the essential parts of an affidavit? Write an affidavit proving the site of an old original post at the corner of a farm lot, the post having been lost or removed.

BOTANY AND TIMBER.

Maximum 50; Minimum 25.

1. Describe fully the uses of (a) root, (b) stem, (c) leaves of a plant.

2. Describe fully (a) Pollination and tell the different ways it is brought about; (b) the process of fertilization; (c) Results of cross-fertilization; (d) Ways self-fertilization is prevented.

3. Give all the characteristics of (a) Monocotyledons; (b) Dicotyledons.

4. Describe carefully all the different organs of the flower, giving the different parts and uses of each.

5. Name ten different economic forest trees of Ontario and tell the uses to which each is best adapted, and the locality in which they are found.

6. A log is 12 inches in diameter; what is the size of the largest square of timber that can be cut from it?

LEVELLING.

Maximum 50; Minimum 35.

1. Make a specimen set of level notes showing how you would rule a note book 5" x 7" for the following:—

(a) The elevation at every 100 ft. and at intermediate points along a line to be found.

(b) The difference of level of two given bench marks to be found using the method of double turning points.

2. Describe the construction of a Wye level also of a Dumpy level and discuss the advantage of each.

3. Before starting work with a Wye level, for what errors of adjustment would you test the instrument, and how would you make the corrections when the adjustments are found imperfect?

4. Same as in question 3 but with Dumpy level instead of Wye level, also how would you adjust a lock hand level?

5. Discuss the merits of direct and inverting telescopes when used on levels, also how would you test a telescope before purchasing for spherical aberration.

6. Discuss the merits of a rod read by means of a target and vernier, and a self reading rod.

7. State the precautions to be taken when levelling.

(a) By instrument man.

(b) By rodman.

8. What levels are taken:—

(a) In laying out a railway.

(b) In making a contour map and explain the purpose in each case.

MENSURATION.

Maximum 150; Minimum 75.

1. The following are the notes of a survey:—

(1) S. $30^{\circ} 17'$ E. 5.12.

(2) N. $80^{\circ} 05'$ E. 6.81.

(3) N. $0^{\circ} 20'$ W. 4.30.

(4) N. $47^{\circ} 35'$ W. 6.37.

(5) S. $40^{\circ} 10'$ W. 7.00.

It is required to find the area first balancing the survey.

2. What is the area of above field assuming chain is one link too long.

3. In a triangular field A B C, A B = 14 chains; B C = 16 chains; C A = 12 chains. It is required to bisect the area by a straight line D E, the point D being in C A and distant 4 chains from C. What is the length of the dividing line D E?

4. Find the area of temperate Zone, assuming the inclination of the ecliptic to be $23^{\circ} 30'$. Radius of earth 3960 miles.

5. What is the area of a mile race track of which the radius of the semi-circles joining the parallel tangents, which form the mile line is six hundred feet. The track is twenty feet in width on each side of the mile line.

PLANE TRIGONOMETRY AND SPHERICAL.

Maximum 100; Minimum 60.

1. Show that

$$(a) \quad \sec^2 A + \cot^2 A = \operatorname{cosec}^2 A + \tan^2 A$$

$$(b) \quad \frac{\tan^2 A}{1 + \tan^2 A} \times \frac{1 + \cot^2 A}{\cot^2 A} = \sin^2 A \sec^2 A$$

2. Express in radius, the interior angle of a regular polygon which has 5 sides.

3. In any triangle A B C prove

$$(a) \quad \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$(b) \quad \cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$(c) \quad \tan \frac{A - B}{2} = \frac{a - b}{a + b} \tan \frac{A + B}{2}$$

4. In a plane triangle, two sides are 1404 and 960 respectively, and an angle opposite to one of them is $32^{\circ} 15'$, find the angle contained by the two sides.

5. Find the area of a triangle whose sides are 171, 204 and 195.

6. Two chimneys A B and C D are of equal height. A person standing between in a line A C joining their basis, observes the elevation of the one nearer to him to be 60 degrees. After walking 80 feet in a direction at right angles to A C he observes their elevation to be 45° and 30°, find their height and distance apart.

SPHERICAL TRIGONOMETRY.

1. Prove that

$$(a) \quad \cos A = \frac{\cos a - \cos b \cos c}{\sin b \sin c}$$

$$(b) \quad \frac{\sin^2 A}{2} = \frac{\sin (s-b) \sin (s-c)}{\sin b \sin c}$$

2. Given $b = 137^\circ 3' 48''$, $A = 147^\circ 2' 54''$, $C = 90^\circ$, find c and b .

3. Given $a = 70^\circ 14' 20''$, $b = 49^\circ 24' 10''$, $c = 38^\circ 46' 10''$, find A .

4. (a) Enumerate Napier's analogies.

(b) Define spherical excess, Lune and Pole of a great circle.

ASTRONOMY.

Maximum 150; Minimum 90.

1. Define the terms year, equinox, solstices, equinoxial points, solstitial points, equinoxial and solstitial colures.

What are the dates of the equinoxes and solstices and what are the corresponding values of the sun's declination longitude and right ascension?

Find the sun's greatest and least meridian altitudes in Toronto.

2. What is meant by "circumpolar stars," and what is the limit of declination of stars which are circumpolar in Toronto? Indicate in a diagram the belt of the celestial sphere containing the stars which rise and set.

3. Explain fully the equation of time—why it varies and when it is a maximum. Illustrate by diagram.

4. What are the extreme limits that the azimuth of polaris may attain, and what are the corresponding latitudes of the place of observation?

5. On Oct. 16th, 1914, the observed altitude of the sun's lower limb on the meridian was $34^{\circ} 54' 01''$. Longitude of station = $70^{\circ} 30' W$. Sun's meridian = $16' 04''$ and declination at G.M.N. = South $8^{\circ} 40' 28.3''$. Hourly variation $55.46''$. Find the latitude.

6. On Oct. 16th 1914, Lat. $46^{\circ} 06' 10''$, Long. $70^{\circ} 30' W$. Observed altitude sun's centre was $17^{\circ} 34' 45.5''$. Sun's dec. at G.M.N. = $8^{\circ} 40' 28.3''$ and hourly variation $55.46''$. The time by watch = 2h 59m 40.7s and H.C.R. on sun = $181^{\circ} 13' 41.6''$. Find the Sun's azimuth and the meridian reading.

7. With the data given in question 6 the equation of time being 14m 14.5s, find the watches correction on Standard time.

8. Aug 1st, 1914, in Toronto, Lat. $43^{\circ} 39' 40''$. Long. 5h 17m 34.6s. Given Polaris Dec. = $88^{\circ} 50' 45.6''$ and R.A. 1h 28m 59.3s. Sidereal time at G.M.N. = 8h 37m 00.16s. Find the standard time and azimuth of Polaris at Eastern Elongation.

9. In Lat. $46^{\circ} 14' 57.3''$, Longitude $70^{\circ} 30'$. Polaris dec. = $88^{\circ} 50' 42.8''$, R.A. = 1h 28m 18.1s. Sidereal watch fast 30 sec, Level correction 0. Polaris observed for azimuth time by watch 19h 30m 40s. H.C.R. on star = $0^{\circ} 1' 16.7''$. H.C.R. on Mark = $6^{\circ} 35' 14.5''$. Find azimuth of the mark.

LIST OF MEMBERS

1915

The names of those members granted commissions since January 1st, 1915 are marked*.
See Section 44, Ontario Land Surveyor Act.

Name and P.O. Address.	Date of Admission by Board.
Abrey, George Spencer, 606 Indian Rd., Toronto	6th April, 1906
Allan, John Richard, Renfrew	6th Nov., 1894
	Grad. S.P.S.
Allison, Calvin Bruce, South Woodslee	22nd Feb., 1911
	D.L.S., Grad. S.P.S.
Anderson, Frederick John, Niagara Falls	1st May, 1910
Anderson, Herbert McEwan, North Bay	18th April, 1910
Anderson, Ralph Mackenzie, Toronto, 16 St. Vincent St.	2nd May, 1911
	Grad. S.P.S.
Angus, George Page, North Bay	18th April, 1911
Ardagh, Arthur Gowan Barrie	18th Feb., 1908
	Grad. S.P.S.
Attwood, Charles Hartley, Hamilton, 88 King Street W.	22nd Feb., 1911
Aylesworth, John Sydney, R. R. No. 2, Roblin, Ont.	9th Jan., 1871
	D.L.S.
Aylesworth, Charles Fraser, Madoc	8th Jan., 1886
	D.L.S.
Baird, Alexander, Leamington	7th July, 1877
	C.E.
Baird, John Ainslie, 129 Margaret St., Sarnia	2nd May, 1913
Baird, Wilmot Johnston, Scarborough	22nd Feb., 1912
Baker, Mason Herman, St. Thomas	16th Feb., 1909
	D.L.S.
Barrow, Ernest George, Hamilton, 26 John Street South	4th Oct., 1877
	D.L.S., Mem. Can. Soc. C.E., City Engineer.
*Bartley, Thomas Holmes, 464 Gladstone Ave., Toronto	11th Feb., 1915
	D.L.S.
Bazett, Edward, Huntsville	8th July, 1881
	D.L.S.
Beatty, David, Parry Sound	12th July, 1869
	D.L.S.

Name and P.O. Address.	Date of Admission by Board.
*Beatty, William Benjamin, R. R. No. 1, Sarnia	11th Feb., 1915 D.L.S.
Beatty, Herbert John, Pembroke	8th Nov., 1893 Grad. S.P.S.
Bell, Frederick Archibald, Court House, St. Thomas	22nd May, 1914
Bell, James Anthony, St. Thomas	11th Oct., 1875 D.L.S., Co. Engineer, Elgin; City Engineer, St. Thomas.
Benner, Frederick James King, Port Arthur...	13th Feb., 1913
Bigger, Charles Albert, 145 Gloucester Street, Ottawa,	6th Jan., 1882 D.L.S., A.M. Can. Soc. C.E., B.C.S., Astronomer, Dept. Interior
Bingham, Edwin Ralph, Fort William	17th Feb., 1906 D.L.S.
Blair, William John, New Liskeard	13th Feb., 1904 Grad. S.P.S.
Blandy, Oliver Roland, Provident & Loan Chambers, Hamilton	22nd Feb., 1912
Bolton, Ellsworth Doan, Listowel	7th Nov., 1899 B.A.Sc. (McGill).
Boswell, Elias John, C.P.R., Montreal	7th Nov., 1896 Grad. S.P.S., D.L.S.
Bowman, Clemens Dersteine, West Montrose...	10th July, 1879
Bowman, Herbert Joseph, Berlin	7th Jan., 1887 D.L.S., Grad. S.P.S., Treasurer County Waterloo, Assoc. Mem. Can. Soc. C.E.
Bowman, Edgar Peterson, West Montrose...	17th April, 1907 D.L.S.
Bray, Harry Freeman, not known	10th July, 1882 D.L.S.
Bray, Lennox Thompson, Amherstburg	17th Feb., 1902 D.L.S.
Bray, Samuel, Ottawa, Dept. of Indian Affairs...	6th Jan., 1877 D.L.S., C.E.
Brain, Michael Edward, Windsor City Hall	17th Feb., 1906 B.A.Sc.
Brown, George Laing, Morrisburg	19th Feb., 1898 Grad. S.P.S.
Browne, Harry John, Toronto, 203 Albany Ave.,	6th July, 1872 C.E.
Browne, Wm. Herbert, Toronto, 18 Toronto St.	18th April, 1910
Burd, James Henry, Sudbury, Ont.	2nd Oct., 1905 D.L.S., Grad. S.P.S.

Name and P.O. Address.	Date of Admission by Board.
Burwash, Nathaniel Alfred, Toronto, 26 Alvin Ave.	6th May, 1905
D.L.S., Grad. S.P.S.	
Bush, Clayton Elgin, Edmonton, Alta.	15th May, 1908
Grad. S.P.S., B.A.Sc. D.L.S.	
Byrne, Thos. Henry, Ottawa, 71½ Sparks St.	24th Feb., 1910
Caddy, John St. Vincent, 327 Laurier Ave., Ottawa	6th Oct., 1866
D.L.S.	
Campbell, Alexander Stuart, cor. King & Brock Street, Kingston	24th Feb., 1910
Campbell, Archibald William, Ottawa, Deputy Minister of Railways and Canals. .	10th April, 1885
C.E.	
Carre, Henry, 276 Albert St., Belleville, Box 203	8th Nov., 1861
M.O. & Georgian Bay Canal, B.A. and C.E. (Trin. Coll. Dublin). D.L.S.	
Cavell, Edwin, 182 Sunnyside Ave., Toronto . . .	13 Feb., 1913
Casgrain, Joseph Phillippe Baby, 180 St. James St., Montreal	5th Jan., 1887
D.L.S., P.L.S. (Que.), C.E., Assoc. Mem. Can. Soc. C.E., Chief Eng. M. & P. J. Ry., Senator.	
*Cassels, W. Lyttleton, 32 Canada Loan Bldg., Ottawa	11th Feb., 1915
Cavana, Allan George, Orillia	8th July., 1887
D.L.S.	
Chase, Albert Victor, Orillia, Box 762	21st April, 1909
A.M.C.Sec., Grad. S.P.S., D.L.S.	
Chipman, Willis, Toronto, Mail Bldg.	4th Oct., 1881
D.L.S., B.A.Sc. (McGill), Mem. Am. Soc. C.E., Mem. Can. Soc. C.E.	
Christie, Uriah Wesley, Orangeville	1st March, 1905
Clarke, Fred Fieldhouse, 75 Sheldrake Bldg., Toronto, Ont.	31st March, 1905
Grad. S.P.S.	
Clarke, Leonard Oswald, North Bay	17th Feb., 1903
Code, Abraham Silas, Alvinston	14th April, 1896
Code, Samuel Barber, Smith's Falls	1st May, 1905
S. P. S.	
Code, Thomas George, Box 330, Cobalt	17th April, 1907
Code, Robert Wilmot, 28 Pitt St., Windsor	April, 1911
Code, Richard Stanley, Box 330 Cobalt	17th April, 1907
Coltham, George William, Aurora	1st May, 1912
D.L.S.	
Coltham, Jas. T., Aurora, Ont.	18th April, 1911
Cook, William Albert McMichael, 37 High Park Ave., Toronto	19th April, 1910

Name and P.O. Address.	Date of Admission by Board.
Cotton, Arthur Frederick, New Westminster, B.C.	11th July, 1874
D.L.S.	
Crerar, Samuel Rutherford, Toronto, School of Science	1st March, 1906
D.L.S., B.A.Sc., Toronto.	
Crouch, Milton Edwin, 12 Banning St., Port Arthur	11th Feb., 1914
D.L.S.	
Dalton, John Joseph, Weston, Ont.	11th Jan., 1878
D.L.S., D.T.S.	
DeMorest, Richard Watson, Ottawa, 77 Metcalf St.	9th April, 1889
M.E.	
Dempster, Herbert Orville, Gananoque	24th Feb., 1910
Dickson, James, Fenelon Falls	6th April, 1867
D.L.S.	
Dobie, James Samuel, Thessalon	21st Feb., 1898
B.A.Sc., (Tor. Univ.), D.L.S.	
Dunn, Thomas Hamilton, Dept. of Interior, Ottawa	14th May, 1906
Grad. S.P.S.	
Dynes, Richard Fforde, Box 136, Camrose, Alta.	27th May, 1913
Eadie, Louis Francis, cor. Dundas and Humber- side, Toronto	2nd May, 1913
Eagleson, Francis Merwin, Winchester, Ont. . .	11th May, 1909
Grad. S.P.S., D.L.S.	
Earle, Wallace Sinclair, Vancouver, 525 Vancouver Blk.	22nd Feb., 1912
Ellis, Douglas Stewart, 209 Albert St., Kingston	12th Feb., 1913
D.L.S.	
Esten, Henry Lionel, Toronto, 157 Bay St.	7th Jan., 1887
Evans, John Dunlop, Trenton	8th July, 1864
D.L.S., Mem. Can. Soc. C.E., Chief Eng. Cent. Ont. Ry.	
Fair, John, Brantford, 165 Colborne St.	13th April, 1875
Fairbairn, Richard Purdon, Toronto 452 Markham St.	7th Oct., 1876
Deputy Minister Dept. of Pub. Works, Ontario.	
Fairchild, Charles Court, Edmonton	9th April, 1894
Grad. S.P.S., D.L.S.	

Name and P.O. Address.	Date of Admission by Board.
Fairchild, William Howard, Brantford	17th Feb., 1900
Farley, Sidney Edward, 362 Rideau St., Ottawa, Road Engineer, Co. Carleton	21st April, 1909
	P.L.S., Que.
Farncomb, Alfred Ernest, Edmonton, Alberta	9th April, 1895
	D.L.S.
Farncomb, Frederick William, London, 213 Dundas St.	6th Nov., 1889
Fawcett, Thomas, 8 Driveway West, Ottawa	6th Jan., 1881
	D.L.S., Dom. Topographical Surveyor.
Fitton, Charles Edward, Orillia, Box 142	10th April, 1879
	D.L.S.
Fitzgerald, James William, 435 George St., Peterboro	13th Feb., 1904
Flater, Frederick William, Chatham	9th April, 1888
*Fletcher, Wm. Jessamine, 22 Wyandotte St. W., Windsor	21st May, 1915
Flook, Samuel Evert, Port Arthur	13th Feb., 1913
Francis, John James, Sarnia P.O., Box 304	16th Oct., 1861
	D.L.S.
Fuce, Edward Oliver, 115 Seventh Ave., Calgary	17th Feb., 1906
Fullerton, Charles Herbert, New Liskeard	7th May, 1906
	D.L.S., Grad. S.P.S.
Galbraith, William, Bracebridge	4th April, 1883
	D.L.S.
*Gallagher, Charles Vincent, South Porcupine	11th Feb., 1915
Gardiner, Edward, St. Catharines	6th Jan., 1866
	D.L.S.
Gaviller, Maurice, Collingwood, Box 164	6th Jan., 1866
	C.E. (McGill), D.L.S.
Gibson, Colin William George, Hamilton	13th Feb., 1913
Gibson, Morton Milne, 1835 Yonge St., Toronto	22nd Feb., 1912
Gibson Peter Silas, Willowdale	19th July, 1858
	C.E.M.S. (Mich. Univ.), D.L.S., Mem. Can. Soc. C.E.
Gibson, Wilbert Silas, 1835 Yonge St., Toronto	21st Feb., 1898
Gill, James Richard, Sudbury	13th Feb., 1913
	B.A.Sc (Toronto Univ.)
Gillon, Douglas John, Fort Frances	9th Nov., 1895
	Grad. R.I.E. Coll.
Gourlay, Robert Murray, 35 Keele St., Toronto	22nd Feb., 1912
Grant, Russell Reeve, 961½ Gerrard St. E., Toronto	23rd March, 1911
	Grad. S.P.S.
Green, Thomas Daniel, Rocky Mountain House, Alta.	7th Jan., 1885
	D.L.S.

Name and P.O. Address.	Date of Admission by Board.
Greenless, Alexander Hunter, not known . . .	21st April, 1909
Griffin, Albert Dyke, B.A., Elk Lake	11th Nov., 1890
Halford, Abraham Joseph Bartholomew, Engineer Public Works, Ontario, Parliament Bldgs., 11 Lowther Ave., Toronto	10th April, 1885
Hanes, George Samuel, North Vancouver, B.C. . .	6th May, 1905
<small>City Engineer, Grad. S.P.S.</small>	
Hart, Milner, Toronto, 51 Yonge St.	11th July, 1863
<small>D.L.S.</small>	
Heaman, J. A., G. T. P. Ry., Winnipeg	16th Nov., 1896
Hellferth, John Benedictus, 703 Temple Bldg., Toronto	13th Feb., 1913
Hogarth, George, Assistant Engineer Dept. of Public Works, Parliament Bldgs., 126 Wells St., Toronto	22nd Feb., 1912
Holcroft, Herbert Spencer, 182 Bloor St. W., Toronto	17th Feb., 1902
<small>D.L.S., B.A.Sc. (Toronto Univ.)</small>	
Hopkins, Marshall Willard, Edmonton, Alta. . .	13th Nov., 1893
<small>D.L.S., B.A.Sc. (McGill), Asso. Mem. Can. Soc. C.E.</small>	
Huffman, Karl, 409 Indian Road, Toronto . . .	11th Feb., 1914
<small>P.L.S.</small>	
Hutcheon, James, Parliament Bldgs., Toronto	10th Nov., 1891
<small>Inspector of Surveys, Grad. S.P.S.</small>	
Jackson, Alan Mair, Temple Bldg., Brantford	15th April, 1912
Jackson, John Edwin, Prov. & Loan Chambers, Hamilton	22nd Feb., 1911
<small>Grad. S.P.S.</small>	
Jackson, John Herbert, Queen Victoria Park Com., Niagara Falls	16th Feb., 1901
Jackson, Percival Anthony, 45 Central Ave., Toronto	11th Feb., 1914
James, Darrell Denman, Toronto, 227 George St.	3rd Nov., 1891
<small>D.L.S., B.A., B.A.Sc. (Toronto Univ.)</small>	
Johnson, Herbert, Berlin	21st Feb., 1905
<small>Grad. S.P.S.</small>	
Johnson Sydney Munnings, 39 Caledonia St., Stratford	9th Nov., 1895
Johnston, Wm. James, 73 Exchange Bldg., Vancouver, B.C.	10th May, 1910
<small>D.L.S.</small>	
Jones, Charles Albert, Petrolea	8th April, 1881
<small>D.L.S.</small>	
Jones, John Henry, Sarnia, Box 194	10th Oct., 1886
<small>D.L.S.</small>	
Jones, Thomas Henry, Brantford	10th Oct., 1878
<small>B.A.Sc. (McGill), D.L.S., City Engineer.</small>	

Name and P.O. Address.	Date of Admission by Board.
Jupp, Albert Ernest, 47 Sparkhall Ave., Toronto	22nd Feb., 1911
<small>Grad. S.P.S.</small>	
Kinnear, Louis Arthur, Port Colborne	2nd May, 1913
Kirkpatrick, George Brownly, Toronto, Dept. of Lands, Forests and Mines	13th April, 1863
<small>D.L.S., Director of Surveys.</small>	
Kirkup, Roy Stanley, Fort William	30th April, 1914
Laird, James Stewart, Essex	6th April, 1867
<small>D.L.S.</small>	
Laird, Robert, Haileybury	11th Nov., 1887
<small>Grad. S.P.S.</small>	
Lane, Frederick Carleton, Sudbury	22nd Feb., 1912
Lang, John Leiper, Sault Ste. Marie	2nd May, 1908
<small>B.A.Sc., (Tor. Univ.), D.L.S.</small>	
Lee, Roger Melville, Galt	19th April, 1910
<small>D.L.S., S.L.S.</small>	
Le May, Tracy Deavin, Toronto, City Hall	1st May, 1909
<small>City Surveyor.</small>	
Lewis, John Bower, 15 Sparks Chambers, Ottawa	4th Oct. 1883
<small>D.L.S., P.L.S. (Quebec), C.E.</small>	
Lloyd, Norval Clarence, 18 Toronto St., Toronto	22nd Feb., 1912
Lougheed, Aaron, Port Arthur	12th Nov., 1888
<small>D.L.S.</small>	
Low, Edward Hamilton, Sturgeon Falls	17th Feb., 1902
<small>Grad. R.M.C. (Kingston).</small>	
Lumsden, Hugh David, Orillia	4th Jan., 1866
<small>C.E., D.L.S., M.I.C.E., Mem. Can. Soc. C.E.</small>	
MacKay, James John, Bank of Hamilton Chambers, Hamilton	24th Feb., 1899
MacKay, Ernest George, Bank of Hamilton Chambers, Hamilton	13th Feb., 1913
<small>D.L.S.</small>	
MacKenzie, William, Sarnia	11th April, 1896
<small>Grad. R.M.C. (Kingston).</small>	
MacKenzie, William Lyon, Can. Nor. Ry., Winnipeg, Engineer's Office	7th April, 1887
<small>C.E.</small>	
MacRostie, Norman Barry, 251 Sussex St., Ottawa	11th Feb., 1914
<small>D.L.S.</small>	
McAuslan, Herbert James, North Bay	19th Feb., 1906
<small>D.L.S., B.A.Sc. Toronto.</small>	

Name and P.O. Address.	Date of Admission by Board.
D.L.S. McColl, Charles Ross, 10 Thompson Block, Windsor	4th May, 1909
Grad. S.P.S. McCubbin, George Albert, Chatham, Box 389.	9th Nov., 1895
Assistant City Engineer. McDougall, Samuel Gladstone, 47 Vittoria St., Ottawa	11th Feb., 1914
D.L.S. McDowall, Robert, Owen Sound	11th Nov., 1890
Grad. S.P.S., Town Engineer. McEvoy, Henry Robinson, St. Mary's	10th July, 1875
D.L.S. McFarlen, George Walter, Toronto, City Hall, City Engineer's Office	11th Nov., 1858
Grad. S.P.S. McGeorge, William Graham, Chatham, 135 King St.	22nd Feb., 1911
Grad. S.P.S., D.L.S. McGregor, James Martin, Chatham	22nd Feb., 1912
McKay, Owen, Walkerville, Ont., Box 324	7th Jan., 1887
M.C.S.C.E., Grad. S.P.S. McLean, William Arthur, Toronto, Parliament Bldgs.	21st Feb., 1898
A.M. Can. Soc. C.E., Highways Commission. McLennan, Murdoch John, Williamstown	13th Nov., 1893
B.A.Sc., (McGill), D.L.S. McMeekin, Albert, Kenora	22nd Feb., 1911
B.A.Sc., (McGill), D.L.S. McMullen, William Ernest, 508 Lumsden Bldg., Toronto	11th Nov., 1892
D.L.S. McNaughton, Alexander Lorne, Cornwall	May, 1905
D.L.S. Malcolm, William Lindsay, School of Mining, Kingston	22nd Feb., 1912
Malcolmson, Walter S., 163 Havelock St., Toronto	2nd May, 1913
Manigault, William Mazyck, Strathroy, P.O. Box 300	8th July, 1876
*Marck, Joseph Albert, Bank of Hamilton Chambers, Hamilton	11th Feb., 1915
D.L.S. Miller, Frederick Frazer, Napanee	8th Jan., 1885
D.L.S. Moore, John MacKenzie, London, Albion Bldg.	9th Oct., 1879
Grad. S.P.S. Moore, John Harrison, Smith's Falls	11th Nov., 1889

Name and P.O. Address.	Date of Admission by Board.
Moore, William James, Pembroke	18th Feb., 1908
Morris, James Lewis, Pembroke	7th July, 1886
<small>D.L.S., C.E. (Toronto Univ.)</small>	
Morris, Alfred Edmund, Perth, Ont.	10th April, 1879
Muckleston, Francis Herbert, City Surveyor's Office, City Hall, Toronto	11th March, 1914
Murdoch, William, Bowmanville	10th Jan., 1860
<small>D.L.S., C.E.</small>	
Murphy, Charles Joseph, Toronto, 157 Bay St.	6th Oct., 1886
Neelands, Ernest Wesley, New Liskeard, Ont.,	16th Feb., 1909
<small>Grad. S.P.S.</small>	
Newman, John James, 57 Sandwich St. W., Windsor	12th Nov., 1892
<small>Grad. S.P.S.</small>	
Newman, William, Regina, Sask	
Niven, David Alexander, 165 St. Paul St., St. Catharines	13th Feb., 1913
*Norrish, Wilbert Henry, 17 Nepeau St., Ottawa	11th Feb., 1915
<small>D.L.S.</small>	
O'Hara, Walter Francis, 236 Waverly St., Ottawa	14th April, 1892
<small>D.L.S.</small>	
Patten, Thaddeus James, Little Current	5th Jan., 1883
<small>D.L.S.</small>	
Patterson, Frank Elliott, Ottawa, Ont. 71½ Sparks St.	21st April, 1909
<small>Grad. S.P.S.</small>	
Peckover, Horace Joseph, City Engineer's Office, Toronto	24th Feb., 1910
<small>D.L.S., B.A.Sc., Toronto.</small>	
Pequegnat, Marcel, Berlin, Ont.	24th Feb., 1910
<small>B.A.Sc., Toronto D.L.S.</small>	
Phillips, Edwin Percy Argall, Port Arthur	24th Feb., 1910
*Pierce Benjamin Clifford, 58 Victoria St., Kingston	11th Feb., 1915
Pierce, John Wesley, Box 98, Pembroke	20th Feb., 1909
<small>D.L.S.</small>	
Pinhey, Charles Herbert, Ottawa, 110 Wellington St.	12th Nov., 1888
<small>D.L.S., Grad. S.P.S., Assoc. Mem. Can. Soc. C.E.</small>	
Proudfoot, Hume Blake, not known	6th Jan., 1882
<small>D.L.S., B.A.Sc. (Toronto Univ.)</small>	
Rainboth, George Louis, 114 Carling Ave., Ottawa	2nd May, 1913
<small>D.L.S.</small>	

Name and P.O. Address.	Date of Admission by Board.
Rainboth, Edward Joseph, Ottawa, 488 Mac-Laren St.	11th Nov., 1887
D.L.S.	
Ramsey, Guy Lawrence, Sault Ste. Marie	13th Feb., 1913
Ransom, John Thomas, Toronto, Engineering Bldg., Toronto University.	22nd Feb., 1911
D.L.S., B.A.Sc.	
Robertson, James, 1170 Yonge St., Toronto	11th July, 1885
Grad. S.P.S.	
Roger, Alec, Ottawa South, 36 Seneca St.	22nd Feb., 1911
Roger, John Mitchell	10th Nov., 1888
Grad. S.P.S.	
*Rolfson, Orville, Walkerville	11th Feb., 1915
D.L.S.	
Rorke, Louis Valentine, Toronto, Department of Lands, Forests and Mines	14th April, 1890
D.L.S.	
Ross, George, Welland	10th July, 1879
Engineer County Welland, A.M. Can. Sc. C.E., B.A.Sc., (McGill), D.L.S.	
Ross, Kenneth George, Sault Ste. Marie	15th May, 1909
Grad. S.P.S.	
Routly, Herbert Thomas, Huntingdon, P.Q.,	1st May, 1907
Grad. S.P.S., D.L.S., A.M.C.E.	
Rubidge, Walter Frederick Brendon, Dom. Bridge Co., Montreal, P.Q.	15th April, 1912
Russell, Alexander Lord, Port Arthur	16th April, 1873
D.L.S., P.L.S. (Que.)	
Rutherford, Frank N., St. Catharines, Ont., 24 Queen St.,	18th May, 1906
Seager, Edmund, Kenora	8th July, 1861
D.L.S.	
Sewell, Henry De Quincy, Toronto, 34 Yonge St.	9th July, 1885
D.L.S., A.M.I.C.E.	
Sewell, Henry Charles DeQuincy, 79 Adelaide St. E., Toronto	2nd May, 1913
Shaw, John Henry, North Bay	17th Feb., 1900
Grad. S.P.S.	
Seibert, Frederick Victor, Edmonton	22nd Feb., 1912
Sibbett, William Algernon, C.P.R., North Bay	6th May, 1912
Silvester, George Ernest, Copper Cliff	12th Nov., 1892
Asst. to President, Canadian Copper Co., Grad. S.P.S.	

Name and P.O. Address.	Date of Admission by Board.
Sing, Josiah Gershom, Toronto, Confederation Life Building	9th Jan., 1879 D.L.S., C.E., Public Works Dept.
Slater, Nicholas James, Ottawa, 10 Sparks Chambers	22nd Feb., 1911
Smith, Charles Campbell, 518 Hastings St. W., Vancouver, B.C.	16th Feb., 1907 D.L.S.
Smith, George, Box 25, Lindsay	7th April, 1881 Engineer for Co. Victoria and four Townships.
Smith, James Herbert, Not known	27th Dec., 1904
Smith, Walter, Sudbury	16th Feb., 1907
Snow, Ernest Arthur, 14 Piper Block, Berlin.	18th April, 1910
Speight, Thomas Bailey, Toronto, 703 Temple Building	6th Jan., 1882 D.L.S.
Stewart, Lionel Douglas Noble, Fort Frances	24th Feb., 1910
Stewart, Walter Edgar, Aylmer	12th April, 1892
Street, James Cunard, Box 1167, Thorold ...	11th May 1912
Stull, William Walter, Sudbury	17th Feb., 1900 B.A.Sc. (Toronto Univ.)
Summers, Gordon Foster, Haileybury	11th May, 1908 Grad. S.P.S.
Sutcliffe, Homer Wilson, New Liskeard, Ont.	11th May, 1908 Grad. S.P.S.
Tate, Harry William, Toronto, Prov. Board of Health, Parliament Bldgs.	30th April, 1911 Grad. S.P.S.
Taylor, William Verner, not known	7th Nov., 1896 Grad. S.P.S.
Tench, William Eastwood, 210 John R. St., Detroit, Mich	11th Jan., 1878
Townsend, David Thomas, C.P.R. Land Dept., Calgary	17th Feb., 1906 D.L.S., B.A.Sc., Toronto.
Traynor, Isaac, Dundalk	16th April, 1873 D.L.S.
Turnbull, Thomas, Winnipeg, Man., C.N.R. Eng. Office	6th July, 1878 D.L.S., C.E. (Toronto Univ.)

Name and P.O. Address.	Date of Admission by Board.
Tyrrell, James Williams, Hamilton, Ont.	
Prov. & Loan Chambers, 7 Hughson St. S. 8th April, 1885 C.E. (Toronto Univ.) D.L.S., Co. Eng. for Wentworth.	
Unwin, Charles, Toronto, 126 Seaton St. . . . 12th April, 1852 D.L.S.	
Ure, Frederick John, Woodstock 7th April, 1887 D.L.S.	
van Nostrand, Arthur J., Toronto 703 Temple Bldg. 30th Oct., 1882 D.L.S.	
van Nostrand, John, Toronto 703 Temple Bldg. 1st May, 1910 D.L.S.	
Waddell, William Henry, not known 6th May, 1905 D.L.S.	
Wadsworth, Vernon Bayley, Toronto, 51 Yonge St. 9th April, 1864 D.L.S.	
Walker, Alfred Paverley, Toronto, Room 606 Union Station, C.P.Ry. Div. Surveyor 6th Jan., 1882 D.L.S., Mem. Can. Soc. C.E.	
Ward, Archeson Thomas, Toronto, 703 Temple Bldg. 10th April, 1897	
Warren, James, Walkerton, P.O. Box 190 7th Oct., 1864 D.L.S.	
Watson, John McCormack, Orillia, P.O. Box 224 13th April, 1892	
Webster, William Gourlay, 68 Bank of Toronto, London 22nd Feb., 1912	
Wetherald, Thomas, 210 Delatre St., Woodstock 12th Jan., 1856 D.L.S., C.E.	
Weekes, Melville Bell, Regina 17th Feb., 1900 B.A.Sc. (Toronto Univ.), D.L.S.	
West, Robert Francis, Grand Valley 7th April, 1881	
Wheelock, Charles Richard, Orangeville . . . 7th Jan., 1886 Treasurer County of Dufferin.	
White, Walter Russell, Dept. Indian Affairs, Ottawa 13th April, 1913 D.L.S.	
Whitson, James Francis, Toronto, Parliament Bldg. 9th Jan., 1886 Commissioner Northern Development.	
Wiggins Thomas Henry, Napanee, 10th Nov., 1891	
Wilde, John Absalom, not known 9th April, 1893	

Name and P.O. Address.	Date of Admission by Board.
WILKIE, EDWARD THOMSON, 56 Marmaduke St., Toronto, President O. L. S. Association	. . . 11th April, 1891 D.L.S.
Wilkins, Frederick William, Norwood, Ont.	6th Jan., 1877 D.T.S.
Williams, David, Port Arthur	. . . . . 9th April, 1864 D.L.S.
Wilson, Norman Douglas, 50 Bay St., Toronto	. . . . . 24th Feb., 1910 B.A.Sc., D.L.S., A.M. Can. Ccc. C.E.
Winter, Henry, Thornyhurst	. . . . . 11th July, 1853 D.L.S., C.E.
Wood, James Russell, Box 995, Peterborough	. . . 22nd May, 1914
Yarnold, William Edward, Port Perry, P.O. Box 44	. . . . . 7th April, 1854 D.L.S.
Young, Alex. Campbell, Swastika	. . . . . 15th April, 1912

REGISTERED AND WITHDRAWN FROM PRACTICE.

Name and P.O. Address.	Date of Admission by Board
Anderson, John Drummond, Trail, B.C.....	13th April, 1892
Anderson, William Beaumont, Halifax, N.S... Grad. R.M.C., B.A.Sc. (McGill), M. Can. Soc. C.E., D.L.S., R.C.E.	14th Feb., 1903
Apsay, John Fletcher (not known)..... Grad. S.P.S.	6th Jan., 1886
Blake, Frank Lever, Meteorological Observatory, Toronto	13th April, 1875
Booth, Charles Edward Stewart (not known)	6th April, 1882
Bowman, Arthur Meyer, Mahan, Beaver Co., Pa..... Grad. S.P.S., Staff of U. S. Engineers.	11th Nov., 1887
Bowman, Franklin Meyer, Bellevue, 1234 North Highland Ave., Pittsburg, Pa..... Grad. S.P.S., Engineer Structural Iron Works.	11th April, 1892
Brady, James, Victoria, B.C., P.O. 815..... M.E.	15th July, 1862
Brown, John Smith (not known)..... D.L.S.	8th July, 1852
Brown, John Alexander, 233 S. Brock St., Sarnia	22nd Feb., 1911
Burgess, Edward LeRoy, Ottawa, 21 First Ave D.L.S.	6th May, 1905
Burnet, Hugh, Victoria, B.C..... D.L.S., P.L.S. (B.C.).	5th April, 1887
Burt, Frederick Percy, President "The American Architect," Times Bldg., New York	
Butler, Matthew Joseph, Armstrong-Whitworth Co., Montreal	11th Jan., 1878
C.E., LL.B., C.M.G., M.I.C.E., Mem. Can. Soc. C.E. Mem. Am. Soc. C.E.	
Cambie, Henry John, Vancouver, B.C..... D.L.S., P.L.S. (B.C.).	8th July, 1861
Carbert, J. Alfred, Medicine Hat..... D.L.S., Dist. Eng. and Surveyor.	7th April, 1876
Carpenter, Henry Stanley, Regina, Parliament Bldgs..... D.L.S., B.A.Sc., Toronto.	25th Feb., 1899

Name and P.O. Address.	Date of Admission by Board
Carroll, Cyrus (not known) Mem. Can. Soc. C.E., D.L.S., District Surveyor and Engineer.	10th Jan., 1860
Chalmers, John, Edmonton, Alta. Structural Engineer, Dept. Pub. Works.	11th April, 1896
Charlesworth, Lionel Clare, Edmonton, Alta. Grad. S.P.S., Director of Surveys, Alberta, D.L.S.	14th April, 1896
Coleman, Richard Herbert, 1170 Yonge St., Toronto.	6th Oct., 1877
Davis, Allan Ross, 146 Cottingham St., Toronto,	8th Jan., 1886
Davis, William Mahlon, Vancouver, B.C. Grad. R.M. Coll. (Kingston), City Engineer.	11th April, 1885
Deacon, Thomas Russ, Winnipeg. Grad. S.P.S.	12th Nov., 1892
Deans, William James, Brandon, Man. D.L.S.	11th July, 1884
Dixon, Howard, C. N. Ry., Jaspur, Alta.	14th Feb., 1903
Drewry, William Stewart, Ottawa, Dept. of the Interior	5th April, 1883
D.L.S.	
Ducker, William A., Winnipeg, Man. D.L.S., P.L.S. (Man.), Swamp Lands Comm'r.	6th April, 1882
Edwards, George, Thurso, P.Q. D.L.S.	6th Jan., 1866
Ellis, Henry Disney, Kuching, Sarawak, Borneo.	7th April, 1877
D.L.S., Commissioner of Pub. Works and Surveys.	
Empey, J. M., Drawer 2081, Calgary B.A.Sc., D.L.S.	16th Feb., 1907
Ford, Wm. Butterton, Wabana, Nfld.	21st Feb., 1898
Gibbons, James, Ottawa, Dept. of the Int. Grad. S.P.S., Dominion Topographical Surveyor.	15th April, 1890
Gibson, George, St. Catharines D.L.S.	10th April, 1860
Gibson, H. H. Willowdale, Ont.	8th Sept., 1891
Harris, John Walter, Winnipeg, Man. P.L.S. (Man.) D.L.S., Assessment Com.	6th Oct., 1866
Harvey, Thomas Alexander, 239 Vernon Ave., Long Island, New York City	13th Nov., 1893
Henderson, Eder Eli, Henderson P.O., Maine. Grad. S.P.S.	7th April, 1887
Hermon, Ernest Bolton, Vancouver, B.C. P.L.S. (B.C.), D.L.S.	7th Oct., 1885

Name and P.O. Address.	Date of Admission by Board
Hobson, Joseph, Hamilton, 343 Bay St. S.	3rd Oct., 1855 D.L.S.
Innes, William Livingstone, Simcoe.	14th April, 1892 C.E. (Toronto Univ.)
James, Silas, 227 George St., Toronto.	19th July, 1858 D.L.S.
Jephson, Richard Jermy (not known).	7th April, 1877 P.L.S. (B.C.), D.L.S.
Johnston, Robert Thornton, 15 Union Hall St., Jamaica, New York City.	9th April, 1889
Jones, George Samuel (not known).	21st April, 1909 Grad. S.P.S.
Kennedy, James Henry, Keremeos, B.C.	7th April, 1887 C.E. (Toronto Univ.) Chief Engineer V. V. & E. R. & N. Co.
Kippax, Hargreaves, Huron, South Dakota.	6th July, 1877 C.E. (Toronto Univ.), Assistant to Surveyor-General.
Kirk, John Albert, Revelstoke, B.C.	6th July, 1877 D.L.S., P.L.S. (B.C.)
Klotz, Otto, 437 Albert St., Ottawa.	6th Jan., 1867 Dom. Top. Surveyor, C.E. (Mich. Univ.), LL.D.
Lendrum, Robert Watt, Strathcona, Alta.	8th Jan., 1874 D.L.S.
Livingstone, Thomas Chisholm (not known)	10th Jan., 1859 D.L.S.
MacLeod, Henry Augustus F., Ottawa, 340 Cooper St.	11th Oct., 1856 D.L.S., C.E.
MacPherson, Duncan, Montreal.	9th Jan., 1884 Grad. R.M.C., M.I.C.E., Mem. Can. Soc. C.E., Div. Eng., East Div. C.P.R., D.L.S.
McCaw, Robert Daniel, Dept. of Lands, Victoria, B.C.	16th Feb., 1907
McCulloch, Andrew, Lake Nelson, B.C.	Grad. S.P.S., Assoc. Mem. Can. Soc. C.E., City Engineer.
McFadden, Moses (not known)	13th April, 1858 D.L.S., P.L.S., (Man.)
McGrandle, Hugh, Wetaskawin, Alta.	5th Jan., 1883 D.L.S.
McNab, John Duncan (not known)	9th Oct., 1879 Grad. S.P.S.
McNaughton, Findlay Donald, Strathmore, Alta.	25th Feb., 1899
McPherson, Charles Wilfred, Dawson, N.W.T.	21st Feb., 1899 Director of Surveys, Yukon, D.L.S.
Magrath, Charles Alexander, International Water- ways Commission, Ottawa	1st Nov., 1907 B.A.Sc. (McGill), D.L.S., P.L.S. (B.C.)

Name and P.O. Address.	Date of Admission by Board
Marshall, James Blyth.....	6th Oct., 1866
D.L.S.	
Meadows, William Walter c/o Director of Surveys, Regina.....	21st Feb., 1898
D.L.S., Grad. S.P.S.	
Miles, Charles Falconer, 25 Marmaduke St., Toronto	13th Jan., 1862
D.L.S.	
Moore, Thos. Alexander (not known).....	12th Nov., 1892
Montgomery, Royal Harp, Prince Albert, Sask...	6th May, 1905
D.L.S.	
Mountain, George Alphonse, Ottawa.....	9th Jan., 1884
Mem. Can. Soc. C.E., D.L.S., P.L.S. (Que.), Engineer for Railway Commission.	
Munro, John Vicar, New York, N.Y., 359 West 31st St.....	9th April, 1895
Ord, Lewis Redman Littlecot, St. Foy Road, Quebec	8th Jan., 1885
Paterson, James Allison, 53 Erie Ave., Hamilton	5th April, 1878
C.E., Mem. Can. Soc. C.E.;	
Pearce, William, Calgary, Alta.....	12th Oct., 1872
D.L.S., P.L.S. (B.C.) Asst. B.C. Land Com. for C.P.R.	
Parsons, Johnston Lindsey Rowlett, Regina, Sask., Box 1004.....	6th May, 1905
D.L.S., Grad. S.P.S.	
Paulin, Frederick William, Bank of Hamilton Chambers, Hamilton.....	11th May, 1908
Purvis, Frank, Mesa City, Arizona	7th April, 1875
Reid, John Lestock, Prince Albert, Sask.	8th April, 1870
D.L.S.	
Reiffenstein, James Henry, Ottawa, Dept. of the Interior.....	16th April, 1873
D.L.S.	
Reilly, William Robinson (not known).....	7th April, 1881
D.L.S., P.L.S. (Man.).	
Reinhardt, Carl, Box 303, Cobalt	25th Feb., 1899
Reynolds, Samuel Henry (not known).....	17th July, 1880
Ritchie, Nelson Thomas, Kipiegan, Man.....	9th Nov., 1888
P.L.S. (Man.).	
Roberts, Vaughan Maurice, St. Catharines....	5th April, 1887
D.L.S.	
Robinson, Franklin Joseph, Regina.....	21st Feb., 1898
Grad. S.P.S., D.L.S., Dep. Min. Pub. Works.	
Rogers, Richard Birdsall, Peterborough,....	9th Jan., 1879
B.A.Sc. (McGill), D.L.S.	

Name and P.O. Address.	Date of Admission by Board
Ross, Joseph Edmund (not known) D.L.S., P.L.S. (B.C.)	11th Nov., 1890
Sanderson, Daniel Leavens, Coral, Mich.	4th Oct., 1892
Saunders, Bryce Johnston, Edmonton, Alta. B.A.Sc. (McGill), D.L.S.	7th Jan., 1885
Seymour, Horace Llewellyn, Dept. Interior, Ottawa	2nd May, 1908
Shaw, Charles Aeneas, Greenwood, B.C. P.L.S. (B.C.)	6th Oct., 1877
Sherman, Ruyter Stinson (not known) P.L.S. (B.C.)	12th April, 1890
Smith, Angus, Regina Grad. S.P.S., City Engineer.	14th April, 1896
Smith, Henry, cor Oxford and Bellevue Sts., Toronto D.L.S., Mem. Can. Soc. C.E.	8th Nov., 1861
Steel, Ira John, 18 Rideau Terrace, Ottawa	18th April, 1910
Stewart, Elihu, Toronto, 84 King St. E. Canada Timber and Lands, D.L.S.	8th April, 1872
Stewart, George Alexander D.L.S.	8th July, 1852
Stewart, Louis Beaufort, Toronto, Faculty of Applied Science, Toronto University Dom. Top. Surveyor, Professor of Surveying.	6th April, 1882
Stewart, John (not known) D.L.S.	11th Nov., 1878
Taylor, William Emerson, 438 Clinton St., Toronto	22 Feb., 1911
Tracey, Thomas Henry (not known) C.E., P.L.S. (B.C.), D.L.S.	8th April, 1870
Vicars, John Richard Odlum, Kamloops, B.C. P.L.S. (B.C.), D.L.S.	5th Jan., 1887
Wallace, James Nevil, Calgary, Alta. D.L.S., B.A., B.E. (Trin. Coll., Dublin).	21st Feb., 1898
Weekes, Abel Seneca, Glencoe D.L.S.	12th April, 1890
Wheeler, Arthur Oliver, Calgary, Alta. P.L.S. (B.C.), D.L.S., Topographer, Dept. of Interior.	8th July, 1881
Wicksted, Henry King, Cobourg D.L.S., C.E.	7th Jan., 1886
Wells, Frederick Arthur, Confederation Life Bldg., Toronto	17th Feb., 1906

DECEASED MEMBERS

NAME	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION.	DIED.
Abrey, George Brockitt.	Toronto Junction.	10th January, 1860.	1892	25th June, 1906
Aylsworth, Charles Fraser	Madoc	2 April, 1861	1892	27th June, 1911
Aylsworth, William R.	Belleville	8th Nov., 1861	1882	22nd April, 1909
Barrett, Russell H.	Pembroke		14th February, 1903	30th January, 1905
Beatty, Walter.	Delta	19th July, 1858	1892	5th January, 1911
Bell, Andrew	Almonte	14th Oct., 1866		12th October, 1912
Bigger, Samuel Howell	Ottawa		30th January, 1904	7th July, 1906
Bolger, Francis	Lindsay	10th October, 1863.	1892	3rd November, 1895
Bolger, Thomas Oliver.	Kingston	6th July, 1865	1892	17th September, 1900
Bolton, Jesse Nunn.	Toronto	6th April, 1867		
Bolton, Lewis.	Listowel	9th July, 1864	1892	18th July, 1910
Bowman, Leander Meyer.	Toronto	14th April, 1892	1892	20th September, 1895
Bray, Edgar.	Oakville	6th October, 1866	1892	20th August, 1908
Brown, David Rose.	Cornwall	10th October, 1850	1892	14th May, 1900
Brown, David Benjamin.	Manado, S. America	23rd February, 1904.		
Browne, William Albert.	Toronto	10th April, 1876		30th July, 1912
Burke, William Robert.	Ingersoll	5th April, 1878	1892	10th June, 1897
Byrne, Thomas.	Sault Ste. Marie	15th July, 1862	1892	
Caddy, Cyprian F.	Campbellford	10th July, 1860	1892	August, 1905
Caddy, Edward C.	Cobourg	18th December, 1846	1892	26th September, 1897
Cameron, Alfred John.	Peterborough	9th April, 1889	1892	12th January, 1912
Cheeseman, Thos.	Mitchell	11th July, 1856	1892	1905
Coad, Richard.	Glencoe	8th October, 1879	1892	17th May, 1897
Cozens, Joseph.	Sault Ste. Marie	7th July, 1875	1892	29th November, 1913
Creswicke, Henry.	Barrie	8th July, 1864	1892	22nd January, 1898
Cromwell, Joseph M. O.	Perth	1st October, 1846	1892	19th October, 1897
Davidson, Walter Stanley.	Sarnia	9th April, 1884	1882	20th January, 1901
Davidson, Alexander	Arkona	11th October, 1858		16th September, 1899
Davis, John.	Alton	5th April, 1878	1892	8th November, 1907

DECEASED MEMBERS — Continued

NAME	DATE RESIDENCE	DATE OF P.L.S. CERTIFICATE	DATE OF O.L.S. REGISTRATION	DIED.	
Deane, Michael	Windsor	26th May, 1848	1852		3rd April, 1897
DeGurse, Joseph	Windsor	5th April, 1883	1892		22nd March, 1898
Doldie, Thos. Wm.	Tillsonburg	11th July, 1856	1892		1908
Doupe, Joseph	Winnipeg	13th January, 1863	1892		1910
Filmore, Stanley H.	St. Thomas		17th February, 1902		16th June, 1904
Fitzgerald, James William	Peterborough	13th July, 1857	1892		1901
Foster, Frederick Lucas	Toronto	9th April, 1863	1892		1899
Fowle, Albert	Orillia	13th January, 1863	1892		1898
Fraser, Charles	Wallaceburg	5th August, 1847	1892		1905
Gibbs, Thomas Fraser	Adolphustown	31st May, 1841	1892		1893
Galbraith, John	Toronto	13th April, 1875	1892		1914
Gamble, Killaly	Toronto	6th April, 1888			1912
Gibson, James Alex.	Oshawa	7th April, 1855	1892		1908
Gilliland, Thomas Brown	Eugenia	11th July, 1868	1892		1898
Gilmour, Robert	Toronto	11th April, 1856	1892		1903
Graydon, Aquila Ormsby	London	8th July, 1880	1892		1913
Hanning, Clement George	Preston	19th July, 1858	1892		1905
Haskins, William	Hamilton	5th July, 1855	1892		1896
Herron, Royal Wilkinson	Rednersville	13th July, 1857	1892		1907
Hewson, Thomas Ringwood	Hamilton	6th July, 1877	1892		1898
Holland, Wm. Hugh	Toronto		1907, 1st May		1908
Howitt, Alfred	Gourcock	12th January, 1856	1892		1896
Irwin, James Moore	Kenora	13th January, 1863	1892		1908
Kains, Tom	Victoria	11th July, 1873			1901
Keefer, Thomas Coltrin	Ottawa	14th August, 1840			1915
Kirk, Joseph Green	Stratford	16th February, 1843	1892		1900
Lane, Andrew	Sparrow Point	1th April, 1895			
Lawe, Henry	Ottawa	6th October, 1860			
Low, Nathaniel Edward	Sarnia	11th July, 1856			

DECEASED MEMBERS — Continued

DECEASED MEMBERS.

NAME	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION.	DIED.
Lynch-Staunton, Francis.	Hamilton	11th October, 1856	1892	11th June, 1899
MacDougall, Allan Hay	Port Arthur	4th April, 1859	1892	February, 1906
MacMillan, James Alex.	Calgary	6th January, 1877	4th December, 1894	1898
MacNab, John Chisholm.	Hamilton	8th January, 1880	1894	16th October, 1897
McArce, John.	Toronto	6th April, 1867	1894	12th December, 1903
McCallum, James	Port Francis	30th March, 1849	1894	July, 1900
McDonel, Augustine.	Chatham	11th July, 1863	1892	1908
McGeorge, Wm. Graham.	Chatham	8th January, 1866	1892	1st July, 1906
McKenna, John Joseph.	Dublin	9th July, 1860	1892	22nd September, 1910
McLatchie, John.	Nelson, B.C.	9th January, 1864	1892	3rd February, 1908
McLean, James Keachie.	Ottawa	8th April, 1876	1892	25th May, 1913
McLennan, Roderick.	Toronto	20th June, 1846	1892	
McPhillips, George.	Winnipeg	9th July, 1885	1892	25th November, 1913
Malcolm, Sherman Morgan	Blenheim	18th October, 1858	1894	13th January, 1899
Nash, Thos. W.	Kingston	7th April, 1854		24th March, 1915
Niven, Alexander.	Toronto	3rd July, 1859	1892	7th May, 1911
Ogilvie, John Henry	Kenora	11th April, 1876	24th April, 1894	21st September, 1898
Ogilvie, William.	Paris, Texas	12th July, 1869		13th November, 1912
Pedder, James Robert.	Doon	10th November, 1891	23rd December, 1892	17th January, 1897
Peterson, Peter Alexander	Montreal	16th July, 1863		21st November, 1913
Ponton, Archibald William	Edmonton, Alta.	9th April, 1880.		20th January, 1915
Pope, Robert Tyndal.	Ireland	13th April, 1875		1905
Proudfoot, Hart William.	Saskatoon, Sask.	6th May, 1905		31st March, 1906
Reid, James Hales.	Bowmanville	6th October, 1866	1892	22nd December, 1899
Robinson, William.	London	—May, 1846	1892	11th October, 1894
Rombough, William A.	Napanee			19th September, 1912
Rubidge, Tom S.	Cornwall	9th February, 1848		June, 1904
Sankey, Villiers.	Toronto	11th January, 1878	1892	10th July, 1905
Scane, Thomas.	Ridgetown	7th January, 1865	1892	

DECEASED MEMBERS — Continued

NAME.	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION.	DIED.
Schofield, Milton C.....	Guelph	28th September, 1843	1892	19th February, 1908
Selby, Henry Walter.....	Toronto	8th January, 1876	1892	23rd August, 1910
Schwitzer, John Edward..	.....	16th November, 1896	1856	1911
Simpson, George Albert..	Winnipeg	7th October, 1864	1892	8th January, 1905
Spry, W.....	Toronto	19th July, 1858	1892	1906
Squire, Richard Herbert..	Brantford	14th April, 1896	1896	1908
Stacey, Albert George....	.....	.....	1908, 30th March	1910
Steele, David Layton.....	Meaford .....	.....	1905, 29th May	1912
Steele, Edward Chas.....	Sault Ste. Marie	9th April, 1889	1892	1908
Strange, Henry.....	Rockwood	30th November, 1838	1892	1908
Strathern, John.....	B. C.	5th October, 1876	1892	1897
Tiernan, Joseph Martin..	Tilbury Centre	7th January, 1886	1892	December, 1900
Thomson, Augustus C....	Chicago	14th January, 1861	1892	December, 1896
Van Buskirk, Wm. Fraser	Stratford	7th April, 1883	1892	30th January, 1905
Wagner, William.....	Ossowo	13th April, 1858	1892	29th March, 1912
Wallace, Charles Hugh....	Castlederg, Co. Ty- rone, Ireland	9th November, 1889	.....	14th March, 1895
Walsh, Thomas William..	Simcoe	25th April, 1842	1892	4th July, 1897
Whelock, Charles John..	Orangeville	—, 1856	1892	20th May, 1906
Willson, Alfred.....	Toronto	6th October, 1866	1892	8th June, 1908
Wood, Henry O.....	Billings Bridge	10th October, 1855	1892	17th June, 1908

No. 31

Annual Report
of the
Association of Ontario
Land Surveyors

Organized 1886

Incorporated 1892



And Proceedings of the Twenty-Fourth Annual Meeting
Since Incorporation. Held at Toronto, Feb. 15th to 17th, 1916

NOTICES

The Annual Meeting of the Association is fixed by statutes and is held on the third Tuesday in February.

Copies of Annual Reports for the past years can be supplied by applying to the Secretary. Price, 50 cents.

Members will please look up names of chairmen of various committees and inform them of any interesting matter pertaining to that branch of the profession which may come to their notice or write to the Secretary.

Our library is now located at the Toronto Engineers' Club, 96 King St. West, and has been consolidated with the libraries of other associations in that building. Members have free and full access to all books in the consolidated library.

Published by Association of Ontario Land Surveyors. This edition 1,350 copies; price, \$1.00.

PREFACE

To the members of the Association of Ontario Land Surveyors :

The Proceedings of the Association at its Twenty-fourth Annual Meeting are herewith presented.

Respectfully submitted on behalf of the Council.

L. V. RORKE,
Secretary.

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Association of Ontario Land Surveyors

Organized 23rd February, 1886. Incorporated 1892.

PAST PRESIDENTS

1886. George B. Kirkpatrick	1901. James Dickson
1887. George B. Kirkpatrick	1902. W. R. Aylsworth
1888. Alex. Niven	1903. W. R. Aysworth
1889. Alex. Niven	1904. C. A. Jones
1890. Villiers Sankey	1905. J. W. Tyrrell
1891. Villiers Sankey	1906. O. J. Klotz
1892. Elihu Stewart	1907. Thomas Fawcett
1893. Elihu Stewart	1908. A. J. van Nostrand
1894. M. J. Butler	1909. Lewis Bolton
1895. M. Gaviller	1910. H. W. Selby
1896. Willis Chipman	1911. J. F. Whitson
1897. T. Harry Jones	1912. T. B. Speight
1898. P. S. Gibson	1913. J. S. Dobie
1899. H. J. Bowman	1914. J. W. Fitzgerald
1900. George Ross	1915. E. T. Wilkie

OFFICERS FOR 1916-17

PRESIDENT

C. J. MURPHY Toronto

VICE-PRESIDENT

JAS. J. MACKAY Hamilton

CHAIRMAN OF COUNCIL

G. B. KIRKPATRICK Toronto

SECRETARY-TREASURER

L. V. RORKE Toronto

MEMBERS OF COUNCIL

HON. G. H. FERGUSON, Minister of Lands, Forests^o and
Mines

G. A. McCUBBIN, Chatham	} For term ending April, 1919.
A. G. ARDAGH, Barrie	
T. B. SPEIGHT, Toronto	} For term ending April, 1918.
JAMES S. DOBIE, Thessalon	
G. B. KIRKPATRICK, Toronto	} For term ending April, 1917.
T. D. LeMAY, Toronto	

AUDITORS

D. D. JAMES Toronto
A. E. JUPP Toronto

BANKERS

Imperial Bank of Canada (Yonge St. Branch) Toronto

BOARD OF EXAMINERS

G. B. KIRKPATRICK (Chairman)	
H. J. BEATTY, Pembroke	} For 3 years
J. F. WHITSON, Toronto	
THOS. FAWCETT, Ottawa	} For 2 years
T. B. SPEIGHT, Toronto	
G. B. KIRKPATRICK, Toronto	} For 1 year
OWEN McKAY, Walkerville	
L. V. RORKE, Secretary of the Board.	

Note.—Board meets at Department of Lands, Forests and Mines, Parliament Buildings, first Monday in February, 1917.

COMMITTEES, 1916-17

STANDING

LAND SURVEYING—H. L. Esten (Chairman), E. T. Wilkie, H. J. Beatty, C. E. Fitton, J. W. Fitzgerald, T. B. Speight, J. M. Watson, J. H. Shaw, C. J. Murphy.

DRAINAGE—G. A. McCubbin (Chairman), S. B. Code, E. D. Bolton, John Roger, Geo. Smith, A. S. Code, F. J. Ure, A. M. Jackson, W. G. McGeorge.

ENGINEERING—N. D. Wilson (Chairman), Owen McKay, Jas. Hutcheon, F. N. Rutherford, J. J. MacKay, R. T. Laird, J. A. Bell, H. W. Sutcliffe.

TOPOGRAPHICAL SURVEY—Thos. Fawcett (Chairman), Otto J. Klotz, Geo. Ross, L. B. Stewart, J. J. Dalton.

PUBLICATION—L. V. Rorke (Chairman), T. D. LeMay, A. J. vanNostrand, J. F. Whitson.

ENTERTAINMENT—T. D. LeMay (Chairman), A. T. Ward, G. S. Abrey, Jno. vanNostrand.

SPECIAL

LEGISLATION—C. H. Fullerton (Chairman), J. W. Fitzgerald, T. B. Speight, J. M. Watson, J. F. Whitson, C. J. Murphy, T. D. LeMay, J. T. Ransom, H. L. Esten, G. B. Kirkpatrick.

REPOSITORY AND BIOGRAPHY—Willis Chipman (Chairman), H. L. Esten, M. Gaviller, L. V. Rorke, A. L. Russell, James Dickson, J. D. Evans, G. B. Kirkpatrick, J. L. Morris, V. B. Wadsworth, Otto J. Klotz, Elihu Stewart.

EXPLORATION—L. B. Stewart (Chairman), J. F. Whitson, J. S. Dobie, Jas. Hutcheon, E. R. Bingham.

ROADS AND PAVEMENTS—J. S. Dobie (Chairman), H. T. Routly, J. F. Whitson, W. A. McLean, A. M. Jackson, J. H. Jackson, J. L. Lang, J. J. MacKay.

Programme of the
Association of Ontario Land Surveyors
(INCORPORATED)

At Its Twenty-fourth Annual Meeting Held at Toronto,
February 15th, 16th and 17th, 1916

PROGRAMME

Tuesday, 15th February — Morning, 10 o'clock
In the Engineer's Club

Meeting of Council of Management.
Meeting of Standing and Special Committees.

Afternoon, 2 o'clock

Reading of Minutes of previous meeting.
Correspondence.
President's Address. E. T. Wilkie
Report of Council of Management.
Report of Secretary-Treasurer and Auditors.
Report of Board of Examiners. G. B. Kirkpatrick, Chairman.
Report of Committee on Publication. L. V. Rorke, Chairman.
Report of Committee on Topographical Survey. Thos. Fawcett, Chairman.
Report of Committee on Exploration. L. B. Stewart, Chairman.
Paper—"Preservation of Field Notes." J. W. Pierce, O.L.S.
Paper—"Survey Act." T. D. LeMay, O.L.S.
Paper—"Azimuth." Alan Mair Jackson, O.L.S.

Evening, 8 o'clock

Address—"Town Planning." Thos. Adams, Esq.
Paper—"Reminiscences of a Winter on the Mississaga." James Dickson, O.L.S.

Wednesday, 16th February — Morning, 10 o'clock

Report of Committee on Land Surveying. C. J. Murphy, Chairman.
Paper—"Harbor Front Surveys." N. D. Wilson, O.L.S.
Paper—"Balacing a Traverse Survey." J. T. Ransom, O.L.S.

Afternoon, 2 o'clock

Report of Committee on Engineering.	N. D. Wilson, Chairman.
Report of Committee on Drainage.	G. A. McCubbin, Chairman.
Report of Committee on Roads and Pavements.	J. S. Dobie, Chairman.
Paper—"Drainage."	W. G. McGeorge, O.L.S.
Paper—"Board of Examiners."	Willis Chipman, O.L.S.
Report of Committee on Repository and Biography.	Willis Chipman, Chairman.

Evening, 7.30 o'clock

Dinner at Engineers' Club Dining Room.

Thursday, 17th February — Morning, 10 o'clock

Report of Committee on Legislation.	G. B. Kirkpatrick, Chairman.
Report of Committee on Entertainment.	T. D. LeMay, Chairman.
Nomination of Officers.	
President, Vice-President, Secretary-Treasurer, two members of Council. Auditors.	
Unfinished Business.	
New Business.	
Adjournment.	

1 o'clock

Luncheon for Veteran Members at Engineers' Club Dining Room.



E. T. WILKIE (Toronto, Ont.)

President Ontario Land Surveyors' Association, 1915-16.

Minutes of the Twenty-fourth Annual Meeting

—OF THE—

Association of Ontario Land Surveyors

HELD AT THE ENGINEERS' CLUB, 96 KING STREET
WEST, ON THE 15TH, 16TH AND 17TH
FEBRUARY, 1916.

The following members were present:

Name.	Address.	Name.	Address.
Abrey, G. S.	Toronto.	LeMay, T. D.	Toronto.
Ardagh, A. G.	Barrie.	Lumsden, H. D. ...	Ori'ia.
Bartley, T. H.	Toronto.	MacKay, J. J.	Hamilton.
Beatty, H. J.	Pembroke.	McCubbin, G. A.	Chatham.
Eolton, E. D.	Listowel.	McGeorge, W. G. ..	Chatham.
Boswell, E. J.	Montreal.	McKay, Owen	Walkerville.
Blake, F. L.	Toronto.	McLean, W. A.	Toronto.
Chipman, Willis	Toronto.	McMeekin, A.	Kenora.
Christie, U. W.	Orangeville.	Miller, F. F.	Napanee.
Code, S. B.	Smith's Falls.	Muck'eston, F. H. ..	Toronto.
Code, R. S.	Toronto.	Nee'lands, E. W. ...	New Liskeard.
Dobie, J. S.	Thessalon.	Niven, D. A.	Guelph.
Esten, H. L.	Toronto.	Peckover, H. J.	Toronto.
Evans, J. D.	Trenton.	Pequegnat, M.	Berlin.
Fair, John	Brantford.	Pierce, J. W.	Toronto.
Fairbairn, R. P.	Toronto.	Ransom, J. T.	Toronto.
Fawcett, Thos.	Ottawa.	Robertson, James ...	Toronto.
Fullerton, C. H.	Toronto.	Rorke, L. V.	Toronto.
Gaviller, M.	Collingwood.	Ross, Geo.	Welland.
Gibson, W. S.		Rutherford, F. N. ...	St. Catharines
Gourlay, R. M.	Toronto.	Sewell, H. DeQ. ...	Toronto.
Grant, R. R.	Toronto.	Speight, T. B.	Toronto.
Halford, A. J. B. ..	Toronto.	Smith, H.	Toronto.
Hogarth, Geo.	Toronto.	Stewart, E.	Toronto.
Hutcheon, James ...	Toronto.	Unwin, C.	Toronto.
Jackson, A. M.	Erantford.	vanNostrand, John ..	Toronto.
Jackson, P. A.	Toronto.	Wadsworth, V. B. ..	Toronto.
James, D. D.	Toronto.	Walker, A. P.	Toronto.
Jones, C. A.	Petrolea.	Whitson, J. F.	Toronto.
Jupp, E. A.	Toronto.	Wilkie, E. T.	Toronto.
Kirkpatrick, G. B. ..	Toronto.	Wilson, N. D.	Toronto.
		Wicksteed, H. K. ...	Toronto.

On Tuesday, February 15th, at 2.30 o'clock p.m., the President, Mr. E. T. Wilkie, took the chair, called the meeting to order, and said:

Gentlemen, it is after the time we should open this meeting. We will begin by asking the Secretary to read the minutes of the previous meeting.

The Secretary—These are embodied in the annual report, they are generally taken as read.

On motion of Mr. McMeekin, seconded by Mr. A. M. Jackson, the minutes of the last annual meeting were taken as read.

The President—The next item is correspondence. The Secretary has a few letters.

The Secretary read letters from Mr. James Dickson, O.L.S., Mr. Thomas Adams, and the Secretary of the American Road Builders' Association.

The President—I see the President's address comes next, and I am not going to inflict anything very lengthy or very technical on you.

The President then delivered the annual address, which was received with applause.

The President—I don't know whether it is the practice to consider this like the speech from the throne, and have your discussion following it or not, but if there is any member who feels like saying anything to any point I may have raised I will be glad to hear it, or if you feel you had better digest it a little beforehand we can have it later; just as you choose.

The next item on the programme is the report of the Council of Management.

The Secretary—No report has yet been handed in, Mr. Chairman.

The President—I suppose we will have to pass it over for the time being. We will take the report of the Secretary-Treasurer and Auditors.

The Secretary read his annual report and financial statement, copies of which were distributed amongst the members, together with the Auditor's report.

The Secretary—I have not been able to get accounts passed by both Auditors, as one of them, Mr. Jupp, is out of

town. Mr. Anderson, the other Auditor, has gone through it, and he has certified to the accounts. If there is any item in the statement that any member would like any further information on, I will be glad to give it.

On motion of Mr. Bolton, seconded by Mr. Gaviller, the Secretary's report was received and ordered to be printed in the minutes.

The President—The Secretary has told you that only one Auditor has gone through this. Do you consider it necessary you should have a second one, or are you satisfied?

The Secretary—I would suggest, Mr. President, that the other Auditor should pass on it when he comes back. He will probably be back inside of a month. He can sign it, and it will be in time to go with the report when printed.

The President—All right. The next item is the report of the Board of Examiners. I am afraid that is not ready. The Board of Examiners are still in session, and we will have to wait probably till Thursday to get that. The next is the report of the Committee on Publication.

The Secretary read the report of the Committee on Publication, which on motion of Mr. D. D. James, seconded by Mr. G. A. McCubbin, was received and ordered to be printed in the minutes.

The President—The next item is the report of the Committee on Topographical Survey, by Mr. Fawcett. I believe Mr. Fawcett is not present. He is engaged at the Board of Examiners, and I suppose we will have to hold that over.

The next is the report of the Committee on Exploration, Mr. L. B. Stewart, Chairman.

The Secretary—Mr. Dobie is on that committee. I don't know whether he is here or not.

Mr. Ransom—Professor Stewart is presiding at the Dominion Land Surveyors' examination. I was asking about that, and he said he had not done anything in the matter. That was a couple of days ago, and he expected to be busy at those examinations and would not be able to attend the meetings.

The President—I suppose we will have to let it stand. Perhaps if somebody would make a motion that this report be taken as read it can be handed in before the different reports

and papers go for publication, and it will appear in the Annual Report in that way.

Mr. Le May—I would make that motion.

Mr. Gibson—I second the motion.

The President put the motion that the report of the Committee on Exploration be taken as read and handed in later, which was carried.

The President—The next on the programme is a paper entitled "Preservation of Field Notes, by Mr. J. W. Pierce. If Mr. Pierce is here and ready we will be glad to hear his paper.

Mr. Pierce then read his paper entitled "Preservation of Field Notes."

The President—The next is a paper on the Survey Act, by Mr. Le May.

Mr. T. D. Le May was received with applause, and read his paper on "The Survey Act," and prefaced it by saying:—"This paper, gentlemen, with all apologies to anybody who may feel offended thereby, is rather a rough criticism of the Survey Act, that it was not always what was thought to be desired, and I have taken it section by section and made such suggestions as I thought were necessary to get the proper meaning out of it.

Mr. Ransom—I move that a committee be appointed by the Association to consider all amendments and proposals submitted by members of the Association, and that that committee submit a report to the Council at the earliest opportunity.

Mr. Gaviller—Wouldn't that question naturally be referred to the Legislative Committee? We are supposed to have one. What it does I am not quite clear, but I think it would tend to obliterate that respected committee if you carried this motion.

Mr. McCubbin—You might revive them by referring this matter to that committee.

Mr. Ransom—Mr. Chairman, the point is this, how many members now are on the Legislation Committee, and does the Legislative Committee want to take this upon its shoulders? Is it the duty of our Legislative Committee to look into these

amendments and suggestions and to act upon them and to submit reports to the Council or to this Association, or is our Legislative Committee only a body to handle any legislation that the Association wishes to have passed and to see that that legislation is passed? I am not quite clear just what the duties of the Legislative Committee are in that regard. If you could order the Legislation Committee to take any suggestions and amendments and discuss them and bring a report into the Council, I certainly would not move this motion, but it seems to me in times previous we have not had reports from the Legislative Committee to this Association or to the Council on suggestions that have been offered at meetings.

The President—I think the Legislation Committee have looked pretty well after the matter. Sometimes things have been suggested at meetings that are hardly suitable for getting into the Act or getting legislation upon, and some others when they tried to get it they found they would be a good deal better without it. It is pretty difficult to get some of the legislation that is sometimes asked for, and rather than be turned down flat they don't wish to press too hard, and the result is they don't get it.

Mr. Ransom—If the Legislation Committee makes up its mind that a certain suggestion shouldn't be carried out, we should still have a report of the committee, should we not?

The President—I think we get reports from them fairly regular.

Mr. Ransom—Then I would not move the previous motion, but have it changed to be submitted to the Legislation Committee for a report.

Mr. McCubbin—Mr. Chairman, I am very much in sympathy with Mr. Le May's idea that the Act should be considered as a whole. I am not so familiar with that as I am with the drainage laws, and it is my idea that these amendments piecemeal—a little at a time every year—are not important enough to attract any person's attention or to secure the sympathy of any person who has to deal with it, and for that reason I have pleasure in seconding this motion, asking the Legislation Committee to consider the whole Act.

The President—While Mr. Ransom is writing out this motion I want to say something which I intended to say after I had given my address. If there is any member who knows of any articulated pupil who has enlisted and gone to the war, we

would be pleased if he would kindly let the Secretary know, so that we may get a record of their names and something about them. At present we haven't any. There are only two or three that are known.

Another matter is, I suppose you all know that we propose to have a dinner to-morrow night, and would like to see you all present. Mr. Le May is in charge, and can furnish you with tickets.

Another matter also is, it is proposed to give a luncheon to the veteran members on Thursday afternoon at one o'clock. I think the proposition is that members of 30 years' standing or over are to be invited or requested to come to this luncheon—a sort of old-time gathering. I notice one person at least who is over that standing, I think, and if there are any more we would be glad to have them come in.

Mr. Dobie—I wasn't in the room at the time the report of the Exploration Committee was called for, and I understand it was passed over or taken as read. Professor Stewart is chairman of that committee, and he was up here this morning, and I had a little talk with him, and he told me he had to attend the session of the Dominion Land Surveyors' Board of Examiners this afternoon, but he had some matter he was trying to get ready for his report, and it would be brought in at a later date. I promised I would mention the matter when the proper time came. Unfortunately, I was out, so I take this opportunity of making that explanation so as to clear Mr. Stewart of any appearance of negligence in the matter.

The President—There was a motion passed that the report be taken as read, and Mr. Stewart can hand it in at any time.

It was moved by Mr. Ransom, seconded by Mr. McCubbin, that all amendments and proposals with reference to the remodelling of the Survey Act be submitted to the Legislation Committee for a report.

Mr. Fullerton—The motion says all amendments or proposals shall be submitted to the Legislation Committee. Anybody that has any proposal to submit would have to submit it directly to the chairman of that committee or to the Secretary here, and he would see they got to the committee. Sometimes the committee meets and no proposals are before them, nobody has made any suggestion, and of course the particular members of the committee might not have any in mind, and

sometimes there is not very much to report upon. Mr. Kirkpatrick is chairman of this committee, and he told me to-day he would hardly be able to get down, and asked if I would report on Thursday at ten o'clock, and for the benefit of those who are members of the committee and those who have any proposals to make, there will be a meeting of the committee at 11 o'clock to-morrow.

Mr. Ransom—The reason why I put proposals there was this, that some of the members here may have certain ideas along the line of the remodelling of this Act, and that therefore they should have the opportunity of making suggestions and proposals, and that most likely the Legislation Committee won't act on this thing, at least, they couldn't act very well in a short time, and will have to have meetings some time during the year, and any members that have any proposals can put them in writing and submit them to the Legislation Committee, and I feel sure we are all interested enough that almost every one would have some suggestion or something to offer, and could put that in writing and send it to the Legislation Committee to be dealt with as they saw fit.

The President put Mr. Ransom's motion, which, a vote having been taken, was declared carried.

The President—We now have a paper on "Azimuth," by Mr. Jackson.

Mr. A. M. Jackson then read his paper on "Azimuth," which was received with applause.

The President—Now, gentlemen, that brings us to the end of the programme as printed for this session, and I want to call your attention to the evening session, but before I go on with that will you do anything with the suggestion of Mr. Jackson's that we appoint a committee in reference to these tables?

Mr. Dobie—Would that be a matter to refer to the Council of Management to take up in connection with business of the Association?

The President—They could take it up.

Mr. Dobie—It would be just whatever the gentlemen think. I would make a motion that this matter be referred to the Council for some action.

Mr. McKay—I second Mr. Dobie's motion.

Mr. Ransom—Just along that line I might say the committee that was appointed at the session of the Association two years ago went into that matter very fully, and the outcome of it was that they decided to do nothing, that it would cost too much to print these tables. The matter came up when it was discussing determining the astronomical bearing of a governing line of a survey. There is no doubt it cost considerable to make these tables. Just at present I have the matter well in hand, since I am writing an examination on Saturday on the compiling of these tables, and the Department at Ottawa have in their computing staff what they call auxiliary sets of approximate tables that they use, and they just apply corrections for the movement of Polaris to make these separate tables every three months. That is a foundation, as it were, and they just have to keep applying corrections to those, and they can figure those tables out for a good many years ahead. I am not just familiar with how much work there would be in a computing staff, but there is no doubt that they go to quite a bit of trouble. These tables have to be computed fairly accurately, and a man has to do good work to get his observations to within one minute. One minute would be a very good standard of accuracy for our surveys here. At the same time in subdivision surveys around the city it would be pretty hard to apply it. Perhaps one minute might be a rather serious error, and any other tables that would cover any longer distance or length of time than three months would not be serviceable, so that we would really have to be governed by drawing up tables very similar to the ones they print at Ottawa, and the committee that would be appointed I am sure could get the foundation and follow up the same system, and all it would mean would be that some Association would have to pay a certain fee to, say, Professor Stewart or somebody of that nature, a qualified man, to make these corrections to this foundation table, as it were, every three months or every year, and get these out ahead of time. I am very strongly in favor of the appointment of this committee, and going into the matter, because I always felt the Association was banking up a lot of money and assets that perhaps would be better put into a thing of this kind than in Consumers' Gas Company stock or anything of that nature. There is no doubt sets of tables like this would net us more profit than even the interest we gain on Consumers' Gas Company stock, and I would suggest if there is any doubt as to what committee this should be put under, that it be put in the hands of an energetic body that would get results.

The President put Mr. Dobie's motion, which, on a vote having been taken, was declared carried.

The President—For the evening session to-night the programme shows an address by Mr. Thomas Adams, but as you have heard, Mr. Adams is not able to reach the city to-day, but will be in to-morrow. In place of that, we will try and get Mr. Dickson's paper, and Mr. Ransom has a paper which he has consented to read to-night, and we will make an effort to get Mr. Chipman to read his paper on the Board of Examiners, and possibly get something else, and by shortening up some of the sessions to-morrow we will be able to give Mr. Adams the time he requires. If he reaches here by eleven-thirty to-morrow we will try and fix it so that we will be able to hear him then. I think that is all we have for this afternoon, and we will adjourn till eight o'clock this evening.

EVENING SESSION.

8 o'clock p.m.

The President—For the benefit of those not here this afternoon, I may say we were compelled to make some alterations in the programme as printed. Mr. Adams, who was down for this evening, sent word that he wouldn't be able to reach Toronto to-day, and consequently we could not have him here to-night, and we have endeavored to fill up the evening with some papers, taking some from to-morrow's part of the programme, but we expect Mr. Adams will be here to-morrow, and we have at the present time arranged that he will address the members at half-past eleven to-morrow.

Now we will take up this evening the paper by Mr. Ransom on "Balancing a Traverse Survey."

Mr. J. T. Ransom then read his paper, entitled "Balancing a Traverse Survey."

Mr. Chipman, are you ready to give us your paper on the Board of Examiners?

Mr. Chipman—Mr. President, I don't think the paper which I have in course of preparation can be very well read before the Association. It is rather too tedious. It might be taken as read and printed in the report if the Council thinks it of sufficient value. It may be of some service to the members in the future for reference, I hope it may, but I would like

to have the opportunity of conferring with Mr. Unwin and Mr. Kirkpatrick before it is published, if they decide to publish it. I have with me the typewritten copy of the paper covering the period up to 1818, and it covers, I think, about ten pages of foolscap. That is only the preface to it. It is a larger task than I expected it would be, and I feel that I was not the proper party to have been selected for drawing up a paper of that kind. It can be best done by an official who is not worried with hard work, some person sitting up in the sanctuary of the Parliament Buildings would be better fitted for that work than I, and with your permission I will leave the paper until, if there is time to-morrow, I can give you a part of it. Some interesting parts and some parts that would be probably suitable for discussion might be read, but there is a large part of it can better be read at your fireside after the publication of the report than read before this meeting. Time is too valuable here, I feel, for tedious papers.

I might just state as I have the opportunity that the committee of which I am chairman, the Committee on Biography and Repository, is very desirous of obtaining all the information they can respecting the old surveyors, particularly those who were employed on the original surveys throughout the country prior to, say, Confederation, and anything you can give us, if it is only a hint, will be acceptable. I got a hint or two to-night from some of the members which will be of great assistance to us later on. It was only to-day I succeeded in obtaining a photograph and biographical sketch of the late J. K. Roche, who few of us, I think, ever saw, a surveyor who was a member of the first Board of Examiners. There are several others who were prominent in their day, but of whom we have practically no trace whatever, and anything that you can do as individual members will be greatly appreciated. Every year some one is dropping off whose knowledge of the past is lost to us. Now, this Board of Examiners paper requires revision before publication. We must bear in mind until 1847 there was no Board of Examiners. Surveyors were appointed after an examination by the Surveyor-General only. That covers about half of our history as a Province. Until 1848 and 1849 there was no examination as you know the examination to-day. It was some years after that before the preliminary examination was asked for, and although the minutes of the Board since its organization have been kept in a very neat and very concise form, there is much supplementary knowledge we would like to get which can only be supplied by Mr. Kirkpatrick and our Secretary and Mr. Unwin, who was the second Secretary of the Board. I don't know that

there is anything further I can add just now. If there is time to-morrow we can discuss the preliminary part of it, but if not, we can leave it.

The President—Mr. Fawcett, have you the report of the Topographical Committee?

Mr. Fawcett—I have not had a meeting with any of the other members of the Board. There are none of them here to-night, but I have a sketch I have written myself, and also a paper on standardizing scales and numbering of maps that was written for our examination by one of the Dominion Land Surveyors, Mr. Nelles, of Ottawa.

The President—Perhaps we might take that this evening.

Mr. Fawcett—I don't think I will read all of Mr. Nelles' report, as it would take up half an hour, and that would be too much time, but I perhaps may read the preliminary remarks which he makes. Two-thirds of the report is made up of a quotation from the report of the committee that was appointed when they were arranging with reference to world maps, and that is the system that Mr. Nelles is working on in his report.

Mr. Fawcett then read report of Topographical Survey, together with preliminary remarks of paper by Mr. Nelles.

The President—Gentlemen, we have Mr. Fawcett's report of the Committee on Topographical Survey. Perhaps we had better deal with it first. What is your pleasure regarding it?

On motion of the Secretary, seconded by Mr. Jackson, the report of the Committee on Topographical Survey was received and ordered to be printed in the proceedings.

The President—Gentlemen, this paper of Mr. Dickson's which is on the programme for to-night is here, but Mr. Dickson is not able to be present. We could get some person to read it, but it is perhaps getting a little late to-night. It would take about twenty minutes or half an hour to read it. I expect it will be rather interesting. I have glanced through it, and I see a few things that have interested me.

The Secretary—If it is the wish of the meeting, I will be pleased to read it. After the intellectual treat we have had on scales and formulae, probably something in a lighter vein would apply.

The Secretary then read a paper entitled "A Winter on the Mississagi," by Mr. James Dickson, O.L.S.

At 10.45 the meeting adjourned to Wednesday at 10 o'clock a.m.

MORNING SESSION.

Wednesday, February 16th, 1916, 10.45 a.m.

The President—Gentlemen, we had better come to order and proceed to business. The first item on the programme this morning is the report of the Survey Committee. Mr. Murphy, who is chairman of that, is unfortunately ill and not able to be present. I happen to be a member of the committee, and they have sent in some of these matters to me. If you have the printed copies of the questions that were sent out to you, you can refer to them. There are a few extra copies here for any who may not have them.

Now, if we are through with this discussion, I think we might have Mr. Wilson's paper before we adjourn.

Mr. N. D. Wilson—This is rather a local paper that has more to do with Toronto than Ontario at large.

(Reads paper entitled "Harbor Front Surveys," which was received with applause.)

At 1.15 p.m. the meeting adjourned to 2.30 p.m.

AFTERNOON SESSION.

At 2.45 p.m. the President called the meeting to order, and called for the report of the Committee on Drainage.

Mr. McCubbin read the report of the Committee on Drainage, and in doing so said: Gentlemen, you notice that most of the matters which have been referred to the committee for discussion and the questions submitted for answers are questions of law rather than engineering. By a most fortunate coincidence, the Drainage Referee is in town to-day, and we have him present with us, and we are exceptionally fortunate in being able to possibly get him up here and heckle him on these matters arising from the Drainage Act, although I may

say we should not impose on his good nature in reference to the Ditches and Watercourses Act.

On motion of Mr. Jackson, seconded by Mr. Ross, the report of the Committee on Drainage was received and ordered to be printed in the proceedings.

The President—I don't want to choke off the discussion on this matter, but Mr. McGeorge has a paper along the same line, and possibly if he would read his paper now it might bring out some points that might lead to further discussion.

Mr. McGeorge—Mr. Chairman and gentlemen, on the programme the paper is put down as "Drainage." The particular branch of drainage which I wish to deal with is mechanical drainage.

Mr. McGeorge then read his paper on "Drainage," which was received with applause.

The President—Now we have Mr. Thomas Adams with us, who we expected last night, but who was unable to reach us. He is to give us an address on "Town Planning." He has been patiently sitting here listening to drainage discussion, which probably does not interest him, a very great deal. Mr. Adams will kindly address us now.

MORNING SESSION.

Thursday, February 17th, 1916, 10.45 a.m.

The President called the meeting to order and requested Mr. Dobie to read his report as chairman of the Committee on Roads and Pavements.

Mr. Dobie—Mr. President and gentlemen, the report of the Committee on Roads and Pavements will be rather brief this year, and I will read it first. (Reads report.)

That, gentlemen, constitutes the report. I might say in connection with this that when the Department of Public Highways was created our good friend Mr. McLean, who has been Chief Engineer of Highways, was selected by the Minister as Deputy Minister of that Department, and one of our good Ontario land surveyors, has been rewarded in a manner fitting to his ability and achievements. (Applause.)

On motion of Mr. Jackson, seconded by Mr. Fullerton, the report of the Committee on Roads and Pavements was received and ordered to be printed in the proceedings.

The President called upon Mr. Wilson to present his report on Engineering.

Mr. Wilson then read the report of the Committee on Engineering, and moved, seconded by Mr. S. B. Code, that it be received and printed in the proceedings.

The President put the motion, which was carried.

The President—The next thing is one that was left over and that is the paper by Mr. Chipman on the Board of Examiners. I understand from Mr. Chipman he was not able to get all the information he required so as to get it fully completed, and if we would pass a motion that it be received and printed in the proceedings that he will hand it in as soon as he gets it finished, and it will appear in the proceedings with the other matters.

Mr. Dobie—I would take pleasure, Mr. President, in moving that Mr. Chipman's paper be received or taken as read and printed in the annual proceedings.

The motion was seconded by Mr. Christie, put by the President, and carried.

The President—We will have Mr. Chipman's report of the Committee on Repository and Biography.

The Secretary—Mr. Chipman handed in his report yesterday. (Reads same.) I would move, Mr. Chairman, the reception of this report, and that it be printed in the proceedings.

On the motion being seconded by Mr. Ross, the same was put by the President and carried.

The President—There were two items in the first day's programme. The report of the Council of Management was not read, and there is a short report that might be read now. I think under a motion or under a regulation that was passed by the Council a year or so ago, it was decided it might be better to try to have the various committees appointed during the annual meeting, and if possible read out before we adjourn. Under that the Council have named the committees, and I hold a draft of it in my hand here, which perhaps I

might read to you. These are the committees for 1916-17. (Reads same.)

There is a short report of the Board of Examiners which might be given.

The Secretary—I have a list of the results of the recent examination which will form the greater portion of the report. (Reads same.) I would move that the report of the Board of Examiners be accepted, and that the Chairman of the Board will write out a complete report and hand it in for publication, if that would be satisfactory.

On the motion being seconded by Mr. McMeekin, the same was put by the President and carried.

The President—The next report is that of the Committee on Legislation. Have you any report from Mr. Kirkpatrick?

Mr. Fullerton—I might say Mr. Kirkpatrick said it would be impossible for him to be here. He had no report ready, and he asked me if I would try to get the committee together to see if we could make some sort of report. I said I would do the best I could, but it seemed impossible. There were only four of us present, so that there is no report. There have been some suggestions made to the committee, and they may make certain recommendations following the papers which were read by Mr. Le May and Mr. J. W. Pierce, but we haven't got together and made any report. The only member of the committee who had communicated with the chairman was Mr. Watson of Orillia. He wrote a letter to the chairman, making certain suggestions, but that is the only thing that ever was done. If you desire to have this letter read I will read it, but I don't think there is any advantage in reading the letter, seeing it is addressed to the Chairman of the Committee on Legislation. At all events, there is no report ready.

The President—Will the committee be able to get a report and hand it in a little later?

Mr. Speight—We can get in touch with Mr. Kirkpatrick and get a report ready and hand it in.

Mr. Fullerton moved, seconded by Mr. Speight, that the report be taken as read and that it be printed in the annual proceedings.

The President put the motion, which, on a vote having been taken, was declared carried.

The President—The next is the report of the Committee on Entertainment, by Mr. Le May.

Mr. Le May—Mr. President, the report of the Committee on Entertainment is, unfortunately, not yet ready. The labors of the committee do not cease until after the veterans' luncheon at noon. I would also like to state that there are persistent rumors that there was some kind of a dinner last night, and I would like to investigate that and have it right in the report. I would like to make a motion that the report be received and taken as read.

Mr. Dobie—I take pleasure in seconding that. I think it is rather unfair to expect the chairman of that committee, after his strenuous labors of last night, to submit a report at this early stage in the morning.

The President put the motion, which, on a vote having been taken, was declared carried.

Meeting adjourned for ten minutes to permit the members to prepare for the election.

NOMINATION OF OFFICERS.

The President called the meeting to order, and said: Gentlemen, if you will come to order again we will try to proceed with the business. The first order is nomination of officers, and I suppose nominations for President will be first in order.

Mr. Dobie—I would take great pleasure in nominating Mr. Murphy for the office of President of this Association.

There being no further nominations, on motion of Mr. McMeekin, the nominations closed, and the President declared Mr. C. J. Murphy elected as President for the ensuing year.

The President called for nominations for the office of Vice-President.

Mr. Jackson—I beg to nominate Mr. J. J. Mackay, of Hamilton.

There being no further nominations, they were declared closed, and the President declared Mr. J. J. Mackay elected to the office of Vice-President for the ensuing year.

The President called for nominations for the office of Secretary-Treasurer.

Mr. Gaviller—I have pleasure in nominating Mr. L. V. Rorke for the office of Secretary-Treasurer.

There being no further nominations, the President declared the same closed, and Mr. L. V. Rorke elected to the office of Secretary-Treasurer for the ensuing year.

The President called for nominations for two members of Council.

The Secretary read list of retiring members, and stated that Mr. C. H. Fullerton and Mr. A. T. Ward would retire on the 1st April, and that there would really be three members to elect, as Mr. Mackay, being elected Vice-President, would be a member of the Council by virtue of office.

Mr. Christie—I take pleasure in nominating Mr. A. M. Jackson to fill the balance of Mr. Mackay's term.

Mr. R. R. Grant—I take pleasure in nominating Mr. T. D. Le May.

The President—I think perhaps it might be well if we could follow the same rule which we followed in electing a Vice-President, in the case of a man to take Mr. Mackay's place. If we put up more than one name and ballots are sent out, there might be a misunderstanding with some of the members who received them, and the votes possibly might be mixed. If it would be left for the three-year term men, it might be simpler.

Mr. Jackson—Following your suggestion, I have much pleasure in retiring in favor of Mr. Le May, but I feel Mr. Le May would be a much more serviceable member of the Council if some one would nominate him for the full term.

The President declared the nominations closed, and Mr. T. D. Le May elected to take Mr. Mackay's place for the unexpired term.

The President called for nominations for members of Council for the three-year term.

Mr. Christie—I nominate Mr. A. M. Jackson.

Mr. Le May—I would nominate Mr. Norman D. Wilson.

Mr. Ross—I nominate Mr. G. A. McCubbin.

Mr. Rorke—I would nominate Mr. C. H. Fullerton.

Mr. Fawcett—I nominate Mr. A. G. Ardagh.

The President declared the nominations closed.

The President called for nominations for Auditors.

Mr. Ross—I nominate Mr. A. E. Jupp and Mr. D. D. James as Auditors.

The President—If there are no further nominations, I declare Messrs. Jupp and James elected as Auditors.

I would appoint Mr. John van Nostrand and Mr. R. R. Grant as Scrutineers.

UNFINISHED BUSINESS.

Mr. Grant—There is something in connection with the Association generally which I am very much interested in, and that is the use of the privileges of the Association that is made by men who have not paid their dues in many years. Can the Secretary tell us what percentage of the members there are in arrears? I suggest that the names of the members in arrears be published in the annual report.

The Secretary—About one-third of the members.

Mr. Grant—There is a similar association, and there are about 276 members, and I saw their annual report, and there was not one of the members in arrears, and the annual fee was \$2.00.

The Secretary—I think if a circular was sent out to the members stating their names would be published, I don't think there would be many in arrears.

Mr. Fawcett—Perhaps a motion published in the report that the names of the members in arrears in future would be published would be sufficient instead of putting the names in this next report. Perhaps it would have the effect required. I think it would be severe. I know there are some legal objections to publishing in the newspapers the names of those in arrears.

The President—I personally perhaps feel as strongly in the matter as Mr. Grant does, but I think it would be an un-

wise move to put these names in the report in that way, and at any rate, even if we did decide to do so, I think we would be wise to have the solicitor's advice first. I fear it would lead us into complications and troubles.

Mr. Jackson—I think the suggestion of the Secretary is a very good one, that those members that were in good standing might have their names embellished with a little star and the black list would be more or less inferential; but I do think it would be a good thing if there was a formal resolution stating some steps would be taken later on to publish the names of those in arrears.

Mr. Ross—I think the discussion will probably serve some good purpose. I think at present we might let the matter drop without taking any further action on it.

Mr. Grant—On what ground do you take that stand?

Mr. Ross—As to marking them out in the report. I think it would be better to sue them or have the fees collected in one way or another, or strike the names off the list altogether.

Mr. Grant—The fees we are paying at present are very small, and if a man isn't making enough out of his profession to pay them, he ought to be on the retired list, and not in good standing.

Mr. Grant—That is rather drastic, but something should be done.

Mr. Dobie—The same question crops up year after year. It has become a hardy perennial, and it is one of those things I presume, unless the existing order changes, which we will always have to wrestle with. Just as to what is the best thing to be done is something the Council and members of the Association have given a great deal of thought to. There does not seem to be any solution short of suing these men. The consensus of the opinion of the legal advice we have had is that it is very doubtful whether or not we have the power to strike a man off the list for non-payment of dues. Some contend if a man goes in court and cannot produce his receipt he has no status. Our solicitor holds the opposite, that non-payment of dues does not disqualify a man, but he holds these dues can be collected by ordinary process of law as an ordinary debt. As to whether it would be the desire of the Association to authorize the Secretary or the Council to proceed against

these men is for the Association to say. Personally I am of the opinion that is the only way we will ever get them.

The Secretary—I may say I am already authorized by the Council to take proceedings against these men. I am wrestling with it and have got a few up to the point and have got in a considerable amount of arrears this last year and I have a list of a dozen now I intend to proceed against in the courts. There are a number of members in arrears for last year, men who are in the habit of paying up, but I don't know whether it would be wise to proceed against them right away. I think we can afford to be lenient for another year with some of those.

Mr. Grant—In any case where a man is in debt to the extent of \$40 if he has any property you can get judgment against his estate; anything under that you cannot. Under those circumstances I don't believe it is advisable to sue for a smaller amount.

The Secretary—In that case I would cut the number down a little because there are many whom it would be absolutely no use to sue, they are not in the country.

Mr. Grant—The ordinary club posts the names of the members in arrears and it is not very long before they pay up the amount of the arrears. It is more or less a dishonor. By publishing it in the report it would be practically the same thing as posting them in the club.

Mr. Ross—If a detailed statement of the fees was put in the financial report it would show who paid and who didn't pay.

The President—I fear Mr. Grant has lost sight of a very important item in this matter. We don't stand on the same footing as the ordinary club or an ordinary society. If we undertake to strike any men off our list we are putting their means of existence away from them; we are depriving them of that; we are in existence under the Statutes of the Province and we can't legislate a man's livelihood away from him.

Mr. Grant—I never proposed that at all. If you post a man in your annual report as being in arrears, there is no question about that.

The President—We want to be careful that we don't lead ourselves into the court for libel or something.

Mr. C. A. Jones—If we are to allow them to run ten years before suing wouldn't it be rather a bad precedent?

Mr. Ross—Six years outlaws a debt.

NEW BUSINESS

Mr. Gaviller—I move, seconded by Mr. Dobie, that the Legislative Committee be empowered to take proceedings as to the correction of any minor changes that may be required in the Act controlling the Association, that is, in the Land Surveyor's Act, the Drainage Acts, or the Municipal Act.

The President put the motion, which, on a vote having been taken, was declared carried.

Mr. Jackson—I move that a grant of \$400 be made to the Secretary-treasurer in recognition of his services, and in doing so I felt when the nomination for the position was made just now if it had been necessary for anything more than a seconder everybody in the room would have very gladly got up and said a little more.

Mr. McMeekin—I have great pleasure in seconding the motion.

The President put the motion, which, on a vote having been taken, was declared carried, with applause.

On motion of Mr. Ardagh, seconded by Mr. Ross, a grant of \$5 each was made to the Auditors.

The President—I call your attention to the fact that we have been trespassing on the goodness of the Engineers' Club and it has been customary for somebody to make a motion.

Mr. Gaviller—I move, seconded by Mr. Fawcett, that this association tender a hearty vote of thanks to the Engineers' Club for their kindness and for the accommodation which they have given us during our annual meeting.

The President put the motion, which, on a vote having been taken, was carried with applause.

Mr. Ross—I move that Mr. Fawcett take the Chair pro tem and that the President leave the Chair.

Mr. C. A. Jones—I have much pleasure in seconding that.

The President—I will retire without putting it to a vote.

The President left the Chair and Mr. Fawcett took the same.

Mr. Ross—Mr. Chairman, I take much pleasure in moving a vote of thanks to Mr. Wilkie, the retiring President, for his services during the past year. He has taken a great deal of interest in the matter and performed all the duties in a most creditable and amiable manner and he has certainly adorned the Chair, and I take very great pleasure in moving a vote of thanks, seconded by Mr. Jones.

Mr. Fawcett—This is a motion that I am sure everyone is in full accord with. Mr. Wilkie has shown himself to be a thorough business man and a thorough business manager as far as presiding over these proceedings and over the work of the Council during the past year. You have heard the motion that a vote of thanks be accorded him for the able manner in which he has presided over the Association during the past year. (Motion carried with applause.)

Mr. Fawcett—Mr. Wilkie, I have pleasure in presenting to you the thanks of this meeting for the able manner in which you have conducted the affairs of the Association.

Mr. Wilkie—Mr. Chairman and Gentlemen: I thank you for your kindness and the kind words you have said to me regarding the performance of my duty, which I have only endeavored to do to the best of my ability, and that I considered I should do, owing it to the society to do the best I could. I am very thankful to know that you have appreciated the service I have rendered, although at times I felt it was not as well done as it might have been. I thank you, Gentlemen. (Applause.)

If there is no other business to come before the meeting we will stand adjourned until the next annual meeting.

12.10 p.m.—The meeting adjourned.

GOD SAVE THE KING.

PRESIDENT'S ADDRESS.

E. T. Wilkie, O.L.S.

To the Members of the Ontario Land Surveyors:—

It affords me much pleasure to welcome you to this twenty-fourth annual meeting of the Association since its incorporation and the thirtieth since its organization, and while I am glad to see so many present, I feel like repeating Mr. Dobie's regrets of two years ago, that more members do not attend these annual meetings, which those that do attend find so profitable and pleasurable.

It is to be regretted that during the past year the grim reaper has removed from amongst us three of our members, namely, Sir Sanford Fleming, of Ottawa; Silas James, of Toronto, and Henry McEvoy, of St. Mary's, and we also regret the loss of Aubrey White, who, though not a member, was permanent head of the Department of the Government with which our members have most to do, and who was many times with us at our annual banquets.

It is also regrettable that the balance in the Association's finances for the past year is on the wrong side, owing most likely to the dullness in business for the surveyors, which has likely prevented many members from paying their dues, as they otherwise would have done. As our only source of revenue is fees from the members and from pupils or prospective members, the neglect by only a few members to pay their annual fee is noticeable in the annual statement.

The unfortunate war, which has now been in progress for over a year and a half, still continues, with the end not yet in sight. Nineteen of our members, whose names will be given you by the Secretary, have responded to the call and given themselves for the defence of our Empire, and have either gone forward or are ready to go to the battle line, but I am glad to say that we have no knowledge of any of them having fallen in battle. Also some articulated pupils have enlisted and gone to the front, but I am sorry to have to say that we have no record of the number or their

names; two only, Matthew Rae and Kenneth Campbell, are known to me. Campbell is with the artillery, and about a month ago was "Somewhere" in France. In a letter he wrote to one of his late office chums he said: "Please jog Mr. Wilkie's memory about my O.L.S. I think under the circumstances the Association might let the odd months slide and let me write my final when I get back. I'm not over here on any giddy pleasure trip." I think I may safely say that if Mr. Campbell is fortunate enough to get back and present himself for his examination the Board will deal fairly with him. If any member knows any pupil who has enlisted, or who does enlist, he will do the Association a favor if he will forward the name to the Secretary, so that as complete a record as possible may be had for the Honor Roll.

The Government have not seen fit to have as much new work done during the past year as they have had done for a number of years previously. Only seven survey parties were doing Government work, consequently the members who had been engaged in that work had to look elsewhere for employment, and as there was a sharp falling off in real estate business all over the country, and much less town lot subdividing done than usual. I fear many of the surveyors were short in their financial returns for the year, if they did not turn to some other line of business, temporarily at least.

The Good Roads movement is spreading and breaking out in new places, which has caused some more communities to agitate for better roads than they now possess. Probably the greatest work in this line is the Toronto-Hamilton concrete road now under construction, which work has been pushed along as fast as conditions would permit, perhaps the most troublesome part of it being the financial end. The movement has reached well to the east and west ends of the Province, where I notice by the public press they are agitating to improve their road systems, and which should result in benefit to some members of the Association.

Perhaps the largest public work being done in the country during the past year is the Welland Ship Canal, work on which has been carried on continuously through the year. I have had the pleasure of visiting the work twice, and found that a very poor conception of its magnitude can be obtained from reading the newspaper and other articles published regarding it. One needs to actually see it to realize its size, which is second only to the now famous Panama Canal, but there is one difference between them—The Welland Ship Canal

is not likely to be subjected to land slides such as the Panama is having, and which will probably continue for some time.

Another large public work is the Halifax Ocean Terminal, which has been under way for more than a year. The work consists of building piers and docks for the Atlantic Ocean shipping and connecting it with the Intercolonial Railway. A novel and ingenious method has been devised for building the wall in deep water, which apparently is proving very satisfactory. The short piece of railway included is very heavy work.

A third public work is the Terminal facilities for the Hudson's Bay Railway at Port Nelson, which is work of some importance, and on which a considerable sum of money has been spent.

Two new transcontinental railways have been put into operation during the year, which marks another prominent milestone in the development of Canada.

Although certain lines of business have been seriously interfered with, and some almost wholly destroyed, by the war disturbance, many new businesses have been created, and at the present time the general business of Canada is in a fairly prosperous condition, as shown by the latest trade returns, Canada's share of the manufacture of war munitions being a very considerable item.

The unlicensed practitioner, like the poor, seems to be always with us, as we hear a few complaints of his still doing work. I think it would not be amiss to try and get some better method than there is at present for dealing with this form of interference with the legitimate work of the members of the Association. It has been suggested that there might be an amendment to the Land Surveyors' Act obtained to deal with the matter and that the Inspector of Surveys could be named in the amendment to look into any cases that were reported to him.

I think our thanks are due to the Secretary for working up the splendid programme which is in your hands, and I trust that the papers and reports which are to be read will prove interesting and instructive to the members.

I have to thank you, gentlemen, for the honor you have done me by electing me your President for the past year, and I trust you will all obtain profit and pleasure out of your attendance at this meeting. It has been my privilege to attend pretty regularly for a number of years, and I have always considered it well worth while to take the time to attend the Association's annual meetings.

REPORTS

SECRETARY-TREASURER'S REPORT.

Mr. Chairman:—

I beg to submit my report of the business of the Association during the last financial year ending on January 31, 1916.

After revising the minutes, as shown in the stenographer's report of the last annual meeting, collecting all committee reports and material necessary, the matter was handed over to the Business Printing Company of Toronto for publication.

The report was completed and delivered to me on the 29th of June, and was at once distributed by mail to the members of our Association and forwarded in bulk to the different Societies of Surveyors and Engineers with whom we exchange reports.

During the year two members have been exempted from payment of annual fees by by-laws under section 41, subsection 5, Ontario Land Surveyors' Act, four have withdrawn from active practice, thirteen have been sworn in as licensed surveyors and been added to the official register, three honored members, Sir Sanford Fleming, Silas James and Henry R. McEvoy, have passed the Great Divide, and their names have been added to the deceased list with regret.

The official register now sums up as follows:

Active members	265
Withdrawn from practice	106
Deceased	103

Total roll 474

In addition to the four members who were mentioned in my report of last year as having answered the call to arms for the defence of our Empire and the upholding of that which is known in the civilized world as humane ideals and honor against a cruel and ruthless foe, several other members have enlisted and are in training or in the firing line. The honor roll to the best of my information is as follows, arranged alphabetically:—

Members

Anderson, R. M., Toronto.
 Baird, Wilmot J., Scarborough.
 Bush, Clayton E., Edmonton, Alta.
 Burwash, N. A., Toronto, Canadian Engineers.
 Blandy, Oliver, Hamilton.
 Clarke, Lieut.-Col. F. F., Toronto, 127th Battalion.
 Davis, Col. W. M., Vancouver, B.C., 2nd Canadian Pioneers.
 Eadie, L. F., Toronto, 75th Battalion.
 Earle, Wallace S., Vancouver, B.C., Canadian Engineers.
 Gibson, Capt. Colin W. G., Hamilton.
 Holcroft, H. S., Toronto.
 Jackson, Capt. Alan Mair, Brantford, 215th Battalion.
 Low, Major E. H., Sturgeon Falls.
 MacKay, Capt. E. G., Hamilton.
 McDougall, S. G., Ottawa, Canadian Engineers.
 Nash, A. L. Stanley, Dunnville, 40th Battery.
 Pierce, B. C., Kingston.
 Steele, I. J., Ottawa.
 Tate, Capt. H. N., Toronto, 2nd Canadian Pioneers.
 van Nostrand, Lieut.-Col. A. J., Toronto, 74th Battalion.
 Young, A. C., Swastika, Canadian Engineers.

Students

Campbell, Kenneth C., Toronto.
 Coulson, Charles L., St. Catharines.
 LaPlant, John, Simcoe.
 Lee, Standish A., Brantford.
 Lovelace, Stanley E., St. Catharines.
 Rae, Matthew, Toronto.
 Yates, Charles R., Toronto.

The payment of annual fees has been fairly well attended to by members. The amount of arrears, however, by a few who insist in ignoring notices for several years back, has not diminished.

The correspondence and clerical work in connection with business has increased considerably. Over five hundred and fifty letters were written and about the same number received during the year. Four sets of circular letters of about 250 each were also mailed.

The financial statement herewith shows the transactions of the past year and the state of the Association's treasury. While the showing is not as good as last year, the reasons for the depletion are evident, that is:—

- (1) Grant of \$400.00 to Canadian Red Cross and Belgian Relief Fund.
- (2) Abatement of annual dues to members who have enlisted and also those exempted by by-law under section 41, subsection 5.
- (3) Extra cost of last year's report.

To these causes I am sure none of you will object. The first two mentioned are duties worthy of honorable men of the profession, and the last one a necessity, which is well repaid.

The actual expenditure (exclusive of the \$400.00 grant above stated) exceeded the actual receipts by \$275.00, and it is evident that some provision should be made to meet the increased expenditure at some future time.

Respectfully submitted,

L. V. RORKE,
Secretary-Treasurer.

**BALANCE—RECEIPTS AND EXPENDITURE BETWEEN
FEB. 1st, 1915, AND FEB. 1st, 1916.**

RECEIPTS.

Balance in Savings Bank 1st February, 1915	\$1,371.21
Balance in Current Bank 1st February, 1915, less outstanding cheques	607.45
Cash on hand 1st February, 1915	2.50
Receipts from annual fees	779.00
Receipts from sale of Reports	5.00
Interest on Con. Gas Co. stock	100.00
Interest on Saving Bank Deposit	32.10
Receipts from Board of Examiners, including Government grant..	1,107.00
	<u>\$4,004.36</u>

EXPENDITURE.

To amount paid Auditors	\$ 10.00
“ “ for stenographic report	75.00
“ of grant to Secretary-Treasurer	400.00
“ of grant to Belgian Relief Fund	200.00
“ of grant to Canadian Red Cross Society	200.00
“ paid for rent	50.00
“ “ for publication of report	666.15
“ “ for stationery, printing, engraving	93.10
“ “ expenses of members to Council	81.25
“ “ premium on Secretary's bond	7.50
“ “ freight, express, brokerage, etc.	12.97
“ “ rent of lantern at annual meeting	5.00
“ copying law reports	5.50
“ paid for floral wreath (S. James)	10.00
“ exchange on cheques, war tax, etc.	1.00
“ paid for postage	86.40
“ paid expenses Board of Examiners	794.20
	<u>\$2,698.07</u>

SUMMARY, 1916.

Total receipts, including bank balance	\$4,004.36
Total expenditure	2,698.07
To balance	—————\$1,306.29
By cash on hand	\$ 40.00
By current bank account balance on Feb. 1st, 1916.....	429.13
By savings bank balance on Feb. 1st, 1915	837.16
	—————\$1,306.29

ASSETS.

Cash in bank and on hand	\$1,306.29
Twenty shares Con. Gas stock	1,760.00
Office furniture	140.00
Six Lufkin Rule Standards	60.00
Arrears of fees collectable	250.00
	—————
	<u>\$3,516.29</u>

L. V. RORKE,
Secretary-Treasurer.

AUDITORS' REPORT

We hereby certify that we have examined the Secretary-Treasurer's vouchers, receipts, final statement and bank accounts, and find them correct.

R. M. ANDERSON,
A. E. JUPP,
Auditors.

REPORT OF COUNCIL OF MANAGEMENT.

The Council of Management beg to report as follows :

The annual meeting was held on the 20th of April, 1915, at the Surveys Branch, Parliament Buildings, Toronto, and the following resolutions were adopted at that meeting :

1. That the Council request the Legislation Committee to ask for legislation amending the City and Suburbs Plans Act so as to include all incorporated cities within the workings of the Act.

2. Messrs. Thomas B. Speight and Thomas Fawcett were reappointed to the Board of Examiners for a term of three years.

3. Maurice Gaviller, Collingwood, was exempted from payment of annual dues under R. S. O., chapter 165, section 41, subsection 5.

4. The Secretary was authorized to place Frederick Henry, O. L. S. of London, on the retired list, without payment of further dues.

5. The matter of rearranging the list of subjects for examination was left to the discretion of the Board of Examiners to make such changes as they think best.

The second regular meeting of the Council of Management was held at the Engineers' Club, Toronto, on the 15th February, 1916. The following resolutions were adopted :

Messrs. John D. Evans and John Fair were exempted from payment of annual dues under R. S. O., 1914, chapter 165, section 41, subsection 5, Ontario Land Surveyors' Act.

The Special and Standing Committees were appointed for the ensuing year.

Respectfully submitted,

G. B. KIRKPATRICK,
Chairman.

REPORT OF COMMITTEE OF PUBLICATION.

Your Committee on Publication beg to report that a contract for the publication of the annual report was made with the Business Printing Company of Toronto at \$1.65 per page plus cost of cuts required. The cost of the publication exceeded that of last year by \$140.00. This was due to the extra amount of engravings and increase of 100 pages in size.

One thousand three hundred and fifty were printed and distributed, as follows:

To Illinois Society of Engineers and Surveyors	200
Ohio Engineering Society	200
Indiana Engineering Society	175
Iowa Engineering Society	175
Dominion Land Surveyors' Association	150
Manitoba Land Surveyors' Association	50
Alberta Land Surveyors' Association	10
Saskatchewan Land Surveyors' Association	25
Members of Ontario Land Surveyors	240
Scientific Libraries and Societies	60
Balance on hand in depository	70
	<hr/>
Total publication	1,350

Every endeavor was made to have this report complete and up-to-date, and the good work being done by your Committee on Biography will enable us to fill up in this year's report many blanks now in the list of deceased members.

Owing to the cost of publication and postage, it was found necessary to fix the sale price of this report at \$1.00.

Respectfully submitted,

L. V. RORKE,
Chairman.

REPORT OF BOARD OF EXAMINERS

An adjourned meeting of the Board was held on the 21st of May, 1915, and the following candidates passed the final examination in compliance with the provisions of resolution passed at the Board Meeting on February 11th, 1915:

William Jessamin Fletcher,
King A. Farrell,
Edward Taylor Ireson,
Carman Rice Kenny.

A meeting of the Board was held between February 7th and 15th inclusive, 1916, and the following candidates passed the examinations:

Preliminary—
C. E. Code.

Final—
William J. Fulton,
William Ewart Lumb,
Hugh Matheson,
Edgar Lawrence Moore,
Charles J. Manser,
John Morrison Riddell,
Oliver Smith,
Claude Hughes Wilkins,
A. Gillies.

The following bonds have been approved of and filed with the Provincial Treasurer in accordance with the provisions of the Act respecting Land Surveyors:

W. B. Beatty,
Orville Rolfson,
T. H. Bartley,
J. A. Marck,
C. V. Gallagher,

B. C. Pierce,
 W. H. Norrish,
 W. L. L. Cassels,
 W. J. Fletcher,
 C. R. Kenny,
 A. L. Stanley Nash.

The following articles were filed by the undernamed pupils during the year:

Name of Pupil	Name of Surveyor	Residence	Date of Articles	Term
Belanger, Victor E. A. M.	J. McLennan ..	Williamstown ...	Oct. 20, 1915	3 years
Cook, Alfred	G. S. Abrey	Toronto	Feb. 8, 1915	1 year
Fraleigh, Arthur ...	F. W. Farncomb ...	London	June 7, 1915	3 years
Fulton, William J. ...	G. S. Abrey	Toronto	May 1, 1915	1 year
Gillies, A.	G. A. McCubbin ...	Chatham	March 27, 1915	3 years
Lee, Standish A.	A. M. Jackson	Brantford	Feb. 15, 1915	1 year
Mooney, Lincoln ...	J. R. Gill	Sudbury	Feb. 9, 1915	3 years
Manton, Lewis G. ...	T. D. LeMay	Toronto	Feb. 15, 1915	3 years
Mitchell, James S. ...	E. D. Bolton	Listowel	Feb. 20, 1915	3 years
Gibson, Vernon W. ...	M. M. Gibson	Toronto	Feb. 10, 1915	1 year
Reuben, Cyril G. ...	T. D. LeMay	Toronto	Feb. 15, 1915	3 years

G. B. KIRKPATRICK,

Chairman of Board.

REPORT OF COMMITTEE ON REPOSITORY AND BIOGRAPHY

We beg to express our thanks to the Council for granting us so much valuable space in the 1915 Proceedings to the work of our Committee, also for publishing the portraits, twenty-one in number. This appreciative act of the Council is encouraging, and we trust it may stimulate the individual members to a more active interest in our work.

The Committee desires to obtain biographical sketches of the following Surveyors, photographs of whom we have on file:

- Aylesworth, John S.—Jan. 9th, 1871.
- Bush, Clayton E.—May 5th, 1908.
- Bonfellow, R. M.—Oct. 7th, 1876.
- Forneri, Chalmers C.—July 9th, 1864.
- Kennedy, Lachlan—April 13th, 1863.
- Passmore, F. F.—Oct. 1st, 1846.
- Steele, E. C.—April 9th, 1889.
- Sanders, Wm.—April 11th, 1857.
- Burke, J. W. (Rev.)—Oct. 16th, 1857.
- Crowe, Walter—July 7th, 1881.
- Irwin, Jas. M.—Jan. 13th, 1863.
- Lillie, Henry—Jan. 8th, 1853.
- Roberts, C. E.—Jan. 13th, 1862.
- Scott, A. B.—April 13th, 1858.
- Vidal, Alexander, June 8th, 1840.

The members of the Association who peruse this report would confer a favor by sending to the Committee the names of descendants or other party to whom we may apply for information respecting any of the above mentioned Surveyors.

We also require photographs of the following Surveyors, biographical sketches having appeared in the Proceedings:—

- Bowman, Isaac L.—1893—page 145.
- Campbell, David S.—1892—page 145.
- DeGurse, Joseph—1898—page 232.
- Holland, Samuel—1896—page 178.
- Bell, Andrew—1913—page 78.
- Bowman, Leander Meyer—1896—page 181.
- Cromwell, J. M. C.—1898—page 234.
- Gibbs, Thos. Fraser—1893—page 146.

- Howitt, Alfred—1897—page 182.
 McDonald, Wm. John—1914—page 59.
 McNabb, John Duncan—1901—page 51.
 Perry, A. B.—1914—page 80.
 Thomson, Clifford E.—1897—page 163.
 Wood, Henry Osborne—1913—page 79.
 Morris, John—1914—page 61.
 Peddar, J. R.—1897—page 163.
 Smith, David Wm.—1908—page 48.
 Thompson, David—1904—page 105.

The Committee desires particularly to obtain complete biographical sketches with portraits of the following eminent Surveyors:—

- John Collins—1764.
 Jeremiah McCarthy.
 Alexander Aitken—1789.
 James Rankin—1789.
 John Stegmann—1790.
 Augustus Jones—1791.
 Lewis Grant—1792.
 Robert McLean—1811.
 John Booth—1816.
 Gabriel Lount—1819.
 Charles Rankin—1820.
 Publius V. Ellmore—1821.
 William Hawkins—1832.
 William Tracey—1836.
 Thomas Allohin—1837.
 Alphonso Wells—1842.
 Bolton McGrath—1866.

We have biographical sketches and portraits of the following Surveyors for publication in the 1916 Proceedings and we may succeed in securing a few additional:

- Walter Beatty.
 John G. Howard—1836.
 David Gibson—1825.
 John Galbraith.
 John A. Snow—1847.
 William Kingsford—1855.
 James Hutchison Esten—1857.
 Francis Jones—1840.
 Henry Creswick, Jr.—1864.
 Charles J. Wheelock—1856.

Frederick Jasper Chadwick—1859.

Sir Sanford Fleming—1849.

John K. Roche—1841.

David R. Brown—1850.

Henry Creswick, Sr.

We also desire the Council to publish sketch of William R. Aylesworth, Ex-President of the Association, who died on April 22nd, 1909, and portraits of J. K. McLean and George O. Rainboth, Col. J. S. Dennis, Lindsay A. Russell, whose biographical sketches have appeared in the proceedings.

Respectfully submitted,

WILLIS CHIPMAN,
Chairman.

WALTER BEATTY.

By David Beatty.

Walter Beatty, the eldest son of William and Ella Beatty, was born in the Township of Yonge (Front), Leeds County, Ontario, Jan. 3rd, 1836. He received his education at Public School and the Brockville Grammar School. He served his apprenticeship to William Rath, P.L. S., at Mitchell, Ont., and passed his final examinations on July 19th, 1858. He returned to the County of Leeds shortly afterward and took up his residence at Beverley, the name of the village afterwards being changed to Delta, where he continued to live until his death.



WALTER BEATTY.

Mr. Walter Beatty was one of the pioneers in the work of surveying public lands in Western Canada. This work was commenced in 1869, but very little was accomplished until after the Indian outbreak known as the Red River Rebellion in 1869-70. The work was resumed in the spring of 1871.

Mr. Beatty and Major A. C. Webb were commissioned by the Dominion Government in this year to proceed to Winnipeg and the West, via Chicago, to take through supplies for the different surveying parties in the Western Provinces. These supplies were conveyed by rail as far as Moorehead, Minnesota, thence by steamer to Winnipeg. The trip from Moorehead to Winnipeg required three days by stage and a week by boat. From Winnipeg goods and supplies could be shipped by boat up the Assiniboine to Fort Ellice in the early summer months, and from Winnipeg down the Red River, Lake Winnipeg, and up the Saskatchewan to Carleton and Edmonton.

In 1871 Mr. Beatty surveyed about 400 miles of township outline in the Province of Manitoba.

. For seven seasons between 1872 and 1881 Mr. Beatty was employed on subdivision contracts, block outline surveys, and road surveys in Manitoba. On most of the subdivision contracts he and his brother David were in partnership.

In 1876 Walter Beatty received instructions from the Government to lay out and superintend roads in the Icelandic settlements on Lake Winnipeg, and was quarantined with the settlement during a smallpox outbreak in the winter of 1876 and 1877.

In the spring of 1882 it was decided by the Dominion Government to commence subdivision surveys in the vicinity of Edmonton, and Mr. Beatty, his brother David, and George Simpson were the first surveyors employed. From Winnipeg their teams and horses travelled overland the entire distance to Edmonton, the time required being two months and two days. Mr. Beatty and others of the party, including Bryce J. Saunders, then a pupil, set out by boat via Lake Winnipeg and the Saskatchewan, taking sufficient supplies for two years. The survey work was prosecuted during the balance of the season of 1882. Early in the winter of 1883 Walter Beatty returned to Winnipeg, thence by railway to his home in Delta. He returned to Winnipeg in the spring, thence to Edmonton. During the winter David Beatty and Mr. Simpson continued subdivision work, upon which they were engaged to the north and north-east of Edmonton, the work extending beyond St. Albert. They surveyed between sixty and seventy townships in the Edmonton district, in 1882, 1883, and 1884. In 1885 Mr. Beatty was on active service in what is known as the second Riel Rebellion.

During 1887, 1890, 1903, and 1904 he was again employed on contract surveys in Manitoba and Saskatchewan, subdividing about two hundred townships. Frank Purvis, Charles Davis, Bryce J. Saunders, Hubert Dempster, and several other surveyors served under articles with Mr. Beatty, and acted as assistants on many Government surveys performed by him in Ontario and in the Western Provinces.

In the Province of Ontario he subdivided the Townships of Stisted, Chaffey, Armour, Strong, and Joly, and subdivided a number of additional townships in partnership with his brother David.

The last work he performed was a subdivision of the Township of Alexandra, near Chapleau. It should be stated that two younger brothers, George and Adam, were associated

with Walter in much of his Western work. George afterwards settled at Red Deer, and Adam on the homestead at Lansdowne.

Walter Beatty was elected a member of the Provincial Legislature in 1894, and represented the riding of South Leeds until 1904. Although a Conservative in politics, he had many friends among his political opponents, and was highly respected in the county.

Mr. Beatty died at Delta on January 5th, 1911.

HENRY CRESWICKE, SR.



HENRY CRESWICKE, SR.

The subject of this sketch was born in Gloucestershire, England, Sept. 26, 1804. He received his education first at Bristol, and then at Reading Grammar School under the famous Dr. Valpy. Mr. Creswicke first came to America in 1830, spent three years in Michigan, then returned to England, and served as civil engineer on the Great Western Railway under some distinguished engineers. In 1841 he settled on N. $\frac{1}{2}$ of Lot 15, Con. 13, Oro, County of Simcoe. At the suggestion of Capt. J. Æ. Irving, Warden of Simcoe District in 1843, he prepared for and passed his examination as County Surveyor, after walking from

his home in Oro to the City of Kingston, which was then the seat of Government. After residing in Oro for a number of years, he moved to Barrie. He qualified as a land surveyor on April 10th, 1854, and was afterwards County Surveyor of the County of Simcoe, and also served as auditor of the accounts for the administration of justice for many years. In June, 1881, he tendered his resignation, and at the end of the year the office of the County Surveyor was abolished. On the evening of his retirement the Council tendered to him their con-

gratulations on the successful and energetic manner in which he had discharged his duties as County Engineer and Surveyor for the unusually long period of 39 years. He died January 21st, 1883.

HENRY CRESWICKE, JR.

Henry Creswicke, Jr., son of the foregoing, passed his final examination as P.L. S. on July 8th, 1864, and practised his profession in Barrie and vicinity. He was engaged in many municipal surveys and had a large general practice, principally in the County of Simcoe. He was unmarried and lived with his sister in the family homestead, "Hillside." He was accidentally killed by a railway train when walking on the track towards Allandale, where he intended to post some letters. The accident occurred on January 22nd, 1898.

The late A. D. H. Creswicke, barrister at Barrie, was a brother of Henry Creswicke, Jr.



HENRY CRESWICK, JR., (Killed).

DAVID GIBSON.

The subject of this sketch was born on the 9th of March, 1804, in the Parish of Glamis, Forfarshire, Scotland, where his father was a farmer. He served his time with Mr. Blackadder, Glamis, as a surveyor and civil engineer. When a young man, about 22 years of age, he came to Quebec, bringing letters to Earl Dalhousie, at that time Governor, and was speedily engaged in the survey of the boundary line between Lower Canada and the United States. He remained some time in Lower Canada, then came to Upper Canada and settled in



DAVID GIBSON.

Markham village, where he had relatives (Mr. Milne, of York Township, being his uncle). On December 27th, 1825, he was appointed Deputy Land Surveyor in Upper Canada. He was actively engaged on Government work, surveying the Township of Goderich, Township of Thorah, etc. He was also the first City Surveyor of Toronto in 1834, Mr. Wm. L. Mackenzie being then Mayor. He was elected twice to the Parliament of Upper Canada for the First Riding of York, and was sitting for that Riding up to the time of the rebellion. He had then been living for some time at Willowdale, nine

miles out Yonge Street, on the farm until recently owned by his son, Peter S. Gibson.

In 1837 he was connected with Mackenzie's revolutionary movement, held a commission as captain, was treasurer, and had charge of the prisoners, whom he treated with kindness. After the affair at Montgomery's, he was concealed for some little time by sympathizers in Canada, and at last succeeded in crossing Lake Ontario in a schooner from the Rouge to Rochester. His house, barns, etc., at Willowdale, were burned by loyalists, and he suffered serious loss of property by his connection with the rebellion.

He next went to Lorkport, and obtained an appointment as engineer on the Erie Canal. He was successful in his undertakings there, and acquired property near to Lockport, which he held at the time of his death.

He was, however, more British than Yankee, and received a special pardon. Upon returning to Canada in 1848 he immediately received Government employment, having charge of laying out the Durham Road, and also surveying the Township of Normanby.

In 1851 he ran for the First Riding of York with Hervey Price and J. W. Gamble, the last named being elected.

In 1850 he was appointed a member of the Board of Examiners, which position he held until his death, and for many years was chairman.

In 1853 he received instructions to survey Melancthon and Proton, but was sent for to Quebec, and received the appointment—Dr. Rolph being then C. L. Commissioner—of Inspector of Crown Land Agencies and Superintendent of Colonization Roads for Upper Canada, which position he held until his death. His son surveyed Melancthon and Proton.

Under his superintendence, while holding this appointment, the following roads were made: Elora and Saugeen, Woolwich and Huron, Southampton and Goderich, road between Southampton and Owen Sound, road dividing Counties of Grey and Wellington, besides a number of minor roads in the western section; also several lengthy lines of road, properly known as Colonization Roads.

Latterly, since the removal of Mr. Salter, he had charge of the roads in Algoma District, as a separate agency, in addition to other duties.

He married, about the year 1828, his cousin Eliza, daughter of Mr. Alex. Milne, of York Township, who survived him, with four sons and three daughters.

Mr. Gibson died at Russell Hotel, Quebec, on Monday, January 25th, 1864. He was ill but a few days, having left home on the 14th inst. to confer with the Government respecting his official work and duties. He contracted a cold in the sleeping car, the cause of his death being inflammation of the lungs.

Two sons, James A. and Peter Silas, became land surveyors. The former removed to Oshawa, where he also conducted a stationery and book shop. Peter Silas, who occupies the homestead at Willowdale, was a member of the Board of Examiners, from 18— until after the Incorporation of Land Surveyors.

At a meeting of the Board of Examiners, held April 4th, 1864, the following resolution was passed:

“That this Board takes the earliest opportunity on meeting subsequently to the death of the late Chairman David Gibson, Esq., to place upon its records an expression of the profound regret entertained by its members that it should have pleased an Allwise Providence by that event to remove from among them one whose courteous and even deportment, and whose able, impartial and dignified discharge of the duties

which devolved upon him, commanded the esteem and respect of all with whom he came in contact.

"The Board would not be doing justice to the feelings of its several members were it not to convey to Mrs. Gibson their sense of the irreparable loss which she has sustained and their respectful sympathies for that lady in her affliction.

"That the Secretary be requested to have a copy of the foregoing resolution neatly engrossed, and that the same be forwarded to Mrs. Gibson by the Chairman on behalf of the Board."

William Hawkins (1857), William Morison (1858), and his sons, James A. (1855), Peter Silas Gibson (1858), and several other surveyors served under articles to David Gibson.

GEORGE Z. RYKERT.

By George Gibson.



GEORGE Z. RYKERT, P.L.S.

George Zacharias Rykert was born at St. Catharines in 1829, his parents being George and Maria Rykert. He qualified as a land surveyor on April 12, 1852, and was appointed Town Engineer for St. Catharines about 1853, which position he held for many years. In 1861 he surveyed the Township of Dysart for the Provincial Government. He also made right-of-way surveys for the Welland Railway from Port Dalhousie to Port Colborne, now part of the Grand Trunk Railway System.

He was noted for his energy and painstaking skill in performing surveys. He died in 1869.

Robert T. Burns, Edgar Berryman, and George Gibson served under articles with Mr. Rykert.

WILLIAM R. AYLSWORTH.

By Mrs. W. R. Aylsworth.

William R. Aylsworth was born in the Township of Ernstown, near Bath, on Sept. 15th, 1836, but spent his boyhood on a farm at Newburgh, receiving his early education at the Newburgh High School.

When eighteen years of age he began his career as a school teacher, and afterwards took up surveying, serving his apprenticeship for three years with A. B. Perry, an eminent and successful surveyor. He passed his final examinations on November 8th, 1861.

In September, 1863, he married Christianna, the younger daughter of Col. John Herchmer, of Frontenac. After five years of private practice and on Gov-

ernment land surveying, he accepted a position with the Rathbun Company as surveyor and general agent, which position he held for twenty-five years. In 1871 he was elected Reeve of the Village of Mill Point, now known as the Town of Deseronto, which municipality he represented in County Council of Hastings for twenty-one years. He was Warden of Hastings in 1878, 1881, and 1893, and appointed Justice of the Peace in 1863. For many years he was Chairman of the Board of Public School Trustees. Mr. Aylsworth was a Liberal in politics, and at two general elections, 1878 and 1892, contested unsuccessfully the Riding of East Hastings for the House of Commons.

Mr. Aylsworth was elected President of the Association in April, 1903, but owing to illness was unable to attend the annual meeting in February of that year. He was re-elected in April, 1904, and presided at the annual meeting following.



WM. R. AYLSWORTH

His death occurred at Belleville on April 22nd, 1909.

He was survived by his widow and one son, Herchmer, born September 29th, 1865, who resides in the Township of Richmond, County of Lennox. Allen Bristol Aylsworth, K.C., of Toronto, is a nephew.

DAVID ROSE BROWN.

By Lydia A. R. Young.

David Rose Brown was born near Iroquois, Dundas County, in April, 1824. His parents were of Scotch and U. E. Loyalist descent. He served his apprenticeship under James West, P.L.S., and passed his final examinations for P.L.S. certificate at Toronto on the 10th of October, 1850. For many years he practiced surveying in the Counties of Glengarry, Stormont, and Dundas, and for thirteen years was Town Engineer for the Town of Cornwall, having removed there from Iroquois. He retired from active practice in 1898, and died at Cornwall on May 14, 1900. One son, David Benjamin Brown, who passed his finals as Ontario Land Surveyor on February 23rd, 1904, resides at Kenil, N.J., and Mrs. Young, of Seeley's Bay, is a daughter.



DAVID ROSE BROWN.

John Smith Brown, of Heckston, Township of South Gower, who passed his final examinations on July 8th, 1852, was a brother of D. R. Brown, and George Laing Brown, who passed his O.L.S. examinations February 19th, 1898, now Registrar of the County of Dundas, is a nephew.

JAMES HUTCHISON ESTEN.

By H. L. Esten.



JAS. HUTCHISON ESTEN.

The following is a short sketch of the life of James Hutchison Esten: He was born at Exeter, County of Devon, England, February 23rd, 1833, and was son of Hon J. C. P. Esten, Vice-Chancellor of Upper Canada, and grandson of Hon. J. C. Esten, Chief Justice of Bermuda.

His parents left England and settled in Canada in 1837, living at Toronto, where he was educated at Upper Canada College.

He was for a time on the Grand Trunk Railway survey, being with a party in charge of Thomas W. Herrick, and as soon as that work was over he entered the office of J. S. Dennis, P.L.S., as a pupil, being ar-

ticled to Mr. Dennis, during which apprenticeship he was assistant to Mr. Herrick, who was also engaged upon Surveys in the Saugeen Peninsula, now Bruce County.

Mr. Esten became a P.L.S. 16th October, 1857, and practiced in Newmarket for some three years, but surveying at that time being very dull, he entered the Law Society as a student, being called to the Bar in Easter, 1865. A short time after becoming a barrister he was appointed special examiner to the Court of Chancery, which office has now been abolished, and in 1873 became Secretary of the Law Society, which office he held till his death, which occurred on June 13th, 1892. He was married to his cousin, Harriet Sybella Phillips, 11th September, 1858.

Three sons, J. P. Esten, of Toronto, G. H. Esten, barrister, of Barrie, and H. L. Esten, O.L.S., of Toronto, also two daughters, survive.

WILLIAM KINGSFORD, LL.D.

By R. E. Kingsford



WILLIAM KINGSFORD.

William Kingsford was born in the Parish of St. Lawrence Jewry, London, England, December 23rd, 1819. He spent some years in the Army, coming to Canada with the 1st Dragoon Guards in 1839. Upon leaving the regiment he obtained professional employment in the office of the City Surveyor, Montreal, and was subsequently Deputy City Surveyor for three years (1842-1846), which position he resigned for newspaper work; then two years in engineering and surveying work in connection with the Lachine Canal. In 1849 he was employed on the Hudson River Railway, New York State, then on the Panama Railway. Re-

turning to Canada, he was appointed on the staff of the Grand Trunk Railway.

On November 5th, 1844, he received his certificate as Land Surveyor for Lower Canada, and on October 8th, 1855, as Land Surveyor for Upper Canada.

Resigning his position on the Grand Trunk Railway, he became City Engineer in Toronto in 1855 for a few months only, returning to the Grand Trunk. He laid out the line for the Victoria Bridge at Montreal, and was appointed the first Contractor for Maintenance of this railway west of Toronto in 1855. He returned to England in 1861, and visited Europe, examining important engineering works north of Naples and east of Vienna.

In 1862 he returned to Toronto and engaged in private practice; also published his work on Canadian canals, being the first to advocate the enlargement of the St. Lawrence Canal system to a uniform depth sufficient for ocean-going vessels. From 1865 to 1868 he was again in England and in Italy respecting various engineering projects.

Recalled to Canada in 1868, he entered the public service at Ottawa, and was engaged on various projected works until 1873, when he was placed in charge of Harbors of Ontario and Quebec from the Gulf to Lake Superior, a position he held until 1880, when he was appointed on the C. P. R. Upon the completion of the railway in 1886, he devoted his time to the preparation of a most comprehensive "History of Canada," which is recognized as a standard authority.

Dr. Kingsford died at Ottawa 28th September, 1898. His only surviving representative is his son, R. E. Kingsford, Police Magistrate, Toronto.

FRANCIS JONES.



FRANCIS JONES.

Francis Jones was born at Ballakillane, County of Carlow, Ireland, November 1st, 1815. The family descended from Edward Saul, who went to Ireland with William III. Francis was the third son of Edward Jones, his mother being Rosanna Sparling.

He was educated in Canada, and qualified as a land surveyor for Upper Canada on July 7th, 1840.

He followed the practice of his chosen profession of land surveying and civil engineering for many years thereafter, but eventually gave the greater part of his time to politics. He was elected member of the Canadian Parliament in 1861, and held the seat for North Leeds and Grenville until Confederation, at which time he was elected member of the Dominion House, and retained his seat in said Parliament till 1874.

He was unmarried, and devoted considerable of his time in early life to scientific subjects, such as mesmerism, phrenology, astronomy, etc. His lectures throughout the country on astronomy were especially popular.

He was noted for his keen and ready wit and sense of humor so typical of the Irish race.

J. W. Harris, D.L.S., Assessment Commissioner and City Surveyor, Winnipeg, served his apprenticeship with Mr. Jones, who was his uncle. Moses McFadden, now of Brandon, Manitoba, was one of Mr. Jones' first students.

Francis Jones resided at Kemptville, where he died on August 2nd, 1887.

His brother, Edward Jones, became widely known as a skillful mechanical engineer, and had a practical knowledge of surveying operations. He died March 26th, 1894, aged 72 years.

SIR SANDFORD FLEMING.



SIR SANDFORD FLEMING.

Sir Sandford Fleming was born at Kirkcaldy, Fife-shire, Scotland, January 7, 1827, migrating to Canada with his brothers in 1845.

It is on record that at the burning of the Parliament Buildings at Montreal by a Tory mob in 1849 he was one of four who succeeded in removing Queen Victoria's portrait.

He began his studies in surveying in Scotland, and his professional career in Canada on the Northern Railway, becoming chief engineer in 1857.

He qualified as a Provincial land surveyor April 28th, 1849, and was appointed a member of the

Board of Examiners in 1852, retaining that office for about fifteen years. From 1864 to 1876 he was chief engineer of the Intercolonial Railway, and in 1871 was appointed chief engineer on C. P. R. surveys.

In 1872 he headed an exploratory expedition to the Pacific Ocean, via the Yellow Head Pass, the results of which are embodied in Principal Grant's book, "Ocean to Ocean." During the '70's he also conducted railway exploration work in Newfoundland. In 1880 he retired from the service of the Dominion Government, but continued to act in an advisory capacity. In the same year he was elected as Chancellor of Queen's University, which office he held until his death.

His efforts contributed in no small degree to the adoption of initial meridians common to all nations, and the initiation of the movement for a reform in time reckoning, resulting in our present twenty-four hour system of time zones. Another subject which he studied and made his own was that of an Empire-girdling system of ocean cables. The Pacific cable was mainly due to his untiring propaganda.

Various honors and degrees were conferred upon him from time to time in consideration of his valued services.

The venerable Canadian Institute of Toronto was organized in 1851. Mr. Fleming was one of the charter members, and chiefly instrumental in its organization.

He died at Halifax on July 22nd, 1915. Winterholme was his Ottawa residence after 1869.

JOHN KNATCHBUL ROCHE

John Knatchbul Roche was born at London, England, March 15th, 1817, and was third son of Capt. John Roche, R.N. He was educated at Christ's Hospital, London, England, and came to Canada about 1833. His brother, George M. Roche, was Crown Lands Agent at Lindsay, Ont., for many years and a Magistrate.

Mr. J. K. Roche received his appointment as Deputy Provincial Surveyor on December 1st, 1841, and was appointed a member of the Board of Examiners in 1852, and was present at the first meeting on April



JOHN K. ROCHE.

5th of that year. He was an active member of the Board until his untimely death. He was then employed by the Government to survey and lay off a continuation of the Colonization Road (the Bobcageon Road), commencing at Bell's Line, between the Counties of Victoria and Peterboro, to Lake Nipissing, thus to open up the Ottawa Valley through that route. Mr. Roche had been with his party on this work since the middle of July and was on his return to report progress to the Commissioner of Crown Lands, when, on Tuesday, the 13th September, 1859, whilst crossing Balsam Lake in a bark canoe during a gale of wind, the canoe was upset, and he was unfortunately drowned, his own canoemen being only able to save themselves by swimming. His men endeavored to dissuade him from attempting to cross the lake during the storm, but he urged them to proceed, saying his business was of importance. Mr. Roche was a gentleman of great urbanity of manners, of high integrity, much ability in his profession, and was held in general esteem by all who knew him.

Mr. Roche was survived by a wife, three sons, John, William Hardie, and Frederick, and by one daughter, Annie Elizabeth, at present living at Cobourg, now the only surviving member of the family.

BOLTON MAGRATH.

By Charles A. Magrath.

The subject of this sketch was born at Tynan, County Armagh, Ireland, August, 1824. Educated Royal School, Armagh, and private tuition. For five years he was employed as an assistant in a private astronomical observatory at Markee Castle, near Sligo, Ireland, and then engaged on railway construction in England for at least two years under an elder brother, who was a civil engineer.

Emigrating to the United States in the early fifties, he was engaged on engineering works in various parts of that country until about 1857, when, being offered a permanent position that would in time have necessitated his renouncing his British citizenship, he came to Canada and for a short time was employed as an engineer on the Grand Trunk Railway.

In or about 1858 he started to teach school in Aylmer, near Ottawa, and was appointed inspector of Protestant Schools



BOLTON MAGRATH

for the Counties of Ottawa and Pontiac, in what was then Lower Canada in April, 1865, and held that position until his death in October, 1895. As inspector of Schools he had considerable freedom, and for fully twenty years after his appointment as such he prepared very many students for their examinations as land surveyors, as well as others taking up civil engineering. He became a P.L.S. for Upper Canada in January, 1866, and for Lower Canada in January, 1873. He was for many years one of the examiners for D. L. Surveyors. He was essentially an educator. He gave up the

very best in himself towards improving educational work in the Province of Quebec. Morgan, in his 1912 edition of "Canadian Men and Women of the Time," refers to him as "a famous mathematician," and in J. L. Gourlay's "History of the Ottawa Valley," it is stated: "He was succeeded by Bolton Magrath, a great mathematician, full of originality, almost to explosiveness. His field is nearly as large as an European kingdom, and to the shame of the Government be it spoken, his salary is as meagre as his labor is immense."

His son, Charles A. Magrath, is now Chairman of the Canadian Section of the International Joint Commission on the Pollution of Boundary Waters.

JOHN BOOTH.

The family name of Booth can be traced back six hundred years to Adam de Boothe, of Lancaster, England. Several of the name were knighted. Henry Booth, second Lord Delamere, was one of a committee of three to demand of King James II. that he remove from the Kingdom.

The first of the name who came to America was

Ensign John Booth, who landed at Southold, Long Island, in 1652. One of his descendants removed to Watkill, Ulster County, N. Y., now Goshen, Orange Co. At the Revolutionary War the family espoused the Royalist cause, and decided to remove to Canada after the war. One son, Zaccheus, was chosen to proceed to Elizabethtown and select a location. He arrived in 1784 or 1785, but he disappeared on his return trip, and it is supposed he was murdered by the Indians. Two brothers, Samuel and Vincent, came to Canada with their families about 1788, Samuel swimming across the St. Lawrence at Brockville.



JOHN BOOTH.

They located on Lot 37, in the 5th Concession, Elizabethtown, and other members of the family joined them shortly afterward.

The subject of this sketch, John Booth, was a son of Vincent Booth, and was born February 8th, 1794. He held a captain's commission during the war of 1812, and served his apprenticeship to Deputy Surveyor Robert McLean, qualifying as a surveyor in 1815, receiving his commission from Governor Francis Gore at Toronto. He was a man of marked ability, and was always held in the highest esteem by all.

He was appointed a member of the first Board of Examiners in 1849, and was Chairman of the Board until his death on May 15th, 1860. He was buried in the family burial plot about a mile distant from his own home, on a farm formerly owned by one of the family, now owned by J. W. Stewart. His only child, a son, died when a child, and the homestead is now owned by his nephew, G. M. Booth. The dwelling in which John Booth was born was built in 1811, and is now (1916) in a good state of preservation.

The field notes of John Booth are models of neatness and clearness, but unfortunately all his notes excepting those of the last twenty years of his practice, were destroyed in a fire

which occurred at a farm house in Augusta, where he was stopping while engaged on a survey. Mr. Booth was the most prominent surveyor of his time in the Counties of Leeds and Grenville, and was employed by the Government to make several municipal surveys and to plant stone boundaries to fix governing lines, concession lines, etc. Any survey made by John Booth may be depended upon as being correct. Henry Lillie, of Lyn, who served under articles with Mr. Booth and passed his finals on January 8th, 1853, became a worthy successor of Mr. Booth, his field work being noted for its exactness, and his descriptions, notes and plans for their clearness.

Norman Booth, who qualified as a surveyor on September 2nd, 1846, and died in 1868, was a nephew of John Booth. Although his address is given in the register at Preston, he practiced in Leeds County.

(The notes, etc., of John Booth, Henry Lillie, and Norman Booth are now in the possession of Willis Chipman, O.L.S.)

FREDERICK JASPER CHADWICK.

By E. M. Chadwick, K.C.

Frederick Jasper Chadwick was the son of John Craven Chadwick, of Guelph; born 19th November, 1838, died 20th June, 1891. He was several times a member of the County Council of Wellington, and of the Town Council of Guelph, of which he was Mayor in 1877. He married Elizabeth, daughter of the Rev. Edward Michael Stewart, of Guelph, and had four sons, of whom three are living, and three daughters, of whom two are living. He practiced as a surveyor in partnership with Milton Cushing Schofield, P.L.S., who afterwards resided in Berlin, Co. of Waterloo. E. M. Chadwick, K.C., of Toronto, is a brother.



FREDERICK JASPER CHADWICK.

JOHN GALBRAITH, M.A., LL.D.

No man was better known throughout the Province of Ontario by the profession than Dean Galbraith, of the School of Practical Science.

His father, Thos. Galbraith, came to Canada from Berwickshire in 1834, and for some time resided at Montreal, where his eldest son, John, was born on September 5th, 1846. He afterwards removed to Port Hope, where John attended the Grammar School, and when a student became acquainted with George A. Stewart, an engineer on the Midland Railway. At that time Mr. Stewart was a powerful man, a fine canoe-man, and a master of wood-craft, in whom the student



DEAN GALBRAITH.

Galbraith found a hero whom he desired to emulate. He then decided to become a civil engineer, and intended to take a course at McGill, but as the McGill School of Engineering, established in 1859, was then in a comatose state, he was induced by J. B. Cherriman, at that time Professor of Mathematics and Physics in the University of Toronto, to take a B.A. course, giving particular attention to mathematics. This he did, graduating with honors in 1868.

In 1866, when yet an undergraduate, he accompanied Mr. Stewart as head chairman on a Government survey on the north short of Lake Huron. Prof. W. H. Ellis thus describes his adventures of that season:

"The trip included a journey of several hundred miles through dense forest interspersed with lakes and rivers, with no other guide than the compass and the stars, save an occasional rude map drawn by an Indian on birch bark. Stewart found him a most useful assistant, showing indomitable pluck and a never failing readiness to do anything and everything to help matters along.

"He was 'full of mathematics,' and the chief and his young assistant had many an interesting discussion over the camp fire.

"At length a belated newspaper overtook the party containing an account of the Fenian Raid and the skirmish of the 2nd of June, 1866, in which seven fellow-students of Galbraith, his comrades in the University Rifles, had been killed or wounded. He told his chief that he must go at once to join his regiment. Stewart asked him how he proposed to go. He said, 'I will get the Indians to take me across to Collingwood and go straight to Toronto from there.' His chief argued in vain about the dangers of such a trip, which he estimated as a hundred and fifty miles of open water across Lake Huron and in a birch bark canoe. But no danger could daunt and no difficulties quell Galbraith's indomitable courage. He set out on his adventurous voyage, and reached Collingwood in safety. There he learned that the trouble was over and the troops had returned home. Without delay he launched his canoe once more, and pointing her in the direction whence he had come traversed again the long stretch of wind-swept water that tossed between him and his chief, with whom he remained till the work was completed.

"He had with him on this occasion an Indian from Rama, John Peters by name, who became devotedly attached to him, and from whom he gained much of that familiarity with woodcraft and Indian lore, which distinguished him in after life. Years afterwards John Peters told me that had it come on to blow at all hard while they were crossing the lake, loaded as they were, they must inevitably have been swamped.

"Shortly after this Mr. Stewart was appointed chief engineer of the Midland Railway, and Galbraith became one of his principal assistants. After leaving Mr. Stewart he went to the United States to get some practice in mechanical engineering, and was employed for a time in the Baldwin Locomotive Works. Returning to Canada, he was employed on the construction of the Intercolonial Railway as contractor's engineer."

After graduation he was employed on the Intercolonial Railway, Midland Railway extension to the Town of Midland, and from 1875 to 1877 was engaged on surveys for the then proposed Canadian Pacific Railway.

He passed his final examinations as Provincial land surveyor on April 13th, 1875.

Upon the organization of the School of Practical Science in Toronto in 1878, he was appointed to the Chair of Engineering, and in 1889 was appointed principal. In 1906, when the school became the Faculty of Applied Science in Engineering of the University of Toronto, he was appointed Dean, which position he held until his death. For thirty-six years, therefore, he was responsible for the engineering education of Toronto, and of his remarkable success there can be no question. He was a great teacher, an able, efficient administrator, and model presiding officer.

He early became an associate member of the Institution of Civil Engineering of Great Britain, and was one of the founders of the Canadian Society of Civil Engineers. In 1909 he was elected President of this society.

In 1875 he received the degree of M.A. from Toronto University, and in 1902 the honorary degree of LL.D. by his Alma Mater, and in 1903 Queen's University honored him with the same degree.

Of his work outside of the School of Practical Science, the most important is probably that in connection with the Quebec Bridge enquiry. This huge structure fell on August 29th, 1907, when under construction. Dean Galbraith was appointed one of a commission to investigate and report upon the failure.

Notwithstanding his many arduous duties, he maintained a continual interest in the Association of Ontario Land Surveyors, and seldom absented himself from the annual dinner. The older members of the Association will recall with pleasure his after-dinner speeches upon topical subjects. During the early Perry explorations astronomical difficulties at the Pole were brought to the attention of the surveyors. On another occasion the underlying principles of the fourth dimension of space were elucidated, and at one of the latest dinners he attended the prospectus of the Skutawabo Liquid Silver Mining Co., Limited, were presented in a most attractive way to those present. His loss to the Association is keenly felt, as a large percentage of the surveyors are graduates in engineering from the School of Practical Science.

Although he had not enjoyed the best of health for some years, his friends were shocked when his death was announced. He attended to his duties at the University during the season of 1913-14, and, shortly after the close of the session, left for his summer cottage at Go-Home Bay. He died suddenly from

heart failure on July 22nd, 1914, and was buried at Mount Pleasant Cemetery on Saturday, July 25th. The funeral was attended by representatives from every class of engineering since the founding of the School, and representatives were also present from engineering organizations throughout and beyond the Dominion.

In 1886 he married Emily Stupart, youngest daughter of Capt. R. D. Stupart, R.N., and sister of R. F. Stupart, of the Meteorological Office. His widow, one daughter Beatrix and two sons, John Stupart and Douglas; and two brothers, Thomas of the Mail staff and William of Prince Albert, survive.

We take the liberty of quoting verbatim from Dr. W. H. Ellis' article that appeared in the University Monthly, Nov., 1914. Dr. Ellis was closely associated with Dean Galbraith at the School of Practical Science from the founding of the Institution, and is now acting Dean.

"Such was Galbraith as the world saw him. Shrewd, clear-headed, straightforward, undaunted, indefatigable. To his friends he revealed another side of his nature. Beneath the somewhat hard exterior, they knew that there beat a warm, generous, loving heart and they discovered hidden springs of poetry and romance little suspected by superficial acquaintances.

"From boyhood Galbraith was a lover of nature and especially of wild, untrodden ways. One of his earliest vacations was spent in a canoe trip from Lake Superior to Hudson Bay, returning by way of the Saguenay. All through his life he sought and found rest and recreation in the forest and on the water. He was not a sportsman. He cared little for shooting or fishing, but he loved to see and to study wild life of all kinds in its native haunts. On such expeditions he was a delightful companion, skilful, resourceful, cool, courageous, patient and cheerful.

"For society in the conventional sense he cared nothing, but no one enjoyed better an evening with a few congenial friends. In such society the burden of care, which he so uncomplainingly carried, slipped away and he was gay and even jovial, while his rich stores of varied reminiscences added no little to the enjoyment of the company.

"The extraordinary affection which he inspired in all his students was manifested in the magnificent tribute which they paid him at the banquet last December (1913), when 600 of his old pupils gathered together to do him honour. Few men have found themselves before their work was done so richly rewarded by the love and gratitude of those for whom they laboured as John Galbraith."



CHARLES J. WHEELOCK.



LINDSAY RUSSELL.



COL. J. S. DENNIS.



GEO. C. RAINBOTH.



J. K. McLEAN.

REPORT OF COMMITTEE ON ROADS AND PAVEMENTS.

Mr. President: —

The year 1915 witnessed a slight decrease in road-building activity, owing to financial difficulties and uncertainties arising from the war. A chief item of interest in connection with highway construction has been the partial completion of the Toronto-Hamilton road, an 18-foot concrete highway connecting the two cities. Approximately 17 miles out of a total length of 36 miles has been completed and is now open to traffic. Practically the entire length has been graded, and it is expected the whole work will be completed by the middle of the coming summer. The estimated cost is \$920,000, or approximately \$25,500 per mile.

Other important highways in the Province, under county jurisdiction, have been improved to a considerable extent. On this work the Provincial Government has been paying a subsidy of 33 1-3 per cent. The total expenditure on county roads for the year will approximate \$750,000, of which the Government will contribute one-third, or about \$250,000.

These figures are slightly lower than those of 1913 and 1914. By recent legislation the Government subsidy has been increased to, and will hereafter be, 40 per cent.

While detailed figures are not available, indications point to a considerable decrease in the amount of street paving in the cities and larger towns. The same is true of the expenditure on road construction in township municipalities.

An outstanding feature in highway development in the Province during the past year has been the passing of the Ontario Highways Act, whereby a Department of Public Highways in the Provincial Government has been created. By proclamation of the Lieutenant-Governor the Act came into force on January 18th, 1916, and it is expected a considerable impetus will be given thereby to road construction when financial conditions have become more settled. In addition to the creation of the Department of Highways, the more important provisions of the new Act include a Government subsidy of 20 per cent. of the cost of maintenance and repair of county roads; the designation of suburban roads in the vicinity of cities, to the construction and maintenance of which the urban municipalities will contribute; and the construction of main or interurban roads, the cost of which is to be shared by the Government and the municipalities and property-owners benefited. Other sections of the Act provide for the payment by the Government of 25 per cent. of the salaries of Township Road Superintendents where all expenditure on roads and supervision of the road work in a township is entrusted to one man; Government assistance to sparsely populated incorporated villages in the construction of connecting links or extensions of main or county roads; and the regulation of signboards and advertising devices in the vicinity of main and suburban roads.

Work under the Northern Ontario Development Branch of the Government has been continued, resulting in the opening up of much new territory and the improvement of roads previously cut out.

Respectfully submitted,

JAMES S. DOBIE,
Chairman.

REPORT OF COMMITTEE ON ENTERTAINMENT

Your Committee begs to report as follows :

The annual dinner was held at the Engineer's Club on Wednesday, February 16th. The number of those attending was for various reasons somewhat less than in previous years, the total being 45, made up of 28 members and 17 guests.

The toast list was as follows :

The King.

Proposer.

Responder.

The President.

The Empire and Canada.

Mr. E. D. Armour, K.C.

Mr. Albert Grigg,
Deputy Minister Lands,
Forests and Mines.

Mr. Thomas Adams,
Commission on Conserva-
tion.

Army and Navy.

Mr. E. Stewart

Lieut.-Col. van Nostrand,
74th Batt., C.E.F.

Sister Societies.

Mr. J. S. Dobie.

Prof. Keys,
Canadian Institute.

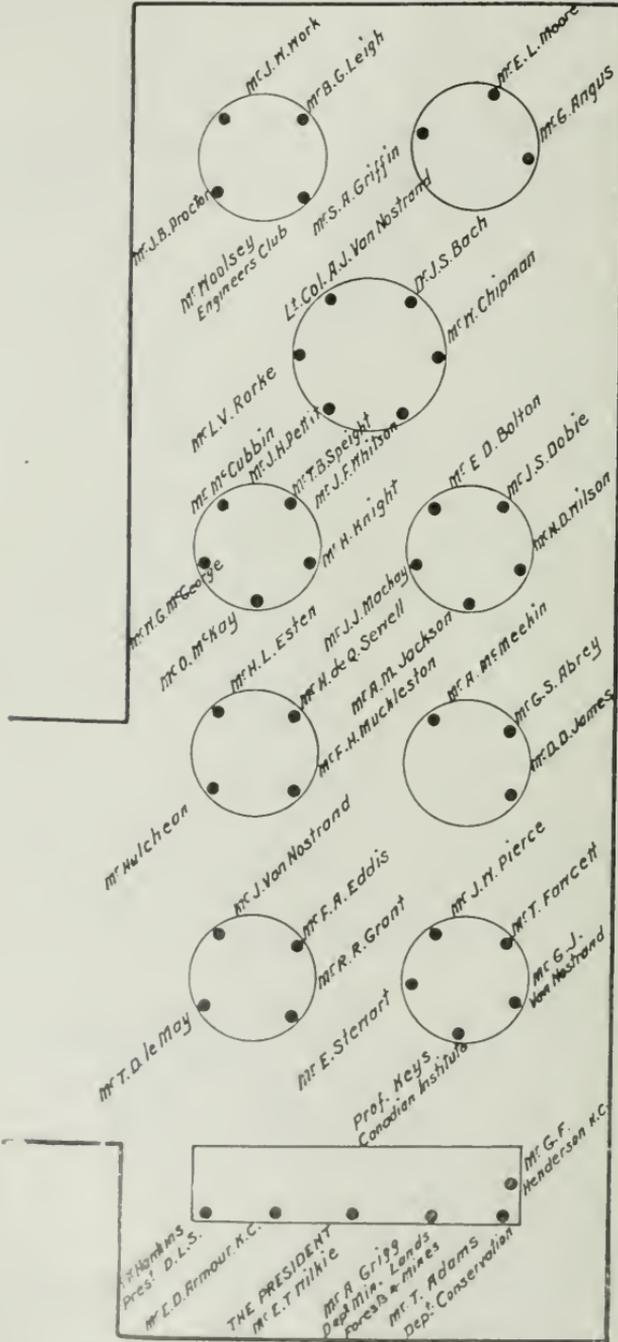
Mr. Hawkins,
President D. L. S.

Mr. F. A. Eddis.

Our Guests.

Mr. Willis Chipman.

Mr. G. F. Henderson, K.C.
Dr. J. S. Bach.



Songs were contributed by Mr. McMeekin, Mr. Sewell, and Mr. Leigh, and recitations by Dr. Bach and Mr. Thomas Adams, to all of whom your Committee wishes to express its thanks.

The veterans' luncheon for members of thirty years' standing and over was held at the Engineers' Club on Thursday, February 17th. This your committee feel to have been an unqualified success, thanks to the untiring energy of Mr. Willis Chipman, who was solely responsible for its organization and arrangement.

The following, who passed their final examinations as land surveyors prior to Confederation in 1867, were in attendance:

Name.	Date.	Place.
1.—Unwin, Charles, Chairman	April 12, 1852	Toronto.
2.—Burns, Thomas	Oct. 16, 1861	Hamilton.
3.—Smith, Henry	Nov. 8, 1861	Toronto.
4.—Kirkpatrick, G. B.	April 13, 1863	Toronto.
5.—Evans, John D.	July 8, 1864	Trenton.
6.—Wadsworth, V. B.	April 9, 1864	Toronto.
7.—Gaviller, Maurice	Jan. 6, 1866	Collingwood.
8.—Lumsden, H. D.	Jan. 4, 1866	Orillia.

The following members also attended the luncheon:

9.—Stewart, Elihu	April 8, 1872	Toronto.
10.—Blake, F. L.	April 13, 1875	Toronto.
11.—Fair, John	April 13, 1875	Brantford.
12.—Fairbairn, R. P.	Oct. 7, 1876	Toronto.
13.—Ross, George	July 10, 1879	Welland.
14.—Chipman, Willis	Oct. 4, 1881	Toronto.
15.—Fawcett, Thomas	Jan. 6, 1881	Ottawa.
16.—Jones, C. A.	April 8, 1881	Petrolia.
17.—Speight, T. B.	Jan. 6, 1882	Toronto.
18.—Stewart, Louis B.	April 6, 1882	Toronto.
19.—Walker, A. P.	Jan. 6, 1882	Toronto.
20.—Miller, F. F.	Jan. 8, 1882	Napanee.
21.—Whitson, J. F.	April 9, 1886	Toronto.
22.—Wickstead, H. K.	Jan. 7, 1886	Toronto.
23.—Esten, H. L.	Jan. 7, 1887	Toronto.
24.—Hutcheon, J.	Nov. 10, 1891	Toronto.
25.—Wilkie, E. T.	April 10, 1891	Toronto.

The reunion was very much enjoyed, and will no doubt become an annual function.

Letters of regret were read from the following: W. E. Yarnold, Joseph Hobson, George Gibson, H. J. Cambie, Edmund Seager, Henry Carre, James Warren, Edward Gardiner, J. W. Harris, James Marshall, James Dickson, J. S. Laird, George H. Frost, J. J. McGee, C. F. Miles.

Three or four members were detained by illness from attending.

Accompanying this report are: (a) Plan of dining-room at annual dinner. (b) Photograph of veterans attending luncheon (numbers to correspond with the numbers in the left hand column of the list of members attending). (c) Signatures of veterans attending luncheon. (d) Letter received from Mr. Otto J. Klotz.

All of which your Committee begs to recommend be reproduced in the annual report.

In conclusion, your Committee wishes to thank all those who assisted in making the annual meeting a success, and to express its appreciation of the courtesy of the Engineers' Club in extending its privileges to the members of the Association.

Respectfully submitted,

TRACY D. LeMAY,
Chairman.



NAMES OF SURVEYORS IN VETERAN GROUP PHOTO

- | | | | |
|----------------------------|---------------------------|-----------------------|---------------------------|
| 1.—Charles Unwin. | 2.—Thomas Burns. | 3.—Henry Smith. | 4.—George B. Kirkpatrick. |
| 6.—Vernon B. Wands worth. | 7.—Maurice Gaviller. | 8.—Hugh D. Lumsden. | 9.—Elihu Stewart. |
| 11.—John Fair. | 12.—Richard P. Fairbairn. | 13.—George Ross. | 14.—Willis Chipman. |
| 16.—Charles A. Jones. | 17.—Thomas B. Speight. | 19.—Alfred P. Walker. | 20.—Frederick F. Miller. |
| 22.—Henry King Wick steed. | 23.—Henry L. Esten. | 24.—James Hutcheon. | |
| | | | 5.—John D. Evans. |
| | | | 10.—Frank L. Blake. |
| | | | 15.—Thomas Fawcett. |
| | | | 21.—James F. Whitson. |
| | | | 25.—Edward T. Wilkie. |

Register
Veterans Lunch Association of
Ontario Land Surveyors.
Feb 17th 1916

Name	Address
W. S. Avillet 1866	Collingwood
Angus & Lunnsden 1866	Geilicia
Chas. Anson 1852	Toronto
Thos Burns 1861	Hamilton
Emmingspatung 1863	Toronto
Thos Fawcett 1881	Ottawa
Geo. Ross 1879	Welland
C. A. Jones 1881	Peterborough
R. A. Fairbairn 1876	Toronto
W. H. Wickett 1886	"
W. B. Hadworth 1864	"
D. Davis 1864	
Samuel Smith 1861	
E. Stewart 1872	
Geo. Fair 1875	Brantford
H. J. Blake 1875	
Chas. Miller 1885	Napanee
W. B. Beight 1882	Toronto
A. L. Estlin 1887	Toronto
J. Hutchison 1891	
J. F. Whitson 1886	Toronto
H. J. Baker 1882	Toronto
G. W. McKie 1891	Toronto
Louise Stewart 1882	Toronto
Wm. Chipman 1881	Toronto

Copy of letter received from Mr. Otto J. Klotz:

DEPARTMENT OF THE INTERIOR.

Dominion Astronomical Observatory

Ottawa, Canada, Jan. 10, 1916.

Mr. Willis Chipman, C.E., O.L.S., Etc.,
Rooms 203-206 Mail Building, Toronto, Ont.:

Dear Mr. Chipman,—

From your circular letter of the 5th inst. I find myself among the thirty-five gods and heroes placed on hoary Olympus, presided over by Zeus. I understand that these thirty-five represent the remnant of the host that started out on the Trojan campaign, and after many adventures and vicissitudes, like unto Ulysses 'midst woods and swamps, windfall and brule, heat and frost, shine and rain, mosquitoes and black flies, hunger and thirst, storm and snow, misery and privation, hardship with cheerfulness, and devotion to work, they survived to tell the tale at their fireside, as the setting sun beckons, beckons—the crossing of the bar.

And these heroes, the circular furthermore tells us, started out on their expedition before the birth of our Dominion—in prehistoric times—in the age of the great mammoth and the dinosaur, when the earth was still young, and light was faint and weak, save for the lantern carried by the surveyor, but the light increased day by day and year by year and spread along the single and doubled fronted concessions, yea, even unto the “blind line,” and recesses of the Crown Lands Department, until all was illuminated. And Zeus spake: “Come hither, true and faithful servant, thou pathfinder; thou hast made available my domain and lands of chaos for man, for smiling fields and homes, for villages and industry. Come hither, I say, thou benefactor, and receive thy bounteous reward of 8 '6 a day. Depart now in peace and contentment.” And the surveyor counted his shillings and pennies and bought some skins from the Indians for moccasins for his wife and children.

That was long, long ago, but he is still here, although many of his friends have counted their last “tally,” and sought Polaris, where they watch over our azimuth and our keeping the straight line or line straight.

He is now sitting before his own hearth, watching the changing flame and curling smoke of the burning log, reminding him of camp. At his knees are his little grandchild Wilhelmine and her brother Peterkin, who with wonder-waiting eyes listen to the tales of the grandfather, which surround him with wonder and awe and reverence.

And hereafter those children when grown up will proudly say: "Our grandfather was a surveyor before the Dominion was born."

OTTO J. KLOTZ.

REPORT OF DRAINAGE COMMITTEE

Your Drainage Committee beg to report as follows:—

1. The last distribution to members of this Association of pamphlets containing the municipal Drainage Act and Ditches and Watercourses Act was in 1910. In the last revision of the Statutes of Ontario all the amendments up to 1913 were included and no important amendments have been made since then. The numbering of a few sections of the Drainage Act was changed and very material changes were made in the wording and arrangement of the Ditches and Watercourses Act though not in its substance. Your Committee recommend that copies of the Drainage Act and Ditches and Watercourses Act as last revised be procured in pamphlet form and distributed to the members of the Association.

2. We expect an early distribution of printed volumes of drainage cases decided by the Ontario Courts which the Drainage Referee has been kind enough to prepare. In view of this it is unnecessary for the Committee to make any report of recent cases.

3. Immediately after the last annual meeting we learned that a considerable number of amendments to the Drainage Act were being asked for by a Committee of the Kent County Council. While some of these amendments met with our approval, some others did not and we took up the matter with the Provincial Secretary and the Drainage Referee. As a result the Referee took the trouble to hold a conference in Chatham which the Committee of the County Council and the Drainage Committee of the Ontario Land Surveyors Association were asked to attend. Other engineers in the adjoining counties were also invited to be present. Altogether there were eight engineers and about as many municipal men who met the Referee and discussed the proposed amendments. The amendments recommended to the Provincial Secretary as a result of this conference, were as follows:—

(1.) Requiring the engineer in making his assessment to show in his report the number of acres actually affected by his assessment.

(2.) Enabling any municipality to pass a general by-law determining the proportion which the municipality should contribute to highway bridges over drainage works within such municipality.

(3.) Treating access bridges in the same manner as private bridges, that is, by making proper allowances in money to the owner's and relieving the municipality from liability for construction and maintenance.

(4.) Authorizing the engineer to determine the compensation to be paid to owners for land actually taken in the construction of a drainage work, and for roadways and building sites necessary in connection with pumping stations.

Your Committee are in accord with all these proposed amendments excepting the first, which we believe would lead to increased cost of engineering and prove a fruitful source of litigation without any corresponding benefit.

We have to thank Mr. Alan Mair Jackson for earthwork tables in a form that will prove very convenient to drainage engineers. We submit these tables with a recommendation that they be printed on loose sheets for distribution to members of the Association.

4. Your Committee has been requested to consider and discuss the following matters:—

(1.) How to secure uniformity in drainage assessments. The problem is stated to the Committee in these words: "We come in contact with a great variety of assessments. Each engineer is a law unto himself. The variety in method of assessment, I presume, arises from a lack of specific directions in the Drainage Laws. The basic principle of the Act is the assessment for benefit. Injuring liability and outlet liability are defined to a limited extent, but not so 'benefit.' The student asks: 'How shall I assess for benefit?' You must answer: 'That is solely a matter of private judgment.' 'But what elements am I to take into consideration, the cost of the work or the increased value of the land?' It is a matter of private judgment. But if you go wrong the Court of Revision may on its private judgment correct you. The County Judge on his private judgment may correct the Court of Revision, the Referee may on his private judgment correct the County Judge and lastly the Court of Appeal may on its private judgment correct the Referee. This trouble might be avoided if the Statutes were more clearly to define the term 'benefit,' the most important word in the drainage laws."

In the opinion of the Committee the assessment for "benefit" is and always will be largely a matter of judgment on the part of the engineer and because it is a matter of

judgment it has been found impracticable to lay down any definition in the Drainage Act.

My Justice Gwynne in delivering the judgment of the Supreme Court of Canada in the case of Sutherland-Innes Company vs. Romney, says that "benefit" would vary according to the difference of elevation of the respective lots, the quantity of water to be drained from each, the distance of the several lots from the drainage work, and the like. We would add to this that the engineer should consider every element that will enable him to make a fair distribution of the cost of the work; this must be borne by the lands affected and a fair benefit assessment can only be made by the exercise of good judgment and by comparison of one property and one assessment with another. After the engineer has considered all the elements of a benefit assessment he cannot combine them by any mathematical or clerical process. We have examined some assessments which were claimed to be made according to scientific system and mathematical formula, but we may say for these assessments that they have failed to meet the approval of the tax payer or to run the gauntlet of the Court of Revision and County Judge.

(2.) The distinction between outlet liability and injuring liability.

This distinction is always troublesome. Outlet liability and injuring liability overlap to a great extent. The present Drainage Referee makes such liberal allowance for this that the engineer need have little concern about making unnecessarily fine distinctions. The engineer, however, will derive considerable information from a careful study of the reported cases dealing with this matter.

(3.) The liability to assessment of lands not artificially drained.

In many localities it is now almost impossible to find lands which are not artificially drained. If drains are not constructed on every lot or subdivision, the municipal drains, award ditches and private ditches reach to the boundaries of such properties so that in this sense they have artificial drainage. If the drainage work for which the assessment is being made provides improved facilities for drainage to such lands, either in an engineering or in a legal sense, they may be assessed and the result is that all lands within a watershed usually contribute to the cost of the work. The reason for assessing higher lands for a portion of the cost of the drainage work on lower

lands is that they actually do, or may in the future, artificially cause more water to flow upon such lower lands than would flow upon them without the aid of artificial channels. The natural flow of water from higher lands to lower lands does not create any liability on the part of the owners of the higher lands. While this is an old and well defined principle of law it has been recently stated in very plain language for the benefit of the laymen in the case of Colchester North vs. Anderdon.

(4.) The Oath of Office.

Objection is made to the trouble involved in filing a new oath of office for every individual drainage work on which an engineer is engaged. Possibly the oath of office taken by the Ontario Land Surveyor when he is admitted to practice is broad enough to cover any duties which he may perform under the Drainage Act and if so, this Act might be amended so that only engineers who are not Ontario Land Surveyors should be required to file the oath.

(5.) Highway Bridges.

It is argued "that the whole aim and object of drainage is to confine water in a narrow channel. The vast majority of our works are in watercourses. As the streams are deepened it naturally follows that shorter bridges will answer. Enlargement is rarely necessary. In such cases it is manifestly unfair to charge any cost of the bridges against the drainage area. This should be made clear in the Act."

There is a great deal of force in the argument as above stated. It is pointed out, however, that in cases where shorter bridges are sufficient for artificial channels than would be required for the natural channels, the foundations are more expensive because of the greater depth of the artificial channel; also that because of the artificial drainage of large areas of land the artificial channel must be wider than it would be if such lands were not artificially drained. There is no uniformity of practice in regard to the assessments for these bridges. One of the proposed amendments to the Act asked for by the Kent County Council will enable any municipality to assume the whole cost or any fixed proportion of the cost of highway bridges over drainage works within the municipality and this no doubt will lead to some improvement in this regard.

(6.) Compensation for flooding creek flats.

It is stated to the Committee that creek flats which have always been subject to flooding cannot be injured unless the period of flooding is extended. The owner of high lands will heartily agree with this argument but the owner of the creek flats and his witnesses, including the old timer who knows the history of the creek flat and its different stages of flooding for a period of fifty or sixty years, and also the engineering expert will point out that the flooding has increased in destructiveness if not in duration. The reason for this is that a much greater volume of water has been brought down in a given time and with much greater velocity. There is also the consideration that the owners of these creek flats might drain them economically if they had only to contend with water which comes upon them from natural causes but that efficient drainage could only be had at a very great cost when the volume of water thrown upon his lands in a given time has been very greatly increased by the act of the owners of higher lands. This matter of flooding of creek flats and the liability of high land owners has been dealt with in a number of cases and we would refer particularly to the recent cases of Orford vs. Aldborough and Colchester vs. Anderdon.

(7.) Instructions from the Council to the Engineer.

The authority of the engineer while derived from the Drainage Act can only be exercised when he has received proper instructions from the municipal council. We consider it the duty of the engineer to examine into the proposed scheme of drainage, find out what is required by the parties directly affected, and what is feasible; then if his instructions are not sufficient to meet the requirements of the case, he should advise the council and ask for further instructions.

In the case of extending a municipal drain up-stream from its original head, a petition is necessary for the new work; in so far as the work consists of repair to a drain already under by-law, the engineer cannot vary the proportion of assessment for maintenance without express authority from the council no matter what injustice may arise from following the proportion of assessment determined by former by-laws. As a matter of fact the engineer is under no obligation to make such pro rata assessment. He need only determine the total cost of repairs assessable in this way and leave the distribution to the municipal clerk. The engineer must, however, make his own assessment for any work of improvement, alteration, or extension. He should call the attention of the council to any injustice arising from pro rata assessment for repairs and if

the council does not then see fit to authorize a variation of the proportion of assessment, the engineer cannot be held responsible for the injustice. It is quite common for councils who have experienced these difficulties to instruct engineers in every instance where they are sent on a work of repair and improvement to make such assessment as will do substantial justice to all parties concerned and for this purpose to vary the proportion of assessment for maintenance to such extent as the engineer considers just.

5. We submit the following questions which have been referred to the Committee:—

Question No. 1.

A and B are adjoining property owners. The water naturally runs in a hollow from A's land onto B's land. B admits that this is the natural course of the water and that it has always run that way, but claims that as it is not a legal watercourse (a channel with defined banks) that he has the right to build an embankment that will prevent the water from coming onto his land, which he has done. What steps can A take to get relief from the flooding of his land?"

Answer to Question No. 1.

B has not exceeded his legal rights in building an embankment. A can take steps under the Ditches and Watercourses Act or the Drainage Act to secure drainage for his land.

Question No. 2.

Can a county road be brought in for benefit under the Ditches and Watercourses Act? If so, what officer is the county road representative?

Answer to Question No. 2.

The Act applies to county roads as well as to others. Your Committee are of the opinion that notices in respect to any proceedings should be served upon the warden.

Question No. 3.

Can a county commence proceedings under the Ditches and Watercourses Act for the drainage of a county road? What section or sections would govern the proceeding?

Answer to Question No. 3.

The Highway Improvement Act, 1915, authorizes the engineer or road superintendent to initiate and carry out pro-

ceedings under the Ditches and Watercourses Act. We assume that this provision is intended to facilitate action on behalf of the county in respect to county roads and that in any case the warden, acting on instructions of the county council might initiate proceedings. This has been done in some instances.

Question No. 4.

Under Section 21 an appeal may be made from the engineer's award to the County Judge. Are there any exceptional circumstances under which an appeal may be made from a decision of a County Judge?

Answer to Question No. 4.

There is no appeal from the decision of the County Judge on the merits of the award. The question of jurisdiction or of validity of the proceedings may, however, be attacked in the courts. For instance if the engineer has not been properly appointed he has no jurisdiction to make an award and any award which he might assume to make would be invalid and would not be binding upon the parties to such award, even if they did not appeal to the County Judge. *Turtle vs. Euphemia* was a case decided several years ago involving this point. Again the Act requires that every ditch be continued to a sufficient outlet and the engineer has no jurisdiction to make an award unless he does, in fact, continue his work to a sufficient outlet. Mr. Justice Garrow in delivering the judgment of the Court of Appeal in the case of *McGillivray vs. Township of Lochiel*, says: "The question of proper outlet is really in the nature of a condition precedent to the authority of the engineer in the premises. If it does not exist the proposed drain cannot be made, and he has no jurisdiction, and an injunction might be obtained to restrain all proceedings under the award."

Question No. 5.

If the owner who makes the requisition has ample facilities for surface drainage, but wishes to "tile drain" his land, has the engineer power, under the Act, to lay out a drain sufficiently deep to afford a proper outlet for such tile drains?

Answer to Question No. 5.

The purpose of the Ditches and Watercourses Act is to enable land owners to drain their land for the purpose of cultivation. It is possible to remove surface water and still leave

the land unfit for cultivation for want of tile drainage. We think the engineer not only may, but that he should lay out the drain sufficiently deep to afford a proper outlet for tile drains.

Question No. 6.

An owner of land the elevation of which is about three feet above the level of a dam on a river controlled by a water power company, makes requisition for drainage under the Ditches and Watercourses Act. The engineer makes the award and carries the work as far as the level of the dam in the drowned lands. This is the only outlet available. Is it a sufficient outlet under the Act?

Answer to Question No. 6.

We are of the opinion that the outlet as described is sufficient. There is no definition in this Act such as there is in the Drainage Act as to what constitutes a sufficient outlet. In cases similar to this arising under the Drainage Act the outlet has been held by the Referee to be sufficient.

Question No. 7.

The work laid out under a Ditches and Watercourses Award crosses a railway. Should the engineer provide in his award for the expenses of securing the approval of the Board of Railway Commissioners?

Answer to Question No. 7.

Such cost should be provided for and as it is part of the increased cost of the ditch due to the construction and operation of the railway it may be charged against the railway company. If the company secures the approval of the Board or constructs the work across the railway, without such approval this cost should not be levied.

All of which is respectfully submitted.

GEORGE A. McCUBBIN,
Chairman.

DISCUSSION.

The President—Perhaps as Mr. Henderson is present, he would like to say something, or some members might wish to ask him questions in reference to some of the answers made by the committee on these questions.

Mr. Henderson—Mr. Chairman and gentlemen, just about a year ago now it was my good fortune to happen accidentally to be in Toronto, and to-day again it happens by reason of the fact that I happen to have a case before the Appellate Division and I happen to be here again, and it is a great privilege to me to be able to come, but I would like to come and listen to your discussion. I don't think you want me to make a speech. If I may be allowed to take an active part in your discussions I will esteem it a privilege. Mr. McCubbin used the word "heckle." It is a very good thing. I am a believer in heckling, and if I can't take care of myself, it will be my own fault, so that if anyone wants to ask any questions, no matter what it is, or if there is anything I can do, I will be very glad to help out in this discussion. Let me say what I said a year ago, if I remember rightly, I believe it to be in the public interest to cut down litigation as far as possible. It is unquestionably in my interest. The less work I have to do the better for myself. But there is something above and beyond all that. I believe that any professional man who takes care of the public eventually takes care of himself, and the better a drainage engineer understands the legal principles of the Drainage Act the better he is going to do his work and the less litigation there will be. Now, if there is anything I can do in taking part in your discussion, I would like to do it. Mr. McCubbin was good enough to send me in advance a copy of his committee's report, and I don't want to throw bouquets at Mr. McCubbin or his committee, but I consider it an admirable report. There is only one feature of it with which I am not entirely in accord. The committee inferentially recommends that the oath which the Municipal Drainage Act requires should be dispensed with in the case of Ontario Land Surveyors. I can't agree with that for this reason. My practice is, and I make no bones about any little idea in the back of my head, because I think the public are entitled to know it—my practice is that the engineer who is in charge of a drainage work, who takes his oath to use the best of his skill, judgment, and ability in preparing a report is entitled to the benefit of every reasonable doubt when the matter comes before me. Any drainage scheme that comes before me under the charge of a qualified member of your profession, Mr. Chairman, is presumably good,

and my experience of your profession is that that presumption is a pretty decent one. There is a big difference between the man who does his work with a thorough understanding of the responsibility that goes with it and the man who comes in, probably inadequately remunerated, to criticize that work. I don't say that it doesn't follow—take Mr. McCubbin, for instance, since he happens to be the preparer of this report—he knows from sad experience he gets very different treatment from me when he is in charge of a report and when he is criticizing a report. When he is in charge of a report, I know McCubbin is all right, I know he has done his work decently and intelligently, and presumably it is all right, but when he comes to criticize McGeorge's report or someone else's report, I know that the strong probability is he has been underpaid; he hasn't had a fair chance, and in that case he has got to show me that McGeorge is wrong before I think McGeorge is wrong. You see the point in that; it is worth while, and it is also worth while in this sense, the engineer goes into the country, the farmer wants to know why this fellow is coming here with supposed book learning and riding roughshod over him; that is only too common. Now, if he realizes the engineer is a judicial officer under the Act, who has taken on oath of office for that particular scheme, the engineer's position is very much more dignified than if he is simply an employe of the municipal corporation for the purpose of laying out that scheme. I want the engineer to be the judge, not simply a hired workman for the municipal corporation, and the farmer should know that, and if you start with the sanctity of an oath taken for that particular piece of work it seems to me that you dignify the position of the engineer, and I take it that the proponent of that suggestion that in some way the Ontario Land Surveyor ought to be above the necessity of taking an oath—to my mind, it is quite the other way about. It adds to the honor and dignity of his profession that he take the oath for the purpose of undertaking that piece of work; and there is also this—I want to be perfectly frank with you—engineers are not all perfect, and we do meet with cases where the engineer has not shown the very best confidence, and I think it is desirable that every man undertaking a piece of work under the Municipal Drainage Law, as they are usually important pieces of work, should realize the importance of what he is doing before he enters into it.

Now, Mr. Chairman, I hope there will be a discussion of this report, and I want to get the practical atmosphere of your part of the work into my poor old head as well as I can. (Applause.)

Mr. McCubbin—In regard to the oath of office, Mr. Chairman, I would say that since drafting that clause of the report I have had the privilege of learning the views which the referee has expressed here before this meeting, and while there is no specific recommendation looking towards action of any kind in the report of the committee, it is simply put before this Association for discussion, and I may say I am quite in accord with the views which the referee has just expressed. That is perhaps only one of the minor matters of the report, and there are other subjects perhaps of much greater importance to the profession as a whole.

Mr. Ross—Mr. Chairman, I think we are under a good deal of obligation to Mr. McCubbin for his splendid report. He has gone into the matter very fully, and he has stated the thing so clearly that it seems to me we must give way to him. There is very little room for discussion, as the report was read clause by clause, and even then I think we couldn't find much fault with anything he has stated. He has put down everything very clearly and concisely. Of course, with regard to the point as to whether a surveyor should take an oath of office, that is merely a minor point. It would be as well probably to allow the matter to stand as it is at present. In everything else I must say I agree with Mr. McCubbin so fully that I don't think there is any room for discussion.

Mr. Gaviller—I have great pleasure in seconding the resolution by Mr. Ross that the report be adopted. I also quite agree with his remarks. Of course, as to the separate oath required by the Ontario Land Surveyor in taking up a piece of municipal work under drainage, I think we will all agree with the suggestion of the referee, and that is that it is putting him in a position which is considered by the ordinary land owner as a far higher position than that of the ordinary land surveyor, and I think we will all agree with that when looked upon in that light, although the question has been several times mentioned that a land surveyor's statement is enough without taking his oath on every job for the municipality, especially when he acts under that Act several times for the same municipality, but it undoubtedly gives an impression that no other process would. Farmers I know from my own observation are beginning to notice that because they go among themselves and they say, there is the township engineer and what he says. Well, I expect you will find it will have to go. They look upon him as a sort of judge, and as far as my own case is concerned I have been very fortunate. We have come before the County Judges, and they have both fortunately

come from counties where they became acquainted with these drainage cases during their practice while they were studying up the law, and as far as I am concerned I have nothing to complain of in their judgments whatever. Another point referred to in the report is as to mentioning the acreage. I quite agree with the committee's answer to that question. The answer was that it was not considered necessary, and I certainly think so, because undoubtedly if a man does complain about anything in a municipal drainage case it is, "Oh, I have only two acres affected, and another man has twenty-five," and they will raise all sorts of objections to that report on that basis, and if it is mentioned in the Act as being a necessity to mention it, which we very carefully avoid doing, we will only be in for more litigation; that is the way I look at it. I think when the Act says the assessment can be put on the whole of the 100 acres, suppose there are only four or five affected, it is a very good provision indeed. It does not particularize, because we all know who are acquainted with these cases, that there have been more fights over what is called flooded lands and what is not flooded lands, and the size of a millpond, and those questions have been brought up and have probably caused a lot of difficulty. I have pleasure in seconding the adoption of the report.

Mr. C. A. Jones—I would like if Mr. McCubbin would just mention those questions again and see if there is any discussion on any one of those subjects. Just mention the heading.

Mr. McCubbin—I shall be pleased to do that, and I may say my reason for not pausing for discussion on each of these questions as they arose was the fear we might never get to the end of them, but just now I shall be very glad to mention them.

The first question was in regard to surface water running from the land of one owner to another, and as to whether the lower man has a right to dam against surface water.

Mr. Henderson—I think you are right. When you report that he has you are right practically. It is practically a case which I had over at Dunnville, Steinman and Sturgy, and it went to the Appellate Division, and if I am right and the Appellate Division was right in upholding me, you are right.

As to this question of acreage, I would like to discuss that for this reason. Here a year ago we had that meeting in the County of Kent that your report refers to, and as a result of that meeting I recommended certain changes in the law, which

were directed to be brought before the Legislature, but you know the difference between a special Act and what they call the Statute Law Amendment Act. There is one clerk of private bills and one clerk of public bills in the Legislature, and between the two of them these things got pigeonholed and were overlooked, and the Legislature closed its session without passing those amendments. It is a mere accident. Now the intention is that they should be passed at the session of the Legislature shortly to be convened, and my recollection is that as a result of that discussion we recommended requiring the approximate number of acres to be given. The reason of that was this, sir, that the difficulty that you speak of arises. A farmer comes up and he says, "I am assessed so much, \$50 for 100 acres, and my neighbor is assessed \$25 only for 100 acres." He thinks that the whole 100 acres are affected, whereas the actual fact is in one case perhaps 25 acres only is affected, and in the other case perhaps only ten acres. The number of acres does not govern anyhow; it is a question of benefit or outlet or injuring liability, as the case may be. Now, it is wrong, it would be a very wrong thing to say the engineer must give the accurate number of acres, because that would entail an expense of surveying out of proportion altogether, but an engineer coming on the ground can tell with his eye approximately the number of acres that are intended to be assessed, and that is the conclusion we came to, and I thought the fairest way of meeting that difficulty was to give the approximate number of acres, the understanding, of course, being that will always be liberally interpreted, but that the man should understand he has approximately 25 acres for his \$25 assessment, and his neighbor has approximately 50 acres for his \$50 assessment, and I thought, and still think, the use of that word "approximate" will get over the engineer's difficulty, and at the same time help out the difficulties that come before the Court of Revision, because, while I have nothing to do with the Court of Revision, I am told the great difficulty is that many Courts of Revision can't understand why the report should say 100 acres when it only means five. I thought the use of the word "approximate" would enable the engineer to give really what is an approximation of the number of acres and nothing more.

Mr. Gaviller—In that light there is certainly not the confusion in the owner's mind in mentioning the number of acres in his lot that is liable for assessment. An engineer can make a very good approximation by looking at it without running a transit. That is where the confusion comes in, and if using

the word "approximate" would avoid that, I certainly think it would be a benefit.

Mr. Ross—I think this question of acreage is also a minor one. I know sometimes I put down the acre and generally have a talk with the owner, and we can generally agree as to the number of acres, and most farmers understand that it is for a certain part and not for the whole. I think it is quite immaterial whether you put down the whole area or just the area that is drained. It is a question that could be argued in a good many different ways.

Mr. C. A. Jones—Before the discussion on that closes, at that meeting for the discussion of different subjects in Chatham I advocated instead of giving the approximate number of acres in each farm to show it by means of an approximate watershed on the plan. That would help the municipal council who are not familiar with the locality in judging whether that much was drained or not, and let them compare it with the rest of the acreage on the plan. My opinion was that that would be a better method to insist upon the watershed always being shown upon the plan.

Mr. McCubbin—Since this matter has come up for discussion, I would be very glad to state as clearly as possible the objections that I have to this proposed amendment, and I speak not only for myself but for the Drainage Committee. As soon as this matter was broached I got into touch with all the members of the committee by correspondence; in fact, a good deal of the committee work has been done throughout the year in this way. Now the first objection I have to it is this, that the average farmer, and probably the average municipal man, looks on his assessment as so much per acre. You get a lawyer, excepting the Drainage Referee himself, but the average lawyer who comes into court to criticize an assessment, and he gets an engineer in the box to cross-examine him, and he will say, "You have assessed this man \$50?" "Yes." "For five acres?" "Yes." "That is \$10 per acre?" "No, it is not \$10 per acre; it is simply \$50." The lawyer will go on and try to show that you have assessed one man \$5 per acre and another man \$10 and another \$1 per acre, and he has the idea, and tries to get others to see it in the same way, that the whole thing is a per acre assessment. It is not. There is not any case at all of benefit which is an acreage assessment.

Now, again, if you put in the schedule of assessment that John Smith is being assessed for 25 acres, he may have his

farm laid off in fields, and he would say, "I have only 23 or 22 acres." If you show on your plan a watershed that divides his farm practically in two, and he knows from looking at the plan he is assessed for about half his property, he is quite content, but if you put it in figures, 25 acres, and he knows or believes there is only 23, he is dissatisfied to the extent of two acres, and thinks his assessment is just that much out, and it should be reduced in proportion to the acreage. Then there are lands which are dissimilarly situated and lands similarly situated which in themselves are dissimilar, which must receive separate treatment. The only case where acreage is even an important factor in assessment is a case of outlet or injuring liability. Take injuring liability, you get two adjoining lots and you assess one \$24 and the other \$36. There is no reason for that distinction in assessment excepting that one of them is draining more land into the scheme than the other. But if you put down 48 acres at 50 cents an acre in one case and 72 acres at 50 cents an acre in the other case and show right through the schedule of assessment, say, for injuring or outlet liability, your assessment is so much per acre, you are running right foul of the decisions of the courts, which say assessment for injuring liability particularly and presumably outlet liability shall not be at a uniform rate per acre. Your excuse is of course these lands are similar lands and similarly situated, and the assessment cannot be anything else; but this schedule of assessment tends to convict you, you have made a per acre assessment, and I may say that while the present referee isn't going to soak you for that, you don't know what somebody else might do.

Then there are some cases where it is practically impossible to say, even within five or ten acres, how many acres are affected by a drainage scheme. Say you get into very flat land and you have a drainage work coming up to a certain point, and this land is all flat, perhaps it is bush land, you don't know and you can't find out from the owner, whether this man after clearing that bush and constructing a drain is going to drain five, ten, fifteen or twenty acres into that ditch; you simply know the outlet is there. Are you going to limit him to so many acres? There is no such thing as a watershed there; the watershed will be just wherever the tributary drains happen to be after they are constructed.

Again, you are constructing a cutoff drain. For instance, you have water courses or swales along here to take care of that water. Here are lots over here which are affected by the scheme. You know that this swale will come angling across

this lot and run off here somewhere, and this one go on down there, and the assessment for cutoff might not be very much on these lots. If you have to show how many acres of those lots are affected by cutoff there is practically nothing to it but follow down to the ultimate outlet every one of those swales.

Mr. Henderson—The answer to both of your difficulties is that you must do it to comply with the law. You must know whether you find it out from the owner or how you find it out; you can't make your assessment until you do know.

Mr. McCubbin—You know approximately, say, the course of the swale, but you are not so much concerned about the number of acres that actually come into that swale.

Mr. Henderson—Unless you know the nature, extent and character of the land, you can't assess it.

Mr. McCubbin—The assessment would be for cutting off the run through the swale.

Mr. Henderson—I don't care which it is, you must know the property before you assess it; at least, you must be able to say you know it anyway.

Mr. Ross—That is the only way to avoid trouble.

Mr. McCubbin—Then there are some cases again where you assess land which is not actually benefitted by a scheme or not directly benefitted by it at all. I may be astray in regard to this, but if I am I would like to be corrected. For instance, a number of owners join in together by petition to construct a drain scheme, and they construct a small scheme which proves sufficient for some of the owners but not sufficient for others. Now, there are a number of co-adventurers who have gone in together to get a drainage scheme. Some of them have got what they want and they have paid a little bit, and they are satisfied to quit. The other fellows that are partners feel they have got something that is not very much good to them, and it is necessary to go on and improve the scheme. Perhaps the improvement does not affect an acre of some of the land assessed in the original scheme, which we think should be assessed with the improvement or the completion of the scheme. I think those are about the points as they have suggested themselves to me in connection with the subject.

Mr. Jackson—In connection with the matter, I was also on the committee that handled that question, and I must say

that I agreed entirely with what Mr. McCubbin thought on the matter, and largely for this reason, that while I had not the slightest doubt about having the law liberally interpreted, when it comes to the referee's court, I do know from bitter experience that is not the interpretation of the law in the Court of Revision, or often enough in the County Judge's Court, in which two courts a great many of these cases would come up. The tendency among farmers in the Court of Revision is that they do not thoroughly understand the method, and their tendency is also to take a certain sum of money and divide it by a certain number of acres, and I have felt by showing even approximately the number of acres drained we were simply opening another channel for dispute. I have always found it is the proper thing and helps to simplify matters to show the drainage area, which is complying with that section, by showing approximately the number of acres drained; but putting it down in figures is more or less hard and fast, and would be considered so by the Court of Revision and County Judge, and that the amount of the assessment will be upheld or condemned very largely on the figures he has actually put down, whether they are approximate or not. The definition of the word "approximate," I have no doubt, would be very liberally interpreted by the referee, but it has been my experience that it is not so in the case of the Court of Revision or Court of Appeal.

Mr. Henderson—This is the result of a very urgent demand by the municipal representatives. They are very anxious to have it, and they want the exact number of acres to be stated.

Mr. Ross—I think it wise for the engineer to be able to tell how many acres he is providing for in the drainage of a certain farm. He can't justify the assessment otherwise. That is, where a large area of different farms is similarly situated you must know the acreage approximately. The engineer and owner by conference and by walking over the ground will come to some agreement, and unless the engineer does this he is looking for trouble.

Mr. McCubbin—The next question was with reference to bringing in county roads under the Ditches and Watercourses Act. Questions 2 and 3 refer to that.

Mr. Jones—I had one case where the county made application, or at least the Warden made the application and there was no appeal, and it went through all right. Whether he was correct or not I don't know, but I took it for granted I couldn't

get anybody else better than the Warden, and he was present at the meeting.

Mr. Gaviller—I had an experience of the same kind, in which the application was made by the County Council, and there was a by-law on the minutes appointing me as representative of the County Council to carry out the cases under the Ditches and Watercourses Act. I got an opinion on that, and the consequence was that it ran for a good many years, and I never took the affidavit to do any job for that County Council. Then a case did crop up in which I got direct instruction from the County Council to undertake a rather large drainage scheme which affected three municipalities and was a town line. I had my misgivings as to undertaking the work, but two lawyers and the Mayor of the town, who was a lawyer, was connected with it and sundry others, so I began it, and after examining the ground and taking a lot of evidence, which I informed them afterwards was not waste of time, their by-law was found to be no good, and the way they got out of the trouble was I happened to be township engineer for the municipalities that were affected, all except one, and they threw aside all the first proceedings and got a land owner in one of the townships for which I was township engineer to make the application, and we began the whole thing over and carried it through, and it is now at work under the Ditches and Watercourses Act. But that is a debated question whether the County Council has any authority to appoint an engineer to undertake ditches and watercourses work for the County Council.

Mr. Jones—In my case the township undertook the proceedings through which the road went, but it was the Warden that made application, the same as a private owner.

Mr. Ross—Mr. President, as I understand it, a Warden of a County Council requiring a drain would file an application with the township clerk of the township in which the drainage work was situated. I had a case myself, and that is the way it was done. I carried it through.

Mr. Jackson—I don't think it was intended for the County Council to appoint an engineer under the provisions of the Ditches and Watercourses Act at all, but that the Warden would act within the meaning of the word owner, and the engineer for the municipality in which the proceedings were initiated would act as engineer of that drain.

Mr. Gaviller—That is the way my case was carried out.

Mr. McCubbin—The next question is whether or not there are any exceptional circumstances under which an appeal may be made from a decision of the County Judge in reference to a decision under the Ditches and Watercourses Act, and the next was whether or not the engineer should lay out a ditch deep enough for tile drains provided an owner already has sufficient drainage to get rid of the surface water.

Mr. Henderson—Speaking from my recollection, I think the answer is absolutely proper. Any drain should be efficient, and if it cannot be efficient without tile drainage you should provide for tile drainage unquestionably.

Mr. McCubbin—The next question is one of considerable interest to every drainage engineer, as to whether this outlet as described is a sufficient outlet being carried to the level of lands which are submerged by back flow from a river.

Mr. Henderson—I had a case down not very far from Cornwall within the last twelve months. It was a question of whether the engineer had carried it far enough. I found that by going perhaps less than half a mile further down you came to a millpond above an old mill, where, if I recollect right, the miller said he was in the habit of running his mill by water-power for two or three weeks in the spring and two or three weeks again in the fall, and then by steam during the rest of the year. Obviously, an increased flow of water was going to benefit him, could do him no harm, and therefore it was a wise thing to utilize that millpond as an outlet, the point being that the proper outlet is the point at which the discharge of the water will do no damage, it could only do him good. There was no question of submerging the land there by additional water. It appeared to me that was a parallel case. In that case my suggestion was acted upon, and the litigation came to an end in that way, and I confirmed an amended report. But that is the point there. Ordinarily speaking, I should judge it would be a rare case where a discharge of water into a mill dam would do other than benefit the mill, and unless you are going to submerge somebody you certainly have a proper outlet.

Mr. McCubbin—My idea of the tendency of the decisions under the Drainage Act is this: In the case of Taft Creek entering MacGregor Creek, the sufficiency of the outlet was objected to there. The drainage area of Taft Creek was three or four thousand acres, say. It discharged into MacGregor Creek, which has a drainage area of fifty or sixty thousand acres.

The flats of MacGregor Creek always had been subject to flooding. The improvement of Taft Creek would add slightly to the flooding of the flats of MacGregor Creek, but the difference wouldn't amount to very much, and it was hardly considered feasible or fair that a small drainage area like the Taft Creek should be the means of forcing an improvement of the whole of MacGregor Creek. Again, in the case of Colchester North vs. Anderdon, I think the tenor of the judgment there was that while the one hundred and some odd municipal drains which emptied their water into Canard River collectively had not a sufficient outlet, still there was no reason for holding up any one of those many smaller schemes which discharged their waters into the Canard River, and if any one of those tributary drains had been dealt with by itself and objection to it on the ground there was not sufficient outlet, probably any such ground for attack on the smaller scheme would be insufficient, but the remedy was to be applied when the conditions became serious owing to the action of all these drains, and when the owners of the flats, any one of them individually or all of them collectively, sought to take action against the township to initiate the larger scheme which would provide an outlet for all of them; and if I am correct in saying that that is the tenor or trend of the decisions under the Drainage Act, it would help in that sense very much under the Ditches and Watercourses Act if they could apply the same reasoning there and say a little scheme should not be held up because the water from three or four hundred acres was being discharged on the flats of the Thames River or some other river.

Mr. Henderson—May I speak confidentially to this gathering? I don't want to be taken technically. Has it ever occurred to the majority of those present that the conditions in the western peninsula of Ontario served by the Thames River and the easterly peninsula served by the Nation River, are very much alike? Each of those streams covers an enormous stretch of country, winding in and out, with occasional very high banks and occasional very low banks. Take the Nation River. The watershed there is the peninsula, the triangle bounded by Rideau and Cataraqui at its base and the St. Lawrence at one side, and the Ottawa River on the other side. The watershed of the St. Lawrence, the Ottawa, the Rideau and Cataraqui is almost nil, very, very shallow indeed, and that unfortunate Nation River has to bear the burden of the whole drainage of Eastern Ontario, and it is an enormous burden. Now there are hundreds of places along the Nation River where if you are going to apply technically the decisions of the courts,

you would necessarily say that the outlet was not sufficient, that is, there is water being brought down more and more every year, and those lands are suffering more and more every year, but if you do apply those decisions technically and say that the Nation River is not a sufficient outlet, you block the cultivation of Eastern Ontario. So to a somewhat less extent a very tremendous portion of the very best part of the Province of Ontario on the west. You have got to use common-sense, that is all there is to it. I have to skate on thin ice over and over again; I am telling you that confidentially, but I have got to use what I think at least is common horse sense, and the engineer has got to do the same. Mr. McCubbin has put it in a very fair way. Here is a little scheme coming in under the Ditches and Watercourses Act. Of course you are going to increase the burden of some lowlying land, but it would be a very wrong thing for you to put those farmers to the expense of a large scheme under Municipal Drainage Act. Take care of it in a common-sense way for the present, and later on when the ditches and watercourses schemes accumulate to such an extent that the volume is larger—and you know the situation that you have at Canard River—then you have to pick it up under the Municipal Drainage Act and clean it up. You have got to use sense. I am not talking technical law, I am talking sense, and that is what you have got to do, and that is what I have got to try to do when this question of outlet comes up, but I don't mind telling you confidentially it is the most bothersome question I have to deal with, and all I can do is try and be decent with it and act in the best interests of the public. Now, if anybody wants to heckle on that, you can heckle, but I appreciate my position.

Mr. Mackay—In a case like this, suppose there are three or four owners squabbling amongst themselves over a little ditch probably four or five hundred feet long that is at the upper stretch of a ditch that is probably two miles long, you would have to go the full two miles to get sufficient outlet, and yet, as far as the three or four owners are concerned, if the little four or five hundred feet is cleaned out and the cost proportioned amongst them, that would settle the question. The question is, would you have to continue it the full two miles or not?

Mr. Henderson—Technically, those owners if they are outside of the Municipal Drainage Act, have no right to drain in, and on appeal under the Ditches and Watercourses Act the County Judge might so say block your scheme, but if he has got the kind of sense I think he ought to have, he would say,

now, let that go on on the understanding that the next time the township is repairing that drainage scheme it will give its engineer a mandate to bring those men in, and the engineer will take into account that they have had two or three years' free drainage. Some of these days, if the County Judge don't fall into line a little more, there is going to be a right of appeal from the County Judge, but we don't want that if we can get away from it. But that is what I would suggest as the decent day of dealing with that. Let those men drain into your municipal drainage scheme for the time being on the understanding that the next time the municipal drain is being cleaned out the engineer will have a mandate to vary the assessments and bring them in.

Mr. Mackay—The point is this, simply that the ordinary farm watercourse and the improvement as far as these four owners are concerned, wouldn't cost more than \$50, whereas, is you had to carry it through the full two miles, it might run up into thousands of dollars.

Mr. Henderson—If I were an engineer I would take the responsibility of putting it in and let the County Judge take the rest of the responsibility.

Mr. McCubbin—The other question that was dealt with by the committee was referring to the cost of securing the permission of the Board of Railway Commissioners, and that is the last one that was dealt with by the committee.

Mr. C. A. Jones—I would like to ask this: There is a petition sent in to the Council for a drainage scheme, describing the area, and the man immediately above the drainage scheme has artificial drains in, coming within ten, twelve or twenty rods of the line, running out and spreading over before it reaches the line. Would the engineer have any power to extend the drain up above this ten or fifteen rods, above the limit of the area described—extending it upstream in order to catch the water from these artificial drains, or would it lie with the lower man to bring an action to compel this man to continue that fifteen or twenty rods himself?

Mr. Henderson—You are assessed for injuring liability over that swale. Couldn't you do it by a cutoff drain?

Mr. Jones—The only trouble would be to get the water into the tile at once, just at one opening.

Mr. Henderson—With a proper assessment for injuring

liability, you could get him to join in the petition to enter your drain.

Mr. McCubbin—You could get him in another way, by putting a little embankment across there, as the lower owner would have a right to do.

REPORT OF COMMITTEE ON ENGINEERING.

Mr. President:—

The Committee on Engineering beg leave to report as follows:—

During the past year, due to the war and the consequent business upheaval, the engineering profession in Canada has suffered a period of untoward depression. Municipal and railway work is practically at a standstill; Government work alone is at present under way.

As we have heard in the Presidential address, extensive improvements are under way to the harbors at Vancouver, Halifax, St. John, and Port Nelson.

Expectation is had that the Hudson Bay Railway will be completed this coming season from the Pas to Hudson Bay. Closure of the steel work of the Quebec bridge is also promised before the year is out.

The Welland Ship Canal is making substantial progress towards completion.

The great engineering plants of the Dominion are almost entirely engrossed in the making of war munitions.

This past year has seen passenger train service instituted over both the Transcontinental and the Canadian Northern from Toronto to the Pacific Coast.

Certain engineering organizations peculiarly Canadian are doing valuable work for the cause of the Allies at the front, to make no mention of the profession in the Royal Engineers. The Canadian Overseas Railway Construction Corps—one of the Colonial frills at first not looked on with sympathy from the British War Office—has won great praise for itself by its resourcefulness and efficiency at its specialized work. Two pioneer battalions, officered entirely by qualified engineers, are now overseas, with at least two more in process of formation in Canada.

In the report of your Committee a year ago, an endeavor was made to obtain some reasonable idea of the importance of the O. L. S. in the open field of engineering. In following up this idea a comparison has been made of the membership list of this association with that of the Canadian Society of Civil Engineers, the typical engineering society of Canada.

Of the 266 active members of the Association,

23 are members in the Canadian Society
48 are Associate Members
2 are Junior Members
2 are Student Members

A total of 75, or 28 per cent. of the active membership of this association.

Of the 104 members registered as O. L. S., and since withdrawn from practice,

24 are members of the Canadian Society
12 are Associate Members

A total of 36, or 35 per cent. of the members so registered and withdrawn.

That is to say, exactly 30 per cent. of the Association are enrolled with this Engineering Society. There can be little question but that at least an equal number of surveyors are engaged in engineering practice without being members of the Canadian Society.

Your Committee deem it within their province to remark upon this fact to this end, that as the general O. L. S. practitioner becomes more financially interested in engineering construction he is liable to become less jealous of encroachments of those outside the pale into the strict field of land surveying. Remark is made upon the fact that right-of-way plans and deed plans, therefor, can now be certified to by the chief engineer of the railway or power line, and similar cases of late legislation exist which as seriously affect the privileges of this society.

Respectfully submitted,

NORMAN D. WILSON,
Chairman.

REPORT OF COMMITTEE ON TOPOGRAPHICAL SURVEY.

Owing to the great war in which our country is engaged, there has been a considerable falling off or diminution in the work of topographical surveying as carried on by the several departments of Government, under which such work has been conducted.

The survey staff connected with the Department of Militia was called in at once when war had been declared to take up other and more important duties. In other branches which undertake this class of surveys there has been a retrenchment in the way of appropriations for this work, so that nothing new in that line is likely to be undertaken until conditions are more favorable.

The Topographical Surveys Branch of the Department of the Interior for some years past has added a levelling party to its base line and standard meridian survey parties, and, in addition to the ordinary maps, profile maps are prepared, which show the relative elevations of points along the lines. This data will be available for control in future when topographic maps in those districts are required. Five thousand three hundred miles of levels had been taken along these lines to the end of the year 1914.

Under the same department topographic surveys have been made in some of the parks in the North-West, also the Forest Reservation on the eastern slope of the Rocky Mountains is being surveyed at the present time.

This work was undertaken at the request of the Director of Forestry, and when completed is expected to be of great benefit not only in the interests of forestry, but to the numerous holders of mineral, oil, timber, and coal claims.

In addition to the levels along base lines, the surveyor in charge is required to make a careful determination of the volume of all streams crossed by his lines, with a view to ascertaining their value as a source of power and irrigation.

Along the international boundary west of the Great Lakes careful surveys have been made under the direction of the International Waterways Commission and the Commission of Conservation to determine the value of such water areas as the Lake of the Woods, Rainy Lake, etc., as sources of power and as an asset belonging to the two countries.

The Precise Levelling parties connected with the Geodetic Survey of Canada during the season 1915 completed 1,805 miles of precise levels. Previous to last year, 6,601 miles had been finished, and there have been established 2,370 permanent geodetic bench marks. A description of these bench marks appeared in a former report.

There were a few observing and reconnaissance parties employed on the Geodetic Surveys during the past season. Work was done in New Brunswick, the western peninsula of Southern Ontario, and west of Lake Superior along the international boundary. This latter will be used to control the maps of that part of the boundary, which is being surveyed and permanently marked by a party of engineers in charge of Mr. James McArthur, D.L.S.

At my request, Mr. Douglas H. Nelles, D.L.S., Min. Can. Soc. C. E., prepared a paper entitled "Standardizing the Scales and Numbering of Maps." Mr. Nelles has given this subject a great deal of study, and I have much pleasure in presenting his paper as a valuable addition to our report.

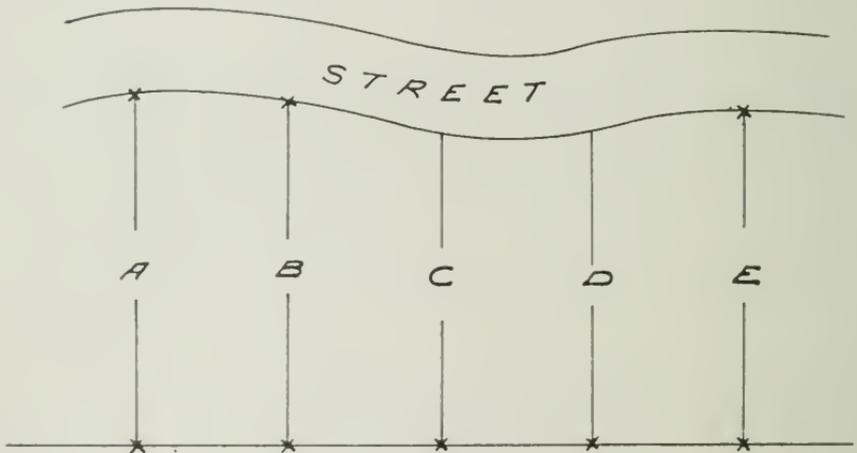
THOMAS FAWCETT,
Chairman.

REPORT OF COMMITTEE ON LAND SURVEYING

The following questions which were submitted to your Committee on Land Surveying for an opinion have been considered, and the following answers have been approved of by your Committee:

Question 1.

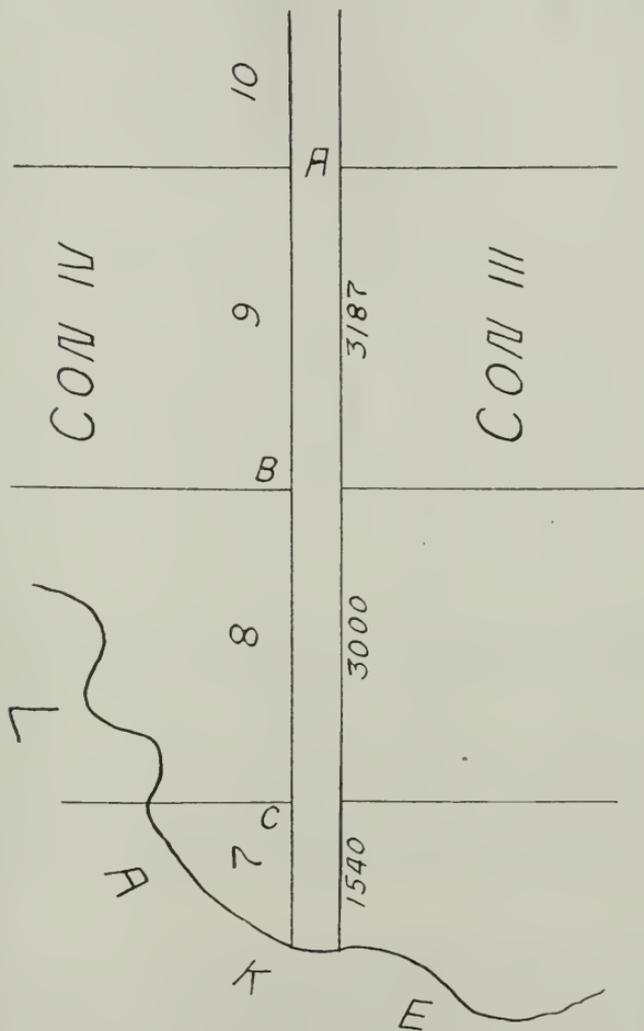
—DIAGRAM.—



The street line is irregular and can only be determined by measuring out from the rear of the Lots. Original stakes found where shown. There is a steep rise from rear to front of Lots. Lines A, B & E are from 2 to 3 feet short of plan measurement. Would it be correct to allow a similar shortage for lines C & D.?

Answer—Width of street not definite, allow similar shortage in lots C and D. While this is not provided for in the Act it seems to be the better thing to be done.

Question 2.



There is an original post at A, but none between that and the lake, which is the south boundary of the township. By reason of dams built for the Trent Canal, the water had been raised two feet above its normal level when the township was surveyed and every year a portion of the shore is being washed away. The water has now encroached a considerable distance inland. The width of every lot is laid down on the original plan. It has been my practice to assign to lots 8 and 9 the width shown on the plan leaving lot 7 to bear the loss inflicted by the water. Was this correct?

Answer—If no evidence obtainable lay off net distances and give to the last lot what is left.

(2) If no line had been run in Concession iii. in this block, how should the side line between Lots 8 and 9 be run?

Answer—Line between lots 8 and 9 in concession 3 should be run on bearing of front of block according to the exception, in last clause of Section 27, Survey Act.

Question 4.

Is it desirable that a standard of accuracy should be established by Statute—

A—For Government surveys?

B—For farm surveys?

C—For subdivision and city and town surveys?

Answer—No.

Question 5.

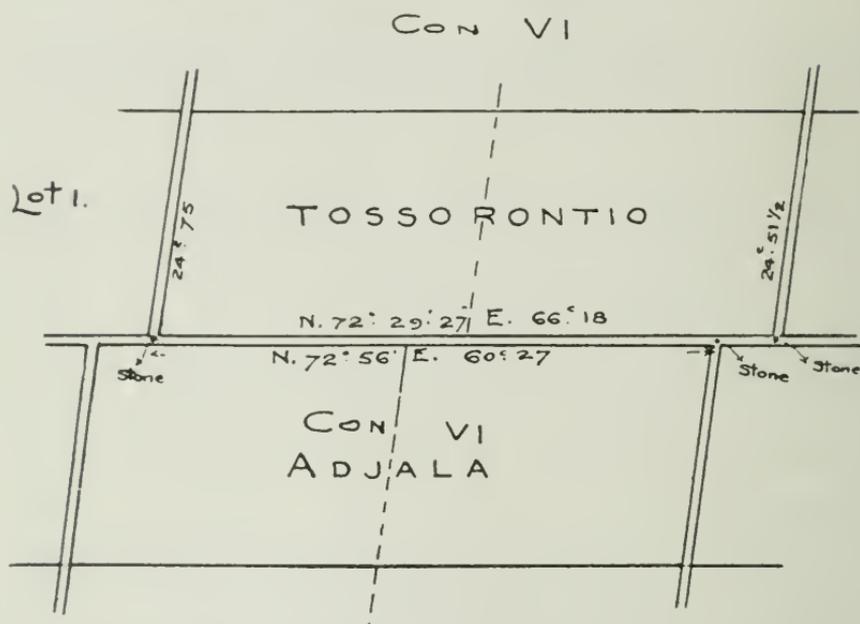
After a governing line has been fixed by a municipal survey, does it necessarily follow that it fixes the courses of the lines to be run parallel to the original line?

The north boundary of the Township of Adjala was surveyed in 1820. In 1822 the south boundary of Tossorontio, immediately to the north, was laid down. But Hugh Black in laying it down did not recover the original boundary of Adjala, but cut out his own lines, and thereby included portions of Adjala Township.

In 1855 John Ryan in a municipal survey re-posted the north boundary of Adjala and re-measured the fronts of lots 1 in Tossorontio. In his report Mr. Ryan suggests: "That on the north side of his line side lines should be run parallel to that portion of the established line which bounds the corresponding concession on the south side, otherwise," he thinks, "each side line would be run crooked."

However this may be, my question was whether the municipal survey fixed the course of the side lines in this instance at all. From the information given by Ryan, the original line, as run for the S. By. of Tp. of Tossorontio, can be approximately recovered.

EXAMPLE FROM RYAN'S REPORT.



The bearing across Tossorontio concessions is "that of a straight line between each nearest two of the stone monuments as planted at the commencement of each of the said concession lines.

Answer—If original line can be recovered it should be used as governing line.

Respectfully submitted.

E. T. WILKIE,
Chairman pro tem.

DISCUSSION

Re Question No. 1.

The President—I understand that is in the city here, and this street in front is of an unknown width, indefinite; the whole surface of the place, the whole condition, has changed, and any marks that were there at the time the original survey was made are practically lost and can't be obtained now, and it is a question of re-establishing the street. Not only is that a fact, but I think, as I understand it, the street is widened and takes a piece of the lot. It is a curve, and the lengths of all these lots are shown on the plan. Several members of the committee have not been present at all, and have not seen this, but a few of us got together yesterday and decided probably the best answer we could give to that would be, as the width of the street is not definite, allow the same shortage in lots C and D. While this is not in accordance with the Act, it seems to be the best thing to be done.

Mr. McMeekin—How about the other side of the street?

The President—There is no other side of the street.

Mr. Gaviller—You say “not in accordance with the Act.” That would seem contradictory. It is not provided for in the Act.

The President—Perhaps that is the better word.

Mr. Gaviller—That might seem a contradiction of the Act, and we would have the lawyers firing at us.

Mr. S. B. Code—Why not make the measurements given on the plan?

The President—Where you have stakes standing and can get actual measurements between them, as shown on the other three lots, they do not correspond with the plan. If you undertake to make the distances on these lines where the stakes are missing, the distances given according to the plan, you are going to encroach on the street.

Mr. Jackson—Do you think that is a decision that would be upheld in the courts?

The President—I wouldn't like to say that.

Mr. Jackson—I would be inclined to follow the Act and let the street go where it could.

The President—As this happens to be a curved street, that might not work out. If the street were straight, it would be easier to determine it, but you couldn't measure out and encroach on the street in that way; at least, I wouldn't think so.

Mr. J. van Nostrand—If it was a straight street, then the shortage would come in.

The President—Then you would get the shortage.

Mr. Ardagh—The only party likely to take it to court would be the city for encroachment on the street. So that it would be safer for the surveyor to allow a shortage and tell his client. If the client chose to have him re-stake it, let him re-stake it the full length.

Mr. J. van Nostrand—I think in this case the road is quite narrow, and they are trying to work in a fairly wide pavement. In that case, it is the city that wants as much land in the street as they can get, and it is a case of whether the owner can prove you should come up the net distance from the rear and take a part of the land the city really need and want.

The President—The more the city can get the less they will have to pay for in the expropriation.

I think, as I understand it, in the original survey this southerly side of the street was defined by simply measuring some certain distance from, as near as could be ascertained, the centre of a travelled road. That travelled road has entirely disappeared; it has been replaced by a concrete pavement of probably a different width, and it is uncertain or unknown as to whether it was in the actual position the old travelled road was in or otherwise; and the street has been re-graded in some places, filled up, and probably in some places cut down. If Mr. Le May was here he could explain it a good deal better than I can. But there is another feature comes into it that would probably play a prominent part; the city have taken this matter to the Department and asked for a municipal survey. The Department were doubtful about undertaking it, with the idea that municipal surveys did not apply to anything less than a township lot, and didn't see why it could be applied to a 50-foot city lot, but I think the Department have consented to have a municipal survey in this case, and I suppose it remains to be seen what the parties who have the in-

structions to do the work will do; but in the meantime Mr. Le May has given us this question to discuss here, and see what was generally thought on the matter.

Mr. Ransom—Doesn't it say in the Act we are to follow the method in making a re-survey used when the survey was made? It seems to me that is quite clear. I would take it the way to solve the problem would be to find out from the facts available what method was used in making the survey, and the man that made the survey in measuring those lots lines A, B and E used a method that gave short measurements, and seeing that those three cases are practically all the evidence in hand, wouldn't it naturally follow that the same method being used with C and D would give the same results, and therefore that would have to be the method we would follow in making a re-survey?

The President—The method adopted, as I understand it, in establishing that line first was by measuring from the average centre of the travelled road, which is now non-existent and cannot be found, and therefore you can't get the point he started on to do it over again. The street line at this particular place is probably 100 feet in elevation higher than the rear line. The man who made the original survey presumably made his measurements from front to rear, but he was probably not as well posted in measuring and getting accurate measurements as Mr. Ransom is, and instead of getting what it actually is on the ground, his measurements show two or three feet greater are to be found to-day when these methods are applied than by applying more modern methods of measurement.

Mr. Ransom—If he used the method that was not as you say accurate, and an accurate measurement applied to that would not be correct in this case, if a bearing line is determined by compass, the surveyor is not, according to the Act, authorized to re-determine that line with a transit; he has got to use a compass if he wants to follow the method previously adopted in the survey.

The President—Wouldn't the same thing apply all through the country? In many cases they are like this one, considerably shorter than what the field notes show, and you have got to allow the shortage; you can't give the measurements called for in the field notes. Why wouldn't the same thing apply here?

The Secretary—I don't think the Act takes into account bad measurement at all; a foot in the Act has the same mean-

ing, whether it is measured accurately or not; and in making a re-survey, following out as nearly as possible the manner in which it was originally surveyed, depends not on the measurements taken, but more on the method in which the surveyor made the survey; that is, the points he fixed in making the original survey; but where he measures and shows fifty feet of a line I think we have got to understand that means fifty feet until it is measured again. That is, the Act does not take into account a bad measurement.

Mr. Ransom—I think I understand what you mean, but just along that line, in connection with D. L. S. surveys a subdivider going out with the outlines already surveyed by a previous surveyor, the Department instructs him to measure along these outlines already laid down and to compare the general methods used by the previous surveyor in recording the measurements, and if he finds a surveyor's measurements are as a rule a little longer than the measurements shown on the plan, he is to assume they are all a little longer and govern the survey accordingly.

Mr. Fawcett—But he does that in order to make a tie in to the post?

Mr. Ransom—Yes.

Mr. Fawcett—If he finds it is twenty chains and twenty links over he makes his twenty chains and twenty links and enters them that way.

The Secretary—I don't think the Survey Act takes into account bad measurements where it stipulates as to how a line is to be established. If the width of a lot is shown to be twenty chains the method of making the re-survey would naturally follow along the lines of the measurements found on the ground and if you find a shortage across the block you divide such shortage proportionately to the given lengths, which is as good a method as can be adopted for allowing for long measurement in original survey.

Mr. James—Couldn't we say allowing those lines to be short we would be arriving at the right curves of the street and that would be one method by which we would be sure we were getting the original curves of the street, and in that way we would be recovering the original front.

The President—There are no curves shown on the original plan; there is nothing to guide you as to what the curve was intended to be, simply the measurements along the lot lines

and the street line; simply a free hand curve drawn with a pen.

Mr. McMeekin—Are the measurements along the front of the lot given?

Mr. J. van Nostrand—I believe they are shown similar to the rear measurement, the square measurement only being given. If the rear measurement is 100 feet the front measurement is shown as 100 feet; there is no slope measurement given at all and no chord measurement.

Mr. James—What I mean is this, suppose you wanted to calculate the varying of the line joining the front angles of the lots, if you calculated those from the measurements given on the plan that would be the proper angle for the bearings of those straight lines joining those fronts and that would give you the shortage. Of course that would be the only way on the plan to show you the curves of the street. One of the members, Mr. Esten, points out to me that supposing in this sketch you measured out C and D the net distance it should happen to be it would make the street a straight line, and that would be obviously wrong.

The President—There is no question of that. The curve is established. Having that two or three-foot difference in that line wouldn't be appreciable in the matter of the curve.

Mr. James—The fact of that principle being true shows you are right.

Mr. Esten—Supposing the shortage is ten feet on either of the lots, the principle would be the same whether it is six inches or ten feet.

Re Question No. 2.

The President—We thought probably as good an answer to give to that would be, if no evidence obtainable, that is, at the other line of B and C, lay off net distances, and last lot No. 7 gets difference left.

Mr. Fawcett—That wouldn't do if the water is encroaching every year.

The President—It is simply taking that much off the lot.

Mr. Fawcett—You couldn't lay off 1,540 feet.

The President—No, it would only get what is left after the water. That is, you would make Lots 9 and 8 the distance given in the field notes and Lot No. 7 would get whatever was between that post and where the water happened to be.

Mr. James—Would there be any chance of measuring the other lots and finding out whether there was a surplus or deficiency and doing something similar to what we have done in Question 1, allowing for that deficiency or surplus in the lots, whichever way it would happen to be, to the other Lot 10 and so on further over? I mean the other lots in the township, finding out how the surveyor's chaining agreed with his field notes.

The President—There is nothing stated in the question; I don't know the conditions. That might be possible. The question is, is that the right thing to do?

Mr. J. van Nostrand—In this particular case haven't they the breadth of Lots 8 and 9? I believe they are shown on the sketch. It is just a question of seven, isn't it?

The President—Yes, but Mr. James' point was assuming the surveyor's chain was not the proper length and his whole work on the concession line, and the other lots were found on the ground not the correct measurement, would it not be better to give these eight or nine a similar proportion of the surplus or shortage to what the rest of the lots had?

Mr. Pierce—Don't you think a surveyor would be apt to run into all kinds of difficulty if he tried to determine the ratio of the surplus or shortage?

The President—The chances are he would.

Re Question No. 3.

The President—(Referring to first part of question)—Those who took this up thought that the line between Lots 8 and 9 in Concession 3 should be run on the bearing of the front of the block, that is the same bearing as the line between Lot 7 and 8 was run, as it comes under the exemption mentioned in that section of the Statute. The question that was worrying us yesterday when we were considering this was an amendment that has been made to this Act two or three years ago, which I haven't got. It is only an addition of a couple of words or something, but as the revised statutes are

to-day at least we were of the opinion that was the proper method to run this line.

Mr. Pierce—Was it not considered at one time amending the Act so that if a line had been run in a certain concession in a thousand acre block prior to 1897 it would be necessary to run on the bearing of the governing line, but if there has been no line run in the other concessions of the same block was it considered running that on the astronomic bearing?

The President—I don't know what was considered; all I know is the way the Act stands at present.

Mr. Pierce—There was never any amendment?

The President—No.

Mr. Pierce—In other words all the lines would be governed by the Act of 1897?

The President—The Act uses the word "block."

Mr. Pierce—It won't refer to one concession of five lots?

The President—No, I think not.

The second part of this question is: "If no line had been run in concession 3 in this block, how should the side line between lots 8 and 9 be run?" That is practically what you were getting at there, Mr. Pierce?

Mr. Pierce—Yes. I never saw the Act changed, but I understood a couple of years ago they were considering limiting that clause just to the particular section.

The Secretary—The amendment went through some years ago to the effect where a line had already been run in any section or block previous to 1897, the balance of the lines were to be run on the same course of the governing line, but if no line had been run previous to 1897, the lines were to be run on the astronomic bearing shown on the original plan and field notes. That was the intent of the section.

The President—That was the reason for running this line in 1905 on the bearing, which has been done.

Re Question No. 4.

The President—Those of the committee who were present answer no to the whole question. Mr. Ransom, that is your favorite subject?

Mr. Ransom—When this matter was talked over by some of the surveyors some little time ago I had in mind only subdivision surveys that would come in there. The bill that was passed in 1914—I haven't got it here—section 47, subdivision surveys of farms or original farm lots in which a new street or something of that sort should be laid out. I wish Mr. Rorke would read section 47 of the new bill.

The Secretary—This is a bill to amend the Surveys Act passed in April, 1915: "The Surveys Act is amended by adding the following as section 47:

"47—Every angle in the exterior boundary of a subdivision plan of an original lot or part of an original lot or of any subdivision plan laying out a new street shall be marked by monuments and all bearings on every such plan shall be calculated from one course in the said boundary to be designated on the plan as the governing line, and the course of the said governing line shall be determined by astronomical observation or other satisfactory method, such monuments to be composed of—

"(a) Stone or reinforced concrete, four inches square at the top, eight inches square at the base, and four feet six inches in length; or (b) of iron bar one inch square and five feet long."

Mr. Ransom—That is just really all I had considered re the standardizing of measurements, was referring to subdivisions of that nature. I have written up a few pages of just what I think along the matter, and I have put it in writing so as to have it in concise form:

**RE SUBDIVISION SURVEYS—SHOULD MEASUREMENTS
BE BROUGHT UP TO A FIXED STANDARD.**

By John T. Ransom, O.L.S.

Until the coming into force of a certain Bill of 1915 a survey for a registered plan could be made, and the only evidence that necessarily existed after said survey was made and the plan prepared was the plan itself. In fact, the plan

in many cases (apparently) was drawn up and registered without a survey in the field being made.

Now, however, standard markings must be made on the ground in certain places and the astronomic bearing of the principal base or reference line of the survey determined, and the necessary corresponding information must be shown on the plans for registration. This was a good and a very important step, but its advantages and usefulness is impaired by the lack of support from other phases of the system of survey with which it goes hand-in-hand.

Does not the secret or foundation of a true survey lie in the establishment of the following?

“Fixed points”—Directions of lines joining points and distances between said points.

How has our Association dealt with this all-important question of permanent, accurate or true surveys?

Until the Bill of 1915, if one judged from legislation enacted the problem was not considered. It was not required of the surveyor to leave any marks whatever on the ground to mark his survey, if any at all were made, no direct observations of any kind to determine the orientation of his survey with regard to the astronomic or even magnetic north were asked of him, and, lastly, the accuracy with which he was to make his measurements was not specified. It was made necessary that he purchase an approved standard measure with which to test his chains, but the methods and accuracy of the methods of using his chain were left entirely to his disposition.

We are proud to know that our Association has been, and is to-day, honored by the membership of members who have not gauged their surveys by just what was actually required of them by Act, but who have through long years of professional practice conscientiously and painstakingly, and most often at their own expense, applied themselves to the act of “making true measurements and surveys,” and we feel the deepest respect for and pride in these men, especially when we have occasion to come in touch with their handiwork.

In 1914 the first step directly along this line in legislation was to provide that, in brief: Standard monuments to be erected at certain points in the survey. Astronomic Bearing of Reference Line of Survey to be determined by observation in the field by suitable means.

In a very large measure, therefore, the Association has provided in their system of survey for better surveys in the sense that the surveys are necessarily marked on the ground and directions given on the plan agree more closely with the truth, there still remains, however, the very important consideration of "measurements between points," and it is particularly with respect to this that I wish to speak.

Considering the survey along the lines already mentioned, "Fixed points or established monuments," bearings and measurements, I think you will agree with me that the establishment, and the correct establishment, of the first two of these is of the paramount importance. To establish a line we must have "fixed points," or a point and a direction, and these must be correct. Faulty measurements on the ground where the line truly exists are to be greatly preferred to measurements, no matter how extremely accurate, where the line does not exist at all.

But we have fixed points and definite bearings, what then will be the effect of faulty measurements, and how should measurements be controlled?

In the first case, where a sufficient number of fixed points or monuments are alone planted on the survey, at suitable points, and upon a resurvey being made these are found O. K., although the measurements connecting these monuments are faulty, intermediate points may be readily and accurately determined by direct proportioning according to proper rules.

In the second case, however, where as in previous cases fixed points or standard monuments are alone planted, but upon a resurvey being made one of these monuments can not be found (i.e., lost), recourse must be made to bearings and measurements to first establish its original position before the surveyor may proceed to establish any intermediate or secondary points, depending upon the position of the last monument. Here is where original faulty measurements lead to great confusion. Probably the measurements and bearing will not agree, and the old question of relative values of angular and chain measurements arises.

But, again, if this case 2 leads to difficulties, much more so do faulty measurements cause confusion in the following case 3:—

Case 3—Where intermediate points, such as lot corners, etc., are marked by readily disturbed markings, such as

wooden stakes, and those stakes have become shifted, shattered or lost and perhaps a standard monument may be missing (Note—Stakes partly destroyed, knocked over and leaning out of position, sometimes cause more difficulties than if they had been completely removed or destroyed) upon which a definite degree of precision could be placed.

In this case, if measurements were known to the missing or partly destroyed stakes or monuments the resurvey would be comparatively simple, otherwise the determination of the exact location of these points would become a very troublesome and problematical affair, and in the case of a stake marking a lot corner, where it is, say, leaning at a very considerable angle or perhaps only a doubtful trace of it left, there would be room for an error in its position of anywhere up to 6 inches or more, but the surveyor is justified in taking the position of the stake or the trace of the seemingly original stake, adjusted to its most reasonable looking position (being then perhaps 4 to 6 inches out of its original position) without regard to any related chainages or measurements.

I would therefore advocate the adoption of a standard of measurements to be complied with by the surveyors and legislation providing for same with reference to subdivision surveys as covered by Bill of 1915. I would suggest that:—

The limit of allowable error be set at $\frac{1}{4}$ of an inch in every 100 feet.

Also that the surveyor be given the right to mark plus or minus (\pm) on certain measurements, but not on the straight line measurements connecting standard monuments.

It is obvious that where a line joining standard monuments follows along an irregular boundary, such as an old irregular farm fence, that it would be impracticable to determine its accurate length, and therefore it would be necessary to show it as a \pm measurement.

In this connection it appears advisable that it should be necessary to give the measurements of straight lines or lines and bearings connecting the two standard monuments and to within probable error of $\frac{1}{4}$ inch in 100 feet.

The (\pm) sign would be necessary, for instance, where lot lines, etc., traversed broken or rough ground, offering much difficulty to chaining, or where measurements are made to an old zig-zag boundary fence.

The limit of error represented by this \pm sign to be set at 2 inches in 100 feet, unless otherwise stated on the plan by the surveyor. In this case the surveyor states, along with his measurement, its degree of precision as

$$\left(\begin{array}{c} 180' \ 10'' \\ \pm \ 8'' \end{array} \right) \text{ or } \left(\begin{array}{c} 200' \ 00'' \\ \pm \ 2' \ 00' \end{array} \right) \text{ etc.}$$

There is no doubt that it is unnecessary for all practical purposes to accurately determine every measurement to be shown on the plan, and the use of this \pm sign would be convenient and satisfactory.

It is of the utmost importance to a surveyor to know what degree of reliance he may place on the several measurements on a plan.

The principles involved in these suggestions are, as you know, not by any means new or untried. It would be a new departure, however, for this Association to undertake to carry them out to any more or less extent.

The matter is at least worthy of our closest consideration. The measurement of land has become of greater importance than ever before, and will continue to increase in importance, despite the incidental times. By many, a surveyor's calling has always been regarded as comparatively easy and simple, forgetting or not knowing that the days of the pole and old style link chain, line tape, etc., are past, and that the surveyor must necessarily be skilled in the art and science of measuring with a standardized steel tape and—quoting from A. C. Snelford—“that the profession of the surveyor deals with one of the oldest and most fundamental facts of human society—the possession and inheritance of land. Fire, flood and earthquakes wipe out the greatest works of the engineer, but the land continues forever. Again, dishonesty in ordinary business life cannot long be hid, and errors in accounts quickly come to light, but the false or faulty survey may pass unchallenged through the years, for few but the surveyor himself are qualified to judge it. I maintain that in the hands of the surveyors, to an exceptional degree, lie the honor of the generation past and the welfare of the generations to come.”

Mr. Fawcett—I may say that I am quite in harmony with the paper given by Mr. Ransom. I think it is right, especially on governing lines, that there should be some standard of accuracy. On base line measurements in the North-West they

are always chained by two sets of chainmen—one is a check on the other—one using a tape graduated to links and the other to feet, and I know my practice was unless they agreed to within the dimensions given by Mr. Ransom, that is to say, one in forty-eight hundredths, if they didn't come within a foot in a mile—and I think the practice of all men on base line surveys was to send the two sets of chainmen back again to chain over, and perhaps my assistant would go with them and start them with some odd measurement, so that they couldn't make an agreement while chaining along the lines. The Statute allowed 18 inches in a mile, but we generally considered they should come within a foot in a mile.

Mr. Speight—Making allowance for temperature all the time?

Mr. Fawcett—Yes.

Mr. James—When we were in the North-west, on some township lines we found, despite the two chainmen, they must have been a chain out at some place. There was a chain difference between the outline and interior measurements of the township.

Mr. Fawcett—Yes, there are some faulty outliners.'

Mr. Ransom—Regarding temperature, a change of 100 degrees in temperature with ordinary steel tape will make a difference of 3.7 feet in a mile.

Mr. James—I think as far as adding those little plus or minus measurements on a registered plan, it would make too much confusion and be likely to decrease the efficiency of the whole thing. The liability to error is so great and the hurry to get plans registered is often so great that that would soon be an erratic sort of thing, and couldn't be relied on.

Mr. Ransom—Isn't it understood that all measurements on a plan now are plus and minus?

Mr. James—I thought you were advocating a plus or minus distinct measurement; plus or minus eight inches in some cases and plus or minus two inches—wasn't that your idea?

Mr. Ransom—This is a rough line that is only of secondary importance on the plan. It wouldn't be advisable to take the time to measure it accurately, and you just put in the probable degree of accuracy that you feel is necessary.

Mr. James—To make it compulsory for every measurement to be that way?

Mr. Ransom—No.

Mr. Jackson—In connection with this subject of accuracy of measurements, the regulations governing land transfer in New Zealand are that every land transfer plan shall be accompanied by a traverse sheet, and the traverse sheet shall be closed and the closing error shown in red ink; the corrections, to balance the traverse, should be shown in red ink. The standard of error adopted is two links to the mile; that used to be eight links to the mile with the Gunther chain, and it was reduced to two links to the mile when the steel tape came into force; but there, in connection with the case of any transfer of land, the plan has to be filed with the Department, and in that case there is a central authority consisting of the best surveyors available in the country, who check over the plan returned to them, and they are the people who say whether the standard of accuracy of that survey is sufficient or not. I think the tendency of this discussion has been in the case of a great many of the papers that have been read lately—I think they all point to the fact that we can't obtain any very much higher degree of accuracy unless there is some central authority that has the sayso, and as long as the plan can be filed with the Registry Office the surveyor is more or less a law unto himself, and I think the adoption of any standard of accuracy would have to be after such a central department had been established, which would decide whether the accuracy of any particular survey was of high enough degree or not.

Mr. Le May—I don't think Mr. Ransom said in his paper who should be the judge as to whether it would be necessary to chain the line or guess at it. It seems to me the suggestion that you could put in 100 feet plus or minus two feet just amounts to guessing at the line. The plan here has been to chain each line as accurately as it is possible to chain it, and I am afraid any such regulation which allows a man to say there is a possibility of error of three feet in this line might be a loophole for dodging anything that looked like accurate chaining, and I don't think our plans would be improved thereby. The point is still to be settled as to who is to be judge as to whether this line and plan is necessary. My experience is that all lines on plans are necessary. I don't think a loophole should be allowed to the surveyor to put that on just as guesswork, so to speak.

Mr. Ransom—I don't see how it is a loophole, because the man has to state his degree of precision, where at the present time there are many plans filed where plus or minus are put with the measurement.

Mr. Le May—Very few.

Mr. Ransom—I can point to plans that have only been filed in the last two years with plus and minus on them, and it leaves all sorts of room for doubt.

Mr. Le May—How are you going to determine the degree of accuracy with which he can measure a line? I don't see how the surveyor is going to determine whether a line is right within two feet or one foot.

Mr. Whitson—I can remember two years ago we used to get plans in for correction, and the surveyor put the first lot 40 chains 2 links, the next 40 chains 3 links, and the next 40 chains 2½ links, and as a matter of fact when they were chained on the ground they might be 43 chains instead of that, or 45. He put all these little odd distances to mislead the public, just as a few feet more or less would do. I think if I was making a survey, and I think the most of us would put probably more or less two or three inches.

Mr. Ransom—The cases I have pointed out had two feet more or less measurement. The Act simply calls for the measurement being plus on all lines. You take the depths of lots backing on the Don Valley or some place like that, which runs down to some dump or something of that nature, and it would involve a lot of work, and I don't see that it is necessary for the surveyor to state that the measurement is exactly 200 feet; he should have some latitude.

Mr. Whitson—He is not planting any posts.

Mr. Ransom—If he is, I don't see why the surveyor should have to put 200 feet on that measurement and have to stand in court and say that is exactly 200 feet. He should have the privilege of putting plus or minus on that measurement.

Mr. Dobie—If a man measures a line 400 feet, assuming there is a probable error that he thinks should amount to a certain amount—we will say two feet in four hundred—if he puts a plus or minus sign on that plan, 400 feet plus or minus, that means in his opinion, or anybody following after him would interpret it that the surveyor at the time thought that

the line might be anywhere between 398 feet and 402 feet. The man who makes the survey and runs the line and measures it at the time, is the man that is best qualified to say which of these probable distances is right, and it seems to me the proper thing for the surveyor to do is put on a plan what he finds the distance to be, and if there is any allowance to be made or correction, he should make it at the time he puts it on the plan and not leave a measurement floating around with two or three feet at the end of it, because with a plus or minus correction anybody interpreting the plan afterwards would have just as much right to say that it was two feet less or two feet more, and the man coming after has no idea which of those two probabilities is the proper one.

Mr. Ransom—A measurement that has plus or minus on it, it will never be necessary to know that measurement accurately.

Mr. Dobie—How is a surveyor going to know that? I go along and measure the line and make some subdivision, perhaps fifteen years from now, a line that I attach no importance to at the time, may be the most important line in the whole subdivision.

Mr. Ransom—There is just the point this is to clear up. When these re-surveys are made we have on the plan the degree of precision of all measurements, and we know what degree of reliance to place on the measurements. The ones that have been made accurately you know, and you will base your survey on them. You would not base your survey on measurements that are only subsidiary; it is just a more or less measurement. Take a winding line following some old zig-zag fence through thorn bushes and not straight, no surveyor can measure that accurately.

Mr. Speight (making rough plan on board)—That more or less in lot 6, when you come to the re-survey of it, it would be quite different.

Mr. Ransom—That is not what I would figure the more or less should be used on, not in the fronts of lots, but where a more or less measurement would be put on like that, according to the paper I read, that would mean more or less, plus or minus, two inches.

Mr. Speight—You put that lot 58 feet 3 inches more or less.

Mr. Ransom—Or 57 feet 10 inches, and the surveyor is satisfied when he makes the survey that it is within two inches.

Mr. Le May—How much land would you sell there if it was plus or minus?

Mr. Ransom—I would sell 58 feet plus or minus.

Mr. Le May—If it was a dollar a foot, would you give him \$58 more or less?

Mr. Ransom—No, you would give him \$58. All the measurements on the plans now are more or less.

Mr. Speight—Yes, but supposing the man purposely left off “more or less,” as it was staked out, and supposing we came along to make a re-survey on the line between five and six and all the stakes were gone except the one at the south-east angle of No. 1 and the south-east angle of No. 6, if that was not more or less you would divide up all your exterior boundaries?

Mr. Ransom—Yes. The paper I brought in was not worked out in detail. I had not in mind measurements on the fronts of lots. I stated in the first place all measurements should be made to a degree of accuracy between the monuments. When we come to stake out the fronts of lots we should also have a standard of accuracy for those. Supposing you have six lots of 50 feet each, plus or minus would mean that in that 300 feet your maximum error would be three times two inches, six inches. If all the stakes were missing in that block except the end one, it is a certainty there wouldn't be a plus or minus of more than six inches in that length, and supposing we were locating any one in between, it would be simply a case of proportioning. Plus or minus does not introduce any conditions that do not already exist, only that on the measurements that show the greatest degree of precision will the greatest degree of reliance be placed. You would put a note in your plan that all those measurements are plus or minus two hundred feet.

Mr. Whitson—You wouldn't put a plus or minus of fifty; you put the plus or minus on lot 6. When you are dividing across the front between five and six, in proportioning, would you divide them in the proportion of 58 to 60?

Mr. Ransom—In that case I would make it this way. If that is plus or minus eight inches, put on there it is a very

rough measurement. There is a note on the plan that these are all within plus or minus two inches. Supposing a stake is in, we know the position of that stake exactly within two inches either way, and we will establish that point there by either fifty feet plus two inches or forty-nine feet ten inches, and we will have that within a radius of four inches.

Mr. Le May—If you couldn't measure lot five in the first place, I don't see how you are going to measure it definitely in the second place? You would have to put a plus or minus of two inches on both of those.

Mr. Ransom—The difficulty I see with the plans of the present day is this, you have there six lots, which are either fifty feet or fifty-eight feet, and it is not plus or minus on the plan. When you come to survey, this fifty-eight may be rough land and all the others are on flat, level ground, and you don't know what degree of reliance to put on any of those particular measurements, and you don't know what precautions the surveyor took to determine the 58 feet.

Mr. Christie—I missed hearing the paper read, and probably this may have been mentioned. How do you measure the probable error? In measuring a geodetic base line, we measure a number of times and then we have a rule for wasting our measurements and giving it a definite value, but I don't know that this gentleman said how often he would repeat his measurements to get his probable error.

Mr. Ransom—I certainly think in getting standard measurement a surveyor should always measure his distances twice. I think it would be very well to go on the ground and establish monuments at the boundaries of the survey without making measurements twice. I didn't mention that because I thought we all knew how easy it was to get at the probable error by measurement, by taking precautions. If we take precautions and if we allow for temperature and ordinary change in elevations of the line, we know that it is accurate to within a certain amount right off the bat, without repeating the measurements. We can guarantee that it is within a certain error more or less.

Mr. James—I think most of the surveyors here would be satisfied with making them once and using their common-sense—that is the only way they could do it.

Mr. J. van Nostrand—I think we have found several cases where it wouldn't have been amiss if they had measured it twice. That is the point Mr. Ransom is trying to get around.

Mr. James—That is not known at the time. They have found it out afterwards.

The President—Would they arrive at any better conclusion if they had?

Mr. Ardagh—The committee answered no to the first question. I would think yes was advisable there, but that depends upon the department, not the Association.

Mr. J. van Nostrand—Doesn't the department set a certain standard of accuracy?

The Secretary—In the instructions that are issued now there is a standard of accuracy set for the work in the north country, and the inspector goes over those lines and reports on them, within the last few years there has been a closing in on the latitude allowed. I would like to get an expression of opinion from the meeting as to what they would consider a standard of accuracy for measurement, say, a mile and a half in Northern Ontario. Mr. Fawcett says he considers about a foot in a mile in the North-West.

Mr. Fawcett—On a base line.

The Secretary—Would you put that same standard of accuracy to base lines in Northern Ontario?

Mr. Fawcett—If it is within 33 feet in six miles, and if not they have to do the whole line over again.

Mr. Ransom (citing Johnson, chap. 14, page 497)—In ordinary surveys that would give us an accuracy of a foot in a mile of subdivision surveys, so that we are not imposing any great or high degree of standard for surveys. The idea really is when we have a plan and we are going to make re-surveys to have an idea as to what method the surveyor employed in making the said measurements and what he considered as the most accurate measurements and what as secondary measurements.

There may be some other way of getting around it, but it seems to me there should be some method of showing on the plan which are the most accurate measurements and which are only secondary.

Mr. C. A. Jones—Could not that be explained by a note on the plan referring to it and saying that such and such a mea-

surement is not as accurate as the other measurements, and the rest of the measurements are as accurate as possibly could be made, with the exception, we will say, of the measurement of the 58 feet?

Re Question No. 5.

The President—The committee were of opinion that was the proper thing to do to recover that line and use that as the boundary.

Mr. James—That is not Mr. Ryan's note, but it is evident that it can be roughly recovered from the north boundary of lot 1.

The President—This states definitely, from information given, the original line can be recovered.

Mr. Gaviller—I think the whole question resolves itself to this, that instructions to Mr. Ryan were given to run the north boundary of the Township of Adjala; he planted stone monuments in the centre of the road at the end of the concession lines, not only in Adjala, but the concession lines in Tossorontio. The whole thing seems to me to resolve itself into the question was that survey intended to fix the south town line of Tossorontio as well as the north town line of Adjala? This is the way it was used for years, and those stone monuments taken to establish the bases of the town line for Tossorontio. The base line for the Township of Adjala is at the south end, at the other end of the township; that is the way it has been used over and over for years. And as to finding any trace of the original south line of the Township of Tossorontio, I have never heard that point brought out.

Mr. James—Ryan's notes give that. From Ryan's survey one can approximately lay down the old lines that was run for the south boundary of Tossorontio.

Mr. Whitson—The original survey was lacking in that, although they were surveyed at the same time, the Township of Adjala took in part of the Township of Tossorontio.

Mr. James—The point to me was that the object of a municipal survey was only to decide the boundaries for the immediate owners, not for a governing line.

Mr. Whitson—I suppose that is a case where the line should be established by the County Council?

Mr. Gaviller—It was done years and years ago, and done under instructions from the Department.

Mr. Ardagh—It was confirmed as the governing line, as I understand it. In my experience there are a number of cases where the governing line is not recoverable. I do the best I can, but I don't say it is legal.

Mr. Whitson—If it is established as the boundary of the township it would be legal.

Mr. Gaviller—It was established by stone monuments.

Mr. Ardagh—It is one thing to know what to do legally and another thing to do it.

The President—Mr. Ardagh has handed me a question which I don't think any of the committee has seen, in reference to section 47 of the Surveys Act amendment, 1915. His question is: "If this section intends that the bearings of all governing lines shall be true, that is, astronomic, it does not state that fact beyond all argument. As contrary opinions have been expressed, the committee is asked for an opinion."

That was up for discussion before. The section reads: "Every angle in the exterior boundary of a subdivision plan of an original lot or part of an original lot or of any subdivision plan laying out a new street shall be marked by monuments, and all bearings on every such plan shall be calculated from one course in the said boundary to be designated on the plan as the governing line." The question refers to this, "and the course of the said governing line shall be determined by astronomical observation or other satisfactory method." As I understand Mr. Ardagh, he wants to know if it is considered absolutely necessary that the bearing of this governing line shall be astronomically determined and so stated.

Mr. Ardagh—If the Act meant that it should be absolutely astronomic in every case, the section might have read, "and the course of the said governing line shall be the true bearing determined by astronomical observation or other satisfactory method." It doesn't say it shall be; it leaves an opening for doubt, and doubt has been expressed.

Mr. Ransom—The difficulty with that was, it seemed when the recommendation of the committee was made they drew up a certain recommendation, but that when the bill went through its final stages it came out in that state; it was

cut up from the original amendment that was passed by the committee and presented to the Council and passed by them. It seems when it came up after the bill passed the Legislature it was considerably cut up and the meaning slightly doubtful. The meaning was that the bearing should be astronomic, and should be determined astronomically in the field, or determined in the field by any other suitable method that would give the astronomic bearing. Another suitable method would be to run a traverse from the bearing which a surveyor knows is the astronomic bearing.

Mr. Ardagh—The question in my mind now is what does it mean as passed, not what was intended. It certainly is doubtful, because I have asked several, and they have all expressed contrary opinions.

Mr. Ransom—You are to give the bearing. You wouldn't want to give a false bearing; it would have to be a true bearing.

Mr. Ardagh—It doesn't say so. The magnetic bearing is a bearing, but according to you the intention is that it should be the true bearing.

Mr. Ransom—Are not all plans showing true bearings astronomic bearings?

Mr. Ardagh—No. If I gave the astronomic bearing, I would put it on my plan in that way, I wouldn't say a true bearing. The majority of the plans in the Registry Office in Barrie give a bearing, and very often those are taken from bearings given on the township plan, which is an assumed bearing pure and simple, and which may be a degree out; it may not be the bearing of the line as actually run at all.

Mr. Gaviller—On some of the township plans there is nothing to show whether it is an astronomic or magnetic bearing.

Mr. Ardagh—What am I to do? I am making the subdivision plan. Am I bound to put my line designated with the astronomic bearing thereon or can I put a magnetic bearing?

The Secretary—I think you are bound to put the true bearing, and if you put a magnetic bearing on you are bound to show the astronomic variation. I think that is the intention of the Act.

Mr. Ardagh—I wish to know if I am bound under the Act to do it. I say I am not bound under the Act; it is not clear. If I do it my client may object and say, “Why should you put me to the expense of taking an astronomic bearing?” If I have not got to do it, I have no right to put him to the expense. It might be cloudy weather, and I might not be able to get the sun or a star for days.

Mr. Le May—I am rather inclined to agree with Mr. Ardagh on this question. I was on this committee, and I think the amendment as printed, the last part of it anyway, is exactly as it was drafted by the committee. I have an idea that there was some slight alteration made in the first part of the section, but the second part of the section I think pretty well represents the original draft that was prepared by the committee. The question seems to turn on the interpretation of the word “bearing.” If the word bearing means astronomic bearing the section means what it is intended to mean, but if it is necessary to insert the word “true” to get the astronomic bearing, I think the section should be perhaps amended. But it appears to me the meaning attached to the word bearing is one that is in doubt just at the present time.

Mr. Whitson—On the old plans you will find “true magnetic course.”

Mr. Le May—When you say the bearing of a line, why doesn't that mean the astronomic bearing?

Mr. Ardagh—There is such a thing as magnetic bearing and such a thing as astronomic bearing.

Mr. Le May—If I asked you what the bearing of your line was you would think I meant astronomic bearing.

Mr. Whitson—Two-thirds of the old surveys up to about 1848 had astronomic bearing on the plan.

Mr. Ardagh—I can't see that this improves matters at all, unless it means these courses are to be astronomic, because we will just go on in the same old way as before, that is, that we are to put the proper astronomic bearing. I move that the Committee on Legislation be requested to revise section 47 of the Surveys Act so that it shall be perfectly clear that all bearings of governing lines shall be true astronomic bearings.

Mr. Speight—If the latter part of the clause, “or other satisfactory method,” were left out altogether there would be no mistake.

Mr. Le May—It seems to me a hardship might be created if you had to get out and take an observation always.

Mr. Speight—You wouldn't have to get out if you can certify that is the astronomic course.

Mr. Le May—The course of that line which you are discussing would have to be determined by astronomic bearing.

Mr. Speight—Why not leave that out, and just say the course of the bearing must be astronomic?

Mr. Esten—Suppose there was some little plan of ten or fifteen houses in town, it would be a hardship if we had to put the astronomic bearing on and take an observation or angle up for some line.

Mr. Le May—That would not come under the provisions of this section.

Mr. Esten—If the city want the astronomic bearings put in the heart of the city, I think they ought to establish certain lines astronomically and not give us the trouble in the middle of the city to take observations to establish lines.

Mr. Speight—I think we are pretty much unanimous that the plan should show the astronomic bearing and whatever is the best way to make it clearly show it, so that there shall be no misunderstanding. In making out any new streets we should have the astronomic bearing; there is no question about it at all, and no doubt that was the intention originally, when it was drafted, that it was for that purpose.

Mr. Esten—We got our solicitor, Mr. Armour, to give an opinion as to what we should put on the plan, and he was very definite that we had to put a governing line on.

The Secretary—This amendment has been passed since we got that opinion.

The President—Do you press your motion, Mr. Ardagh?

Mr. Ardagh—No, I am not particular about it, because it doesn't make any difference one way or the other, only I want to know what I have to do and what I have not to do.

The Secretary—You can use your best judgment. I am of the opinion that it means astronomic bearings must be put on the plan whether you take an observation to determine the same or not. The only way to remove any doubt is to put this motion through and get the Legislative Committee to have the wording of the clause changed.

Mr. Le May—I would like to second Mr. Ardagh's motion.

The Secretary—The motion is that section No. 47 be referred to the Committee on Legislation to bring in an amendment to make the matter clear as to whether the bearing should be astronomic in all cases.

Mr. Le May—There is another point I would like to suggest, and that is there is no compulsion upon the surveyor to show on the plan the monuments that are planted. Under the section the certificate to be put on the plan states, "This plan shall be in conformity with the Registry Act, and not the Survey Act." It could be arrived at by requiring surveyors to put on the plan such monuments as were planted, or amending the certificate that has to be put on in accordance with the Registry Act to include the Surveys Act also.

The Secretary—There was a motion passed yesterday that the whole Act was to be referred to the Legislative Committee?

Mr. Le May—Then this could come in under the same motion.

The President—I think the motion is already covered, and it would be hardly necessary to put it again.

PAPERS

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

THE PRESERVATION OF FIELD NOTES

By J. W. Pierce, D.L.S.

Away at the end of the Surveys Act, in fact it is the third last section, appears a short paragraph instructing every surveyor to keep exact and regular journals and field notes of all his surveys and to file them in the order of time in which the surveys have been performed. To a student of the Survey Act it would at first appear that this single section of six or seven lines, in contrast, as it is, with nearly fifty other sections all relating to the varied methods to be employed in performing surveys, had been added as a kind of afterthought and hence might be only of minor importance, and I am afraid that, should he pursue the subject further, by studying the Annual Reports and looking through the examination papers printed therein, he would find little tending to alter this impression. I believe that in the earlier days of our examinations, candidates were occasionally asked for the date at which surveyors were first instructed to take and preserve field notes, but in looking through examination papers of more recent date, it would appear that even so slight a reference as this to our subject is now considered superfluous.

It is proposed to discuss a few of the phases that commonly occur in the taking and preserving of field notes, and to consider whether these systems of taking notes result in their being of most value to us and to our clients. For the purpose of this paper, the term "field notes" will be considered to include all original notes as taken by surveyors in the field, together with all descriptions, plans and reports afterwards

prepared therefrom, all of which, it is expected, are filed in the surveyor's offices in accordance with the above clause.

The practice of Surveying in our Province may be divided into two broad classes, namely, surveys performed under instructions from the Department of Lands, Forests and Mines, commonly known as Government surveys, and private or local surveys, which are performed by surveyors at the request of their clients. This latter division may again be divided into two classes—first those kinds of surveys from which it is necessary for the surveyor to prepare plans, descriptions or reports; second, those surveys made merely for the purpose of marking on the ground some boundary, limit or point in accordance with a prior plan or description and from which it is not necessary for the surveyor to prepare any plans or documents, or in fact to make any return whatever, other than what is called for in the clause of the Surveys Act just mentioned. In passing it is worthy of note that this last sub-class includes probably the greater part of all the surveying that has been done in this Province.

In the first class mentioned, that of Government surveys, where a surveyor receives instructions to make surveys in a certain section of country, he is made to realize right from the commencement of his work the importance of performing his surveys on the ground exactly in accordance with his instructions and of taking complete field notes, showing all his distances and bearings, the character and position of all monuments erected and the various topographical features of the district, so that on his return he is in a position to prepare copies of his field notes and all the usual plans and reports that are now on file in the Department. Before this survey is accepted an Inspector of Surveys is sent on the ground for the purpose of ascertaining whether or not the survey has been properly carried out and the surveyor's returns are critically examined in the Department by competent officials, so that there is a reasonable assurance of the fact that these surveys are properly performed and that the field notes will always be accessible for our guidance in future work.

In the second class cited, composed of such surveys as town and city sub-division, mining claims, surveys made for the purpose of making descriptions as contained in deeds, water lots, islands, etc., while these surveys are usually made for private individuals and are subjected to no inspection on the ground, still, the surveyor is required to prepare such plans, field notes and descriptions as are necessary for filing in the

various Land Titles and Registry Offices and in some cases the Department. These are examined, before filing, by the Registrar, or Master of Titles, and while this may or may not be sufficient to detect errors or imperfections in the work, the Registrars not usually being technical men, still, these documents with the Surveyor's name attached are from time to time examined by other surveyors who have occasion to refer to them. It follows then that in this class of survey also, there is a check on the field work and the certainty that the notes will always be accessible.

Now let us devote our attention to the third case referred to—that of private surveys for which the preparation and filing of no special public plans and documents are required. It is, of course, unnecessary to bring to the attention of the older surveyors of this Association who are engaged in this class of work, the important assistance that field notes of former surveys are to them, exhibiting as they do or should do, the position and character of monuments then found on the ground, bearings or angles of concession roads with governing lines, the inferences that the former surveyor deducted and what posts he planted. The older and more valuable districts of our Province were originally surveyed between seventy-five and one hundred years ago, so that now very few, if any, of the original marks of these surveys are in existence, the original notes on file in the Department thereby being of little value in the performance of these private surveys. However, private surveys have been made from time to time, and it is to the notes of these that we must now look for information necessary for guidance in our present work. Unfortunately many of these private notes are lost or are not available. Where they are available they are conflicting or indefinite so that it would seem that the system of leaving to the surveyor's discretion what he considers proper to be entered in his notes and then allowing him to retain these in his own possession, has not in all cases been satisfactory.

There are, have been and possibly always will be in this Province good surveyors, bad surveyors and indifferent surveyors with all the intervening gradations. Good surveyors from our viewpoint are those who always execute their field work properly, regardless of counteracting influences and who then write up their notes and file them in such a manner that in after years it is possible from an examination of these notes to understand exactly what was done on the ground and why it was done. Work of this quality may possibly be the result of different motives. It may be that the surveyor is naturally painstaking

and conscientious, and, while he realizes that his client's fee usually covers only the time he is absent from his office, still he devotes time of his own necessary to the preparation of his field notes. It may also happen that he is a shrewd business man and realizes keenly the necessity of doing good work and of preparing complete notes of all his work, even if at his own expense, so that at some future date it will be necessary for the parties in that district to come to him rather than to other surveyors.

With surveyors of the other extreme, that is the bad surveyors, those that are aware that there is no check on their work, either on the ground or in the office, that no person need ever see their notes, hence little, if any, time is devoted to their preparation, and whose sole interest in surveying, apparently is only to collect their fees, little need here be said. Fortunately their number is small although the results of their malpractice are widespread. Between these two extremes there is a considerable number which I have classed as indifferent, a few types of which I will not describe. Some surveyors, while doing fairly good work, thus protecting the immediate interest of their clients, devote little or no attention to their field notes, these being often taken on loose paper in such a manner as to be indecipherable to anyone but himself and very often not even to him a short time afterwards. Occasionally these characteristics are reversed, the field notes being carefully written up for a low grade of surveying. Some practise the profession only as a side line, or use it as a stepping stone to some other pursuit, and with their departure from the profession follows the disappearance of whatever notes they may have had.

This system of preservation of notes has resulted in the custom of surveyors, when starting a practice, of procuring all the private notes of former surveyors that it is possible for them to acquire, the resulting collection often being at best a very miscellaneous one. In the district in which he is practicing there may have been a dozen different surveyors at different times since the original survey, all grading from good to bad. Possibly only half of their field notes is in existence, representing one-quarter of the work that has been done and this is all that is attainable. Perhaps he even cannot get these because some surveyor in the neighboring town had an opportunity of acquiring part of them before and wishes to retain them. This puts the surveyor at a disadvantage right at the start, for in order to do his work properly he must be in possession of all the information contained in private notes. Of course, if he knew what information was in existence relating

to any particular survey and where it was, I suppose he could, by legal procedure, if necessary, procure it, but unfortunately he often does not always know what to look for. I am aware that most surveyors having private notes in their possession are quite willing to place these at the disposal of other surveyors, but is this fair to them? They have themselves gone to a great deal of trouble and expense in procuring and tabulating the notes they now have, for their own future use and it does not seem hardly just to expect them to give this information away to an opposing surveyor. But what of the position that the young man finds himself in who is attempting to start a practice? He has diligently and faithfully served his apprenticeship, has passed his examinations, paid his fees and has been admitted to the Association, only to find that he cannot practice intelligently because he has not, in his own right, access to older private notes. It may be argued that as far as the surveyor, who has possession of the notes, is concerned, he is not called upon to give this information away gratuitously. I think he often does, but suppose he does not; then our young man pays for them and naturally his survey would be more expensive to his client than it would had it been done by the surveyor who had possession of his notes. A consideration of these difficulties often leads our young friend to the conclusion that he will attempt to carry on his practice without the aid of these notes, the result of which we are all the more or less familiar.

If you will pardon a personal reference, I would like to illustrate the value that these old notes often have, by reference to a case I had two years ago. In making a survey it became necessary for me to establish the corner between, let us say, Lots 5 and 6. No evidence of the position of this corner could be obtained on the ground, but there was, however, a post known to be correct between Lots 4 and 5; also one between Lots 6 and 7 which was supposed to mark the original corner and from which, I was informed, a surveyor had run a line about fifty-five years ago. This was all the data that I could get and I naturally concluded that the locating of the corner I desired was simply a question of dividing proportionately the intervening distance. This I did, with the result that one man was sure that my post came too far over by ten feet. Afterwards I was fortunate in obtaining the notes of the surveyor who had been there fifty-five years before, only to find that he had himself planted the post between Lots 6 and 7 by dividing between a post then at Lots 7 and 8 and an original post at Lots 5 and 6, the corner which

I wished to locate. By using the width he found Lot 6 to be and laying this off from his post I found that it brought the corner where the people said it used to be and that the post I had first planted was in error by the ten feet just mentioned.

If you will still bear with me I would like to draw your attention to one instance of the fate of these private notes. In the office in which I served my apprenticeship, there were several dozen books on surveyors' private notes covering more or less fully the entire practice of four different surveyors dating back to 1866. In certain sections of our district these notes described practically all the surveys that had been made up to that date and in the case of the several of the single and double fronts, the surveyor had determined by observation the bearing of the governing lines through the various concessions at a time when it is possible to do so accurately. In 1911, the building in which this office was located was destroyed by fire so that these notes with all their valuable information are now lost and can never be replaced.

It would seem that our professional forefathers who apparently inaugurated this system, when posts and original marks were easily found and hence little trouble in making surveys, had been somewhat improvident regarding the heritage they have left to us, so that we now find ourselves without their original marks and very few of their notes.

I would now submit to the consideration of this Association the following—that the system of taking and filing notes on surveys of this class as now in use has a tendency towards laxity on the part of the surveyor, both in his field work and in the preparation and preservation of his field notes, which may be taken in such a manner as to be readily intelligible only to himself; that this system by which the surveyor becomes the sole owner and custodian of his notes is often not to the best interest of either our own profession or the public; and that in view of the future value of these notes, more adequate measures should be adopted to insure their preservation.

Would it be possible that instead of carrying on these private surveys under conditions such as have prevailed, to consider changes under which the notes of all such surveys would be filed in some central office, or the Department, there to be subjected to the inspection of competent officials. If some such method as this were in operation, it seems to me that there would be more uniformity in the procedure of surveyors together with the assurance that the surveyor when

acting, was in possession of all prevalent data and certainly that all information thus acquired would be preserved and accessible for future guidance.

I suppose it may be rather late in the day to suggest any such radical change as this over a great part of older Ontario, but is there not yet time to consider something of advantage to Northern Ontario?

DISCUSSION.

The President—Gentlemen, I suppose we might have any discussion on this paper now that any member feels like offering.

Mr. Gaviller—Mr. President, I think Mr. Pierce has done the Association a great favor in bringing forward this subject. There is only one point that I can see where it would be the slightest injustice, or apparent injustice, to any old practitioner in a territory where he had been for a great many years, and that is when a young man comes in who doesn't know anything about it and perhaps is not at all used to the subdivisions which there are in that district. He comes there and wanders about and can't find any original stakes, and the oldest inhabitant shows him all sorts of pieces of wood stakes in the ground here and there, and as a last resort he has to go to the old surveyor, and he appeals to him to get the information. It is highly probable he has it, but of course when it is in his possession we know that the notes of the surveyor's work are his own property. According to the Statute, a man whom he makes a survey for is not supposed to get the measurements made by the surveyor unless he pays something extra, and then of course the surveyor has to give it to him, which amounts to the same thing as supplying a man with a plan of his place. As to his suggestion of filing them, that would be a matter of getting a statute passed, and it would be very difficult to get it. But the importance of having them on record I do not think can be questioned, and I think the younger the surveyor is the more he would see what benefit he would derive if such a plan had been carried out. In my own experience I know I have the field notes of four or five surveyors on a territory covering a great many square miles in which now it is nothing but grass and sand to a great extent. These field notes were taken before the tramways were run through this territory, and of course when the original crop of pine was standing there. Now it is of course burned stumps

and second growth pine, and as I said before hardly a trace of the original to be found. Anybody can see without argument the necessity of having something to work upon in that case, and I think there is a gentleman present here, Mr. James, who has been through that process. I have great pleasure in moving that Mr. Pierce's paper be received and published in the Annual Report.

On the motion being seconded by Mr. Ardagh, the President put the same, which was carried.

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

SURVEY ACT

T. D. LeMay, O.L.S.

Since I started considering this subject about three weeks ago I have been more or less haunted with the thought that I was taking a big chance in criticizing an Act that has been built up during the course of years by those older members of this Association, who by reason of their wide experience with surveys of all descriptions have been able to judge what was necessary to make this Act upon which we as land surveyors would our uses fit any occasion that might arise.

I cannot help thinking, however, from conversation and arguments I have had with other surveyors that in some instances the amendments, as from time to time passed, did not express the whole thought of those who originally designed them, and that in the course of their passage through legal hands and the Private Bills Committee phrases have been turned and words substituted until in the finished product, as placed on the statute book, the sense has been twisted and situations created that are misleading and, moreover, unnecessary. For this reason I have in most instances confined myself to comments on the various ambiguities that occur in the text and in the arrangement of the sections; with spirit of the sections I am not competent to deal.

On these criticisms I have endeavored to mould a new Act, since criticism of this destructive nature is of no real value without an effort to remedy the faults that become apparent. And this new Act will I hope receive at the hands of the Association the treatment that it deserves, whether it be the waste paper basket or not. During the last few weeks I have enquired very diligently amongst members of the legal profession whether they ever experienced any difficulty in interpreting the various sections of this Act, and have in every instance received an answer to the effect that it is all clear as daylight. This speaks very highly for the intelligence of the legal profession or otherwise. Anyhow, I believe I am safe in saying surveyors as a general rule are not so sure about it, and if as a consequence of this criticism some further thought is given to the doubtful points that occur, then my purpose is served. I will first of all consider the Act section by section, apologizing for any remarks thereon which you may consider too frivolous, and then, if time and the meeting permits, run briefly over the suggested new arrangement of the sections referred to above:

Section 1.—Title—This is one of the few sections that is above reproach.

Section 2.—Definitions—Is all right as far as it goes, but it might be extended to cover other terms in the Act that I have heard interpreted in several ways and a proper understanding of which is necessary to a correct interpretation of the Act. These I will call attention to from time to time as they occur.

Section 3.—Needs no comment. Says that boundary lines, etc., under ordinances since repealed are valid. This seems reasonable and needs no comment.

Section 4. (2).—Standard Tape—I doubt whether this section is lived up to by surveyors, especially those with city practices. It says that before proceeding on any survey the surveyor shall verify, by means of his standard measure, the length of his chains and other instruments for measuring. Presumably a surveyor is therefore called to check the length of his transit and tripod every time he starts on a survey. This section is a relic of the time when the old link chain was in universal use and really had to be tested every time it was taken out, and should be redrawn to fit present conditions. It would appear as it is that a survey could be protested if the surveyor could not make a declaration to the effect that he had complied with the provisions of this section.

Section 5.—Deals with the chain-bearer's oath. The failure to administer the oath or the employment of anyone within the prescribed degree of relationship would presumably be grounds for a new survey. I believe, as a matter of fact, that some of the most conscientious members of this Association have at times used the farmer by whom they were employed or his son as assistant without considering that the law was being broken thereby. If the Government want it for Government surveys let it be the subject of special instructions, but we should not be tied up by a section which is impossible to live up to and which might land us in difficulties.

Section 6.—Gives a surveyor power to pass over lands. Section 2 defines a surveyor as an Ontario Land Surveyor, but I suppose for the purposes of this section an assistant would be included owing to the difficulty that the surveyor might encounter in controlling both ends of a 100 tape stretched at full length. This section might reasonably be amended to include assistants and to enable the surveyor to delegate his powers under the section to the assistant in charge of the party when unable to be present himself.

Section 7.—Obtaining evidence by subpoena.—Surveyors themselves are apparently not exempt from the provisions of this section, and it might be liable to abuse if the procedure was not rather too cumbersome to be made a habit. I would also like to call attention to the marginal notes to this section. They seem to miss the point. This seems to be the case also in several other places in the Act to which I will call attention as they occur.

Sections 8 and 9.—Dealing with the service of subpoenas and the penalty for non-observance.—Do not call for any comment.

Sections 10 to 14.—Deal with what are known as municipal surveys, so-called from the fact that it requires a municipal council to put in motion the machinery provided therefore. They provide for a reference to the Minister of Disputed Boundaries and confirmation by him of the lines established as the true and unalterable boundaries. Municipal surveys are divided into three types.

1.—Those initiated by a county council to establish points on township boundaries.

2.—Those initiated by a township council to establish concession lines and side road lines.

3.—Those initiated by a township, city, town or village council to establish lot corners.

These sections seem to be unnecessarily involved and it should be possible to redraw them so as to eliminate such frequent references as occur in the Act to what has gone before and what is to come after. In this respect Section 12, Sub-Section 2 is perhaps the worst offender. The second class is peculiar inasmuch as in that class alone are particular instructions given to the surveyor making the survey, and the more so because these instructions are more or less at variance with those given in Sections 33 and 40. For instance Sub-section 2 of Section 13 may be interpreted to mean that the concession line shall be straight as intended in the original survey between points fixed by proportion on the township boundaries. While Section 33 clearly states that the concession line shall be established by proportioning the depth between the adjacent concessions at each lot line. Personally I am of the opinion that the former method would more closely conform to the original survey and the spirit of the Act. Since the line was intended to be straight, it is possible

to make it straight, and the concession lines only having been run no such lines that exist are only evidence as to the position of any other, which was not run, at the township boundaries.

Further Sub-section 3 and Section 40 differ inasmuch as the former refer to concession lines intended to be straight while in the latter this qualification is omitted, yet the procedure for joining the two nearest established points by a straight line is the same. Incidentally no provision is made in the Act for a concession line that is not intended to be straight, other than in a sectional township.

Section 15.—Which provides for the immediate payment of a surveyor making a municipal survey is unassailable.

Section 16.—Defines the authority under which original surveys are and have been made and says that the width of a lot is the width between the posts front and rear.

Section 17.—Says much the same thing as the latter part of 16, except that its application is limited to the front posts.

I have been unable to discover in my own mind the reason for the repetition or the difference and it seems to me reasonable that these two sections might be combined or the latter part of Section 16 eliminated.

Section 18.—Gives in a cryptic manner instructions for the survey of the aliquot parts of lots, but whence the reason for the secrecy as to the systems of surveys and particular cases to which it refers? Why is it so far separated from Section 31, with which it must be read to mean anything at all? The question of aliquot parts is surely one of sufficient importance to be dealt with in a connected manner so that the rules to be observed may be capable of comparison with one another.

The marginal note says "aliquot parts of township." As a matter of fact a township is about the only subdivision of land to which the section does not refer.

Section 19.—Having in the previous Section touched lightly on matters connected with the subdivision of lots, the Act now turns to further consideration of the validity of original monuments; this time in connection with town or village lots and instructs the surveyor when surveying the same to apply the same rules as required for the survey of township lots.

Section 20.—Says that surveys of unsurveyed Crown grants by the grantee shall have the force of and effect of the original surveys. So far so good. The Section next tries to crowd into half a Section all that has been said in Sections 16, 17 and 19 with regard to original surveys. It doesn't appear necessary.

Sections 21 to 27.—Deal with governing lines and the variations of the fundamental rule expressed in Section 21, which reads in part: "The course of the boundary line of every concession at that end from which the lots are numbered shall be the course of the division or side lines throughout the township."

I cannot help thinking that this is rather a poor start for an important subject. In the first place it is necessary to go to Section 39 to discover what is meant by the course of a line; in the second place, although it says every concession, it only refers to two systems of survey out of nine; and thirdly it says: "shall be the course of the division or side lines throughout the township." Surely the intention would be better expressed by substituting the word concession for township.

Generally, however, the Sections are clear and easy to understand, although most unnecessarily verbose. I would call attention to several points.

Firstly—The governing line is variously referred to as the end side or boundary of the concession from which the lots are numbered. This doesn't seem necessary and is confusing, especially when the marginal note to Section 34 designates the same boundary as the side line at the end of the concession.

Secondly—The word succeeding in Section 25 should, of course, be preceding, the former rendering the section unintelligible. At the same time I have heard it argued by high authorities that the Section is correct as printed.

Thirdly—The latter part of Section 27, Sub-section 1 says that under certain circumstances side lines are to be run on the astronomical course of the side lines in the township. What happens if there are two bearings for lot lines in a township? There seems no reason why this should not be amended to read on the astronomical course shown in the plan and field notes for that line which it is desired to establish and so do away with any possibility of uncertainty.

Fourthly—In the latter part of Sub-section 2, Section 27, an exception is made of any concession in any Section in which a line has been run prior to 1897. I suppose this means where a lot has been patented prior to that date. Why not say so? The departmental records then would give the surveyor all necessary information.

Fifthly—The term “course of a line” should be defined in Section 2.

Section 29.—Deals with the re-establishing of Section corners. Some doubt seems to exist as to the meaning of the latter part of Sub-section 1. I am of opinion, however, that the provision as to 20 chains can only refer to the side lines and not to the concession line, the renewal of which, if partly obliterated, is provided for by Section 13, Sub-section 3. Further if the stipulation as to 20 chains applies to the concession lines and there being no provision in the section for dealing with such a case it would necessitate a reference to the Minister, which I do not think is intended. The operations under Sub-section 2 are apparently limited to the Sections whose corner is under consideration, since a proportional sub-division extending beyond the next section corner might conflict with the establishment of that corner under Sub-section 1.

The words “undisputed point” in this section might reasonably be dealt with in Section 2 as a definition. Does a point established under the provisions of this Act become an undisputed point within the meaning of the Act?

Sub-section 3.—Is poorly written. It may mean that there is a bend in the line or it may mean that the bearing given in the plan and field notes is incorrect. The former is, I believe, the intention. Further, the words “front or rear angles” would only refer to sections in a 6-mile township and should be amended to include all kinds of sections. This is another case where the marginal note seems astray, it referring only to obliterated lines and not to those with angles in them.

Section 30.—This Section legalises the Dominion Government surveys in the Rainy River District and gives instructions for the reduction of road allowances from 99 to 66 feet.

Section 31.—Dealing with aliquot parts in sectional townships is one of the newer sections and in some ways does not seem a credit to those who drew it up. In the first place it departs for some reason from the method previously adopted in the Act of referring to sectional townships as those town-

ships surveyed into sections agreeably to an order-in-council dated 27th day of March, 1829, and refers to the sections themselves in a disjointed way as sections of 1,800, 2,400, 1,000 or 640 acres or thereabouts, omitting all reference to the sections of about 1,200 acres that occur on the west side of a nine-mile township. To make the section a little more intelligible I would suggest that Sub-section 3 might reasonably be divided between Sub-sections 1 and 2, the first part, which describes the kind of sections affected, to go to Sub-section 1 and the balance to Sub-section 2. In Sub-section 2 and the seventh line the word "line" is evidently an error instead of the word "lot." As written the Section means nothing and a surveyor without a certain amount of imagination would be in difficulties. I would also suggest that the words "unbroken lot" in this section might be a suitable subject for a definition in Section 2.

The marginal note to Sub-section 1 omits all reference to aliquot parts, which is what this Section is really about.

Section 32.—Dealing with D. L. system—Is generally clear and easy to understand, but it should be stated somewhere that these townships are exceptions to the rules laid down elsewhere in the Act for the survey of sectional townships.

The marginal note is very secretive, as it carefully avoids any reference to the particular system of survey to which the Section refers.

Section 33.—Dealing with single fronts, in itself seems all right, subject, of course, to the remarks made in dealing with Section 13, Sub-section 2, but the second marginal note is nothing but a joke. As a guide to the contents of the Section it is useless. It says: "Side lines in such cases."

Section 34.—Deals with lot lines in broken front concessions. It is clear and to the point, which the marginal note seems to miss entirely, since it refers to townships and not concessions.

Sub-section 2.—Dealing with concessions partly broken in front, supplies another doubtful case. Suppose the lake obliterated the end of the concession as well as part of the front, how is the proportion to be arrived at if no measurement is given on the rear of the concession to the lake? Provision in this case should be made for laying off, as far as possible, plan widths for the lots that are broken.

Sections 35 and 36.—Double fronts.—Seem all right, although the latter seems to be adequately covered by the provisions of the former.

Section 37 and Section 42.—Dealing with the depths of lots where only each alternate concession line has been run, say the same thing in a different way and lay down again the principle governing operations in Section 13, Sub-section 2, and the latter part of Section 33. It is true that two of them deal with lot corners and two of them with a whole line between two adjacent concessions. But the procedure is the same, i.e., proportion along each lot line and a new section laying down the principle that to survey a line made up of the limits of lots the same procedure shall be followed as is necessary to survey individually the various lot limits composing the line would render about three of them unnecessary.

Section 38.—Dealing with blocks made up of several lots is all right and incidentally carries out the idea outlined in connection with Section 37.

Section 39.—Explains what is meant by the course of a line in a very long winded manner. The meaning could be included in a very few words as a definition in Section 2, and this Section done away with. The marginal note to this section may or may not mean anything. Personally I am inclined to the latter view. Anyhow, it certainly does not state beyond all doubt what this Section is about.

Section 40.—Determination of lot corners.—I have nothing to say about this Section, except what has already been said in connection with Section 13.

Section 40.—Lays down the methods to be followed in determining lot corners when the posts are missing. This section has already been discussed in part in connection with Section 13, but there remains one point that appears to me to be worthy of attention. In the latter part of the Section which deals with the determination of lot corners on a concession line partly obliterated instructions are given to make allowance for roads. Whilst in the beginning of the section which deals with the determination of lot corners where the concession line is still extant, the surveyor is particularly instructed to divide the true distance between the nearest undisputed posts into such number of lots as the same contained in the original survey without making any allowance for roads. It seems a shame to poke fun at an old section like this but if my reading of it is

correct there must have been lots of surveys made contrary to the statute. The word "on" in the 5th line is a misprint apparently for "or."

Section 41.—Front and Rear System.—This Section may be construed as the only place in the Act where authority is given to produce a line and then again it may not. Anyhow, I have never yet met anyone who was sure from a study of this section that he would know how the Act required him to replace missing posts in one of these townships.

Section 42.—Has already been dealt with in connection with Section 37. A blind line might be defined as part of Section 2.

Section 43.—Deals with the depth of lots in adjacent and alternate concessions where the front is broken. The word alternate is not in the text and has to be deduced to make sense.

Section 44.—Provides the connection between the Surveys Act and the Registry Act and is satisfactory if not overlooked at the critical moment as in the case of *Might Directories v. Home Bank*.

Section 45.—Field Notes.—This section appears to be obsolete and might be dropped. In general practice the man who pays for the survey controls the distribution of the results outside of the profession.

Sections 46 and 47.—O. K.

The amendment of 1915 is called Section 47 also and should be itself amended to require the surveyor to indicate on the plan where the monuments have been planted and the nature of the same. The surveyor's certificate on the plan should be amended to include Survey Act as well as Registry Act.

So much for the Act and its ambiguities. Some of the points raised may, of course, be open to argument, based on a different interpretation of the text. Apart from these, however, I do think that there is room for considerable improvement in the arrangement of the Sections, so that those relating to each subject may read more or less connectedly and with that end in view I have drawn up, as a suggestion, a new Act, in which the Sections whose provisions are general and

which do not deal with any specific case are placed first, the instructions for planting posts coming towards the end. I have endeavored as far as possible to make the Sections lead as to one another, so that each may be intelligible having in mind what has gone before. This is as follows:

New Number	Old Number
1.—Short Title	1
2.—Definitions	2
3.—Repeal of Previous Acts	47
4.—Boundary Lines Established. Under Repealed Acts Still Valid	3
5.—Field Notes	45
6.—Standard of Measure	4
7.—Chain-bearer's Oath	5
8.—Privilege to Pass Over Lands	6
9.—Affidavits and Evidence	46
10.—Subpoena	7
11.—Service of Same	8
12.—Penalty for Ignoring	9
13.—Original Surveys Under Competent Authority	16
14.—Original Posts Govern	17
15.—Original Surveys of Unsurveyed Territory by Grantee Confirmed	20
16.—Original Survey of Town or Village	19
17.—Connection of Survey Act with Registry Act	44
18.—Monuments on Registered Plans	47
19, 20, 21, 22.—Municipal Surveys	10, 11, 12, 13, 14
23.—Payment for Same	15
24.—New Section—Whole Line to be Surveyed as Parts	
25.—Lots in Block to Be Surveyed Individually	38
26.—Rainy River D. L. S. System Legalised	30
27.—Method of Survey in D. L. S. System	32
28.—Front and Rear System	41
29.—Governing Lines	21, 22, 23, 24
30.—Proof Line	25
31.—Two Proof Lines	26
23.—Governing Line of Sections	27
33.—Return to Township Clerk	28
34.—Aliquot Parts	31, 18
35.—Section Corners	29
36.—Single Fronts	33
37.—Broken Fronts	34
38.—Double Fronts	35
39.—Townships With Alternate Concessions	37
40.—Determination of Lot Corners	40

In this arrangement I have endeavored to give effect to the suggestions previously made, the number of Sections being reduced from 47 to 40, some being omitted entirely and others re-written and amalgamated, and I cannot but think that some such revision as this is necessary to render the Act wholly intelligible to those whose work is governed by its provisions.

DISCUSSION.

Mr. Ransom—Personally I feel Mr. Le May deserves a lot of credit for preparing and going to the trouble of preparing this report. There are several things that perhaps some of us might not agree to in his recommendation, and perhaps the majority of them we might agree with. Along the line of amendments to Acts generally speaking they bring poor results, and Mr. Le May has certainly tackled the problem in the right way when he suggests a complete new remodelling of the present Act. I don't know, I am not up in, the history of our Act well enough to say how many times it has been remodelled. In connection with the Dominion Lands Survey Act, I know personally of four remodellings, at least along certain lines, and it seems quite in order that we should have a remodelling of our Act. Two years ago I was instrumental in bringing forward an amendment, and at the time I really desired to bring forth further amendments than I did, but I didn't feel justified, as being perhaps a young junior member of the Association. This year there is also another amendment along the line that I brought out before of introducing a standardization of measurements. I might just say, bringing that subject up now, it seems to be in order that our Act goes very fully into certain methods of division, for instance, aliquot parts and resurveys of certain townships, but until two years ago, speaking along subdivision surveys, there was nothing that compelled a surveyor to plant any marks on the ground to determine or to govern the methods of determining his astronomical or any kind of bearings; he could use a compass or transit, as far as I could gather, or assume his bearings. This year I would like to see an amendment made setting forth the methods or the results of the methods that a surveyor must use in measuring lots; and I don't see in looking through the Act anything that would say that a surveyor couldn't ascertain the distance between two lots by stadia, for instance. The Act says a surveyor must have a standard measure and that he must test his chain before going out to make a survey, but it doesn't say when he gets on the ground he must use the chain he tested; it doesn't say he must use a

chain at all in making his measurements, and the only thing I could find in looking through the Act that governed the actual mode of measurement was if he was guilty of gross negligence the Association could strike his name off the roll. That is sort of careless phraseology. We all have our ideas more or less along particular lines along the Survey Act, and I would move that a committee be appointed by the Association to consider all the amendments and suggestions that have been put forth recently in regard to the Survey Act and to consider Mr. Le May's proposal, and that this committee bring in a report to the Council regarding any changes that are to be made in the Survey Act.

The President—Gentlemen, wouldn't it be better to have a motion to deal with the paper in some way first?

Mr. Ransom—I beg your pardon. I move that Mr. Le May's paper be received and printed in the proceedings.

Mr. Dobie—I take great pleasure in seconding that motion. I am sure the thanks of the Association are due to Mr. Le May for the very edifying paper he has given us this afternoon. I have run across a good many surveyors who have succeeded in burying themselves in the mazes of the Survey Act, but I never struck a man yet who was able to dig himself out the way Mr. Le May has done, and I think the thanks of the Association are due to him.

The President put the motion, which, on a vote having been taken, was declared carried.

Mr. Jackson—I think, Mr. Chairman, that Mr. Le May's handling of this question is absolutely heroic. I think he deserves some decoration. I remember being ploughed in the Survey Act myself the first time I tried to explain how much I knew about it on the very same question he mentioned to-day, the governing line of a township, where, as a matter of fact, there isn't such a thing; there are perhaps a dozen of them; there is a governing line for each concession. I got ploughed for saying that the governing line for each concession was the line for the whole blooming township.

There is one point in the Act which I believe Mr. Le May has skipped, that is, where the Act mentions the true and unalterable boundaries. In one section it says certain boundaries shall be the true and unalterable "lies" of this township. Mr. Le May has gone even to the extent of pointing out

the misprints. I think the subject is one that could be very well investigated by the Association and thoroughly thresh out the revision of the Survey Act, and it would please not only the existing members, but it would be a tremendous help to all students.

Mr. Fullerton—I was very much impressed with the speaker's paper and his remarks on the Act, and also his courage in attacking a subject of that kind. Of course, all law is more or less of a growth, and different clauses have to be tacked on year after year as conditions change and as new conditions arise, and as men have found that previous sections meant altogether different to what was intended. You can go to all the trouble you like and get the best constitutional and municipal lawyer to draft legislation, and after it is passed it is often found to mean something entirely the opposite to what was intended, and in the Association here for a number of years we have at various times considered the re-drafting and compiling of a Survey Act that will be more elastic and will be of more use to the surveyors, but until the present we have not found anybody that was willing to do the job. Now we have at last unearthed a man who has dug himself out and he apparently is willing to go to work and draft a new Act, and we will not be put to the cost of securing constitutional and municipal lawyers to draft our new Act, and I think that this Association is very fortunate indeed in having Mr. Le May, who is willing to take upon his shoulders something that we were wishing would be put on somebody's shoulders long ago. But at the same time I would like to say that very likely after he finished drafting the new Act that next year it might be possible for somebody else to go through it and find perhaps just as many mistakes and blunders and discrepancies as exist at present. Some things he might put in the new Act that he would find next year didn't mean what he intended to mean at all, so I just give him a few words of warning when he drafts a new Act to be careful, because it will be scrutinized very closely after he gets it finished.

The President—If no person wishes to say anything further, you have heard the motion that this paper be received and printed in the proceedings, and I suppose thereby give us a new Act.

Motion carried.

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

AZIMUTH.

By A. M. Jackson.

Very naturally in deciding to read a paper before the Association on any subject the first consideration is to find out what has been previously said on the subject. By the aid of the very excellent index of subjects prepared by our indefatigable Secretary, and published in the Proceedings for 1912, it is very simple under the head of "Azimuth," to turn up all which has been said or written before this Association on that subject.

The first paper on the subject was by Mr. John McAree in 1887 entitled "Solar Azimuths," but while Mr. McAree evidently preferred the method he described of obtaining the true azimuth, he still stated that he believed the method by observation on the Pole star to be the more accurate.

In the Proceedings for the next year, 1888, appears an article by Mr. E. Deville, the present Surveyor-General for the Dominion, giving formulæ for finding the time by observation in the vertical of Polaris.

The next year, 1889, a paper appeared entitled "An ephemeris of stars in the vertical of Polaris," by Mr. F. L. Blake, which introduced a set of tables by that gentleman, for use in obtaining the azimuth of the pole star, by observation of a time star in the same vertical.

There is now a gap of 10 years in the proceedings, during which period, the subjects of Azimuth and Time are not dealt with, but in 1899 Professor L. B. Stewart presented a highly technical and very carefully prepared paper, again on the subject of "Time and Azimuth by stars observed in the vertical of Polaris." This paper brought forth one in the following year, 1900, by Mr. Cyrus Carrol, entitled "Azimuth and Time by Observation on Polaris," in the discussion on which it was shown that the results obtained agreed very closely with those by the more intricate method described the previous year, by Professor L. B. Stewart.

Mr. Otto Klotz, also in 1900, provided a paper on "Azimuth by Polaris," which dealt in simpler form with the formulæ used the previous year by Professor L. B. Stewart, i. e., for observations on Polaris and a time star in the same vertical. The discussion on this paper was interesting, in that it brought out the fact that the solar compass was no longer in general use by the Surveyors of Ontario, and the prophecy from the president of that year, Mr. Geo. Ross, of Welland, that the time was coming when all registered plans and descriptions would have to show the true astronomic courses.

There was then another considerable interval, six years, in which the subject of Azimuth was not touched in our proceedings, but in 1906 Mr. F. L. Blake again approached the subject in a clear and extremely practical paper embodying a set of tables for determining Azimuth by observation on Polaris at any time. The table of corrections given in this paper for the changes of declination throughout the year, was, of course, for the year of issue only, i. e., 1906. These tables together with the accompanying instructions as to their use, were, I believe, issued by the Department to Surveyors engaged on Municipal Surveys in that year, and identified 1906 as the year in which our Association attained its high water mark, in the direction of supplying its members with an authoritative set of tables, for the ready determination of true azimuth.

The subject was, however, again dealt with in an article by Professor L. B. Stewart in 1909, in which he discusses a set of tables for use in determining azimuth, which were in that year appearing in the *Canadian Engineer*.

The determination of azimuth has not since 1909 been discussed in our Proceedings, and the tables referred to as published in the *Canadian Engineer*, in that year, have ceased. To-day we stand as an Association in the position in which we have always stood, with the exceptions of the years 1906 and 1909 referred to, without the data for the easy and accurate determination of a meridian. The thanks of the Association is undoubtedly due to those members who have so ably discussed this matter in the past, particularly to Mr. F. L. Blake, and Professor L. B. Stewart, for their continued efforts to provide us with the means of determining a meridian by other than the sitting-up all night elongation period. As an Association, it would surely be unnecessary for us to rely on the courtesy of any individual, or the publication of any

journal unconnected with the Association for the supply of the data necessary to enable us to comply readily with the requirements of the Survey Act. The Act, however, provides in Sections 27, 31 and 39 and the new Section 47 of last year, that astronomic courses shall be given to lines covered by those Sections. There can be no doubt whatever, as has been shown in the discussions on the papers already referred to, that the infrequency of astronomic bearings on all record of the present time in old Ontario, is due very largely to the want of a ready and comparatively inexpensive method of obtaining the same.

The Surveyor called upon to make a survey in old Ontario, usually has to follow out an old plan on which are given bearings and distances. The bearings, as a rule, he knows are only an approximation, and therefore cannot be fully relied on. Thus of the fundamental data required, a part is lacking. The reason for this he knows to have been the inconvenience and cost of taking an observation. At the present time we are to a great extent perpetuating this malpractice. If the profession of the Ontario Land Surveyor is to be kept up, or should I say brought up, to the status to which it belongs, the information supplied on plans must be as accurate as it is possible to make it.

In the past generation or two the country has been cleared and land has become far more valuable. It is easier now to make an accurate survey than it was thirty or forty years ago. The expense of an accurate survey is now justified, and I find that the people expect accurate work and are willing to pay for it. It would seem to follow that to make our work as accurate as is possible, astronomic bearings should be used in a very large proportion of our every day work.

The sets of tables issued by the Surveyor General's Office at Ottawa for the survey of Dominion Lands are designed to enable observations for azimuth and time to be made whenever Polaris is visible, with no more difficulty or fatigue than is encountered in recording any two sights in an ordinary survey, and by their use the reduction of the observation is made so simple that it will occupy only five or ten minutes and will give results always within a limit of error of one minute of arc.

For the use of these tables it is assumed that the surveyor is equipped with a sidereal watch and a transit having a quite ordinary telescope. The use of such a set of tables,

compiled for Latitudes 42° to 52° would enable any of us to record true bearings on a very large proportion of our work, by the use of an ordinary watch and Standard time.

It must be borne in mind that while a sidereal watch is an essential on Dominion Lands or Northern Ontario surveys, it is not indispensable for azimuth observations in old Ontario, where accurate Standard time can be had at any railway station which has a telegraph operator. The Dominion Tables are calculated for sidereal time 0 hours to 24 hours and not, as is so often the case with such sets of tables, for mean time hour angles, i. e., the angle between the star and the meridian east or west. With the Dominion tables the azimuth of the star is given in degrees, minutes, and decimals of a minute for every ten minutes of sidereal time, so that with the azimuth of the Pole star written in the tables $359^{\circ}-36.3'$ or $1^{\circ}-49.7'$ it is impossible for that simplest of all errors in azimuth observations to be made, i. e., the placing of the meridian on the wrong side of the star.

To conclude might I suggest that a Committee of the Association be appointed to decide on the form such a set of tables should take to be of the greatest amount of use to the greatest number of our members, the information they should contain, and the frequency of publication necessary, and that a resolution be passed by this Association authorizing the publication of such tables in the form recommended by the Committee and their distribution to all the members of the Association.

DISCUSSION.

Mr. Dobie—Mr. President, I am very glad to hear Mr. Jackson bring up that subject, and treat it in the manner he has done. I have had some idea of preparing a paper along that line myself for some time. Now I guess I will have to look for another subject. But, the use of these tables is something that I have found amongst surveyors is not as general as it should be; there are not nearly as many of them used as there should be. The Department of the Interior have gone to a very great deal of trouble to prepare these tables, covering a couple of years in advance, and distribute them gratis to anybody that wants them. I send in myself at the first of every year and ask the Surveyor-General to send me a set of them, and he always does, and with these tables and a sidereal

watch the taking of an observation if Polaris is visible is the simplest possible matter, and it can be done with a very small telescope. I have a small transit with a four-inch circle and three-quarter inch object glass, and I have frequently taken observations with that telescope just after sunset when Polaris and the picket on the line were both quite visible, so there was no necessity for using a candle or artificial light around the object at all. Those tables he speaks of unfortunately are compiled for Dominion land purposes only, and they start at the 49th parallel, and the interpolations are for township numbers and start at zero, and the next is township twenty and township forty and so on, so that they are hardly suitable without some modifications for use in the older parts of Ontario. The Topley Company of Ottawa a few years ago published a small pamphlet containing those same tables, and they were prepared in different forms; they were prepared for surveyors in the other parts of the Dominion, and my recollection is that they started with latitude 43, 45, 47 and 49 so that you could interpolate in between, so that information is very much more valuable from our standpoint in Ontario than information supplied by the Department of the Interior. For some reason I understand the Topley Company has discontinued the publication of that little pamphlet. I wrote to them for it at one time, and they sent me a copy, and said they were preparing these at their own expense and distributing them free of charge, and whether they would continue to publish them or not would depend on whether the surveyors throughout the Province appreciated them enough to keep up the demand, and I presume the fact that they discontinued publishing them is probably due to that cause. However, I quite agree with Mr. Jackson that some steps should be taken whereby every member of the Association should have a copy of the Azimuth tables prepared so that an azimuth observation on Polaris can be taken at any time. These tables have the azimuth for every ten minutes of sidereal time and have a list of about twenty first and second magnitude stars, and so that no matter where a man is or at any hour of the night when he can see a star, or usually on in the afternoon when a star is visible, he can check up his watch and take an observation. With the assistance of those tables it is not any more difficult than taking an ordinary sight on the line. I know I have one or two cases. In one case I remember in running a base line, in working along in the afternoon, there was a big rock; it was one of these sloping things; you couldn't get set up on it, just a shoulder that stuck out over the line. I had these tables in my pocket, and I ran up to that rock and put

the picket on the top and moved my transit around to the other side and set it up sighted on Polaris, and then went right on with the work. That one sight alone saved me enough time to repay me for all the time I had spent to send and get them. A sidereal watch is not absolutely necessary, but it is a great convenience; the Waltham people have a very fine one. I have one that cost me \$45; I check that thing up right along, and it is never out more than ten or fifteen seconds in a month; that is all it has ever varied. In taking your watch and taking the observation it is such a simple thing, and the information in those pamphlets is so valuable, it seems to me the surveyors should be supplied them. I don't think it would cost very much. We got a set of tables one time that were prepared by Mr. Blake—I have one of them yet. That was some years ago. The declination of Polaris changes from year to year, and they are only applicable to certain months in the year. The change is not very great, but still it is enough to necessitate practically the preparation of tables from time to time. I don't think the preparation of a set of those tables and the publication of them and the distribution of them to each member of the Association would entail very much expense on the part of the Association. I believe it is something that would well repay the Association for whatever little bother or expense it would be put to. I would take great pleasure in moving that Mr. Jackson's paper be received and printed in the proceedings, and that he be congratulated on the manner in which he has treated that subject.

Mr. Le May—I have much pleasure in seconding that motion. I represent perhaps a different class of work to that represented by Mr. Dobie, but I can assure you that in Toronto we would feel the benefit of a set of tables of that kind quite as much as they do in the outside. These new sections of the Survey Act require observations, and anything that will help and enable us to get those observations more easily is a thing very much to be desired.

The President put the motion, which, on a vote having been taken, was declared carried.

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

TOWN PLANNING

Thomas Adams, Esq.

Gentlemen:—I am sorry to take you away from those practical questions connected with the drainage of the land, but I hope I shall be able to convince you that town planning is also a very practical question.

“Town planning” is a term which is used to designate a movement which has for its object the proper planning and regulation of the use and development of land for all building purposes in cities, towns, and rural municipalities, and more agreeableness and beauty in connection with that use and development.

The Land Surveyor is concerned with fixing the legal boundaries of land, hence the importance of his relationship to town planning. He needs to more adequately appreciate that relationship. It is likely to grow more intimate in future, and the time may come when the surveyor will have to broaden his outlook and extend his functions.

It is an important question in connection with surveyors' work to appreciate the importance of planning, and of exercising more foresight and intelligence in connection with the sub-division of land for building purposes.

When I first went to Hamilton I remember a group of people were considering the question of what they should do to get a town plan of the city. No doubt it had passed through their minds that one way to do this would be to employ some landscape artist to come along and take the place of the real estate artist and prepare a beautiful picture which would enable the citizens to visualize how the “ambitious” city would look after a period of fifty years. That method of procedure was no doubt discussed. One reason why the preparation of pretty pictures fail is because the surveyor and lawyer are left out in their preparation. The surveyor and the lawyer are very much alike—both are angels if they are brought in at the beginning of schemes, but if only brought in as critics, after the work is done, they are rather apt to lose their angelic

disposition and suggest all sorts of objections—perhaps that applies especially to the lawyer. The men concerned with the laying out of the land and the men concerned with the legal aspects of land development must be consulted from the very beginning of schemes. Hamilton has realized the importance of starting at the beginning, and leaving the preparation of pictures over for the present. Moreover, they have also realized that the plan of a city is not the plan of its sub-division only. The plan of Hamilton as I saw it first was a plan of subdivisions—rectangular plots in scattered spots spread about in prairie lots—but seeming from the plan to represent the existing city. What it did represent was the imagination of real estate speculators. I have seen a plan of a western city which covered about ten square feet of blue print, and the actual city would be about one square foot in the centre. I am mentioning that, not as commendation of real estate speculation, but as an indication that such plans give no idea of what a city is. I could bring an ordnance plan of any town in the old country to any surveyor here and I am sure it would enable him to understand the character as well as the position of the buildings and streets, to visualize the whole of the town without seeing it—everything is so accurately drawn and so well indicated. There is no obliteration of the physical features of the land by a multitude of sub-division lines on the map.

In Hamilton they came to the decision that the first thing to secure was a physical plan of the city. When an architect wants to put up a building he wants a ground plan first. When you want to make a survey you want some data with which to begin. When an engineer wants to put in a water pumping plant he wants to know what volume of water he has to pump, and generally to have the necessary data on which to prepare his plans and estimates. If you were asked to plan the extensions of Toronto would not the first thing be to have a map of Toronto as it is, its buildings, its railways, its canals, its physical features—ignoring its vacant sub-divisions. Of course you cannot altogether ignore the sub-divisions when you come to plan for the future, but you must first have an adequate conception of what land is covered by improvements so as to see what vacant areas you have to deal with. We want maps of cities as they are and not cities as they have been conceived to be in the wild fancy of those who speculate fifty or one hundred years ahead. Demagogues used to say from the hustings in the Old Country that what they wanted was to see “more people with stakes in the country.” When I was out West I thought that the need was for the people to have “fewer

stakes and more buildings." That is by the way. What I am trying to urge is the need for better maps, and that brings me to a letter I received from Mr. J. J. MacKay with regard to the necessity for co-operation between the Federal Government and cities in regard to preparation of maps. I want to quote that letter because it raises one or two very interesting points in connection with the data that is required as a preliminary to the preparation of town planning schemes. Mr. MacKay says:—

"It might be possible to make arrangements whereby all future maps of our towns and cities would be based on geodetic work performed by the Geodetic Department. The map, thus prepared by the Department, would show the streets and geodetic triangulation points, the location of buildings and a proper system of contours. The triangulation points, as established by the Department, could be used by the local surveyor in preparing the survey map of the town, which would show the proper location of street lines and lots into which the blocks have been sub-divided.

"It is an important matter, in all towns and cities, to know where the proper street lines are so that in the erection of buildings the lines to which the buildings can be erected may be easily ascertained. In order to do this it is necessary that the block corners should be permanently marked.

"The map to be prepared by the local surveyor would show the proper street lines, the permanent block markings, the subdivision of lots and the accurate data from which the individual surveys would, in future, be made.

"The map prepared by the Geodetic Department could be used by the municipal authorities for all works in connection with street grades, location of grades of water and sewer mains, hydrants, catch basins, manholes, etc.

"The work of permanently monumenting block corners and preparing the map showing the sub-division of blocks, should, I think, be prepared by the local surveyor who, on account of his local work and knowledge, would be best fitted to do this.

"The plan thus prepared by the local surveyor, would be based upon the geodetical survey previously prepared by the Department and the street lines would be tied in to the various geodetical triangulation points, hence by a working arrangement between the Geodetic Department and the surveyor ap-

pointed by the civic authorities a proper system of maps could be prepared."

We want the necessary scientific data, the location of buildings and other physical features and a proper system of contours where the land is undulating in character. Mr. MacKay indicates the importance of having the Federal Department working in co-operation with the cities, through local surveyors employed by the cities. There is great scope for the work of the surveyor in connection with this detail work which has to precede the preparation of plans. In the past surveyors have not had as much regard for the symmetry of nature as they have had for the symmetry of Euclid; they need to have more regard to conformity with topography and less, perhaps, to geometric patterns.

More attention should also be given to efficiency in industrial development, especially in connection with transportation as influenced by the plan. We need also to have plans which will enable us to effect economies in street construction. We can do with less superficial area given up to roads and with more good roads capable of bearing traffic. We need more variety in grouping of buildings, better provision for main arterial thoroughfares on the one hand and comparatively narrow driveways in residential districts on the other hand. It is not desirable to have a higher average width than 66 feet, therefore if we want wider thoroughfares in certain positions we must be prepared to permit narrower thoroughfares in other positions. That is not only possible but desirable. Enormous sums of money have been expended in Canada, and still greater sums are involved in the completion of local improvements in connection with the development of real estate, because we have followed the call of the man operating real estate and not sought the general public advantage. If we have proper town planning it will help us to lessen this waste, and to secure more convenient means of road transportation to the manufacturer and to the farmer. Industrial efficiency in the future will come from civic efficiency and town planning is a necessary foundation to both.

Cities have been allowed to grow. The surveyor has been somewhat helpless in trying to regulate that growth. He is like the architect who has to design a building to suit his client, as he has had to conform to conditions laid down for him. But I would like to see the surveying profession taking a wider view of its responsibilities. The surveyor should not only deal with the measurement of land, he should also deal with town planning, in its first stages at least, and with ques-

tions of land valuation. If he is an engineer as well as a surveyor he should deal with the second stages of town planning which enters into consideration of drainage and water supply systems and other questions. This work has to precede that of the architect, which is more concerned with that of the planning and grouping of buildings.

We find a condition of things going on in connection with land development which requires very careful consideration. I do not think any of us would say that the present position is satisfactory, that we could not have a better system of main thoroughfares, more direct without being necessarily straight; that we could not have more variety of width of secondary streets and less waste in making wide residential streets; that we could not have more beauty and symmetry than we get in the middle of the average city both as to sky line and grouping of buildings without any injustice to individuals and with an actual saving to the community. In Toronto there is a fine group of buildings—the Parliament and University buildings—but what kind of approach have they? A great deal of beautiful open space surrounds them, they are admirably situated; the University Avenue leads up to them for a certain distance, but the actual approach for visitors to Toronto or from the station is via Terauley Street.

When I speak of town planning, however, I am speaking of the planning of vacant land rather than that which has already been built upon. That is why it touches the surveyor so closely. Before giving a brief description of the powers contained in a town planning Act, I would like to draw your attention to a tendency in connection with the development of cities. Cities are beginning to decentralize. All over the American continent there is a movement of manufacturers out of the cities. New York, Chicago—perhaps Toronto—and Montreal are growing more rapidly outside of their boundaries than inside their boundaries. Cities with large areas of vacant lots are seeing development go on outside of their areas, on land which does not possess the same facilities, but which is so much cheaper and affords so much better room for expansion, that manufacturers prefer it. The vacant lots in the cities still pay taxes on their high building value as if the development was being attracted to the city itself. High land values are driving manufacturers and well-to-do residents outside of cities. The United States Steel Corporation, when they came to locate in Canada, did not come to Toronto, they did not even go to Welland, but they bought an agricultural area at agricultural rates to establish a town for themselves. When-

ever a manufacturer has sufficient capital his tendency is to go where he can buy land unaffected by existing subdivisions and high land values. Every tendency in industrial expansion and scientific evolution is going to accelerate that process. What is the Hydro Electric Commission going to do? It is going to make cheap land, fifteen or twenty miles from Toronto, as valuable for manufacturing purposes as dear land in Toronto, and it is going to create a condition of affairs whereby people will spread their residences over wider areas than they have in the past.

It is said we are fifty years too late with town planning, but fifty years after this the same thing will be said. We have to study new tendencies and consider how they are going to affect us. We will only then be doing what the Germans, with all their disadvantages and wretched militarism, have been doing for so many years, planning for industrial efficiency. We cannot have efficiency without planning; by letting things grow in a haphazard way and leaving everything to chance. We must lay down principles in advance and plan for the future growth and for healthy living conditions if we are going to be able to compete effectively with other countries after the war. The surveyor has a great responsibility in that direction.

It seems likely that Canada within the next year will have town planning Acts for all the Provinces. Three Provinces have them now in force, New Brunswick, Alberta and Nova Scotia—the Nova Scotia Act being compulsory for the whole province. I have just come back from Winnipeg, and I have seen a bill put through its second reading which will be almost certain to become law in the next week or two which will lay the foundations of an entirely new policy in regard to sub-divisions. A bill has also been printed and passed its first reading in Saskatchewan. In Ontario the pressure for legislation has come from cities and towns rather than from the Legislature itself. The most active of these cities is Hamilton in regard to town planning, but there are many others which have been taking steps the most active of which are perhaps Berlin, Brantford and Renfrew. A movement is on foot to secure the planning of a large area of land opposite Detroit where there are five municipalities, Windsor, Walkerville, Ford, Sandwich and Ojibway. These five municipalities took steps to join together for the preparation of a town plan for their joint area. In the Ojibway area I believe the Steel Corporation which has purchased the site for a new town intend to improve on anything they have ever done in the way of building a model town around their steel works.

The Acts now being considered in different provinces are divided into five parts. The first part relates to the appointments under the Act—included in that there is the Minister of Municipal Affairs, who is the Minister responsible for the Act. Where there is no department of municipal affairs, another department may be made responsible; for instance, the Commissioner of Public Works and Mines is responsible under the Nova Scotia Act. Under him is to be a director or comptroller of town planning. The latter may be an architect or engineer or a Land Surveyor. The director would be the responsible person under the Minister for the operation of the Act.

Each local authority is required within three years to prepare a set of town planning by-laws or a town-planning scheme. If it is unorganized territory that scheme must be prepared by the owner of the land and submitted to the Minister before sub-division can take place. No person can subdivide any tract of territory without submitting a plan for the approval of the local authority and the local authority in giving its approval must take into consideration the following among other things: It may not allow any plan to show buildings nearer to each other on the opposite side of a street or road than 80 feet in the case of ordinary streets, or up to a maximum of 120 feet in the case of main thoroughfares. It may provide for limiting the number of buildings to the acre. It may limit the height of the buildings, it may prescribe the use of the land for factories or residences or open spaces. It may reserve not less than five per cent. of the sub-division for public open spaces. All these things it may do without payment of any compensation for injury, so long as it can prove to the Minister that its regulations are reasonable for the purpose of amenity and proper sanitary conditions. This will prevent many of the evils from which we suffer in our existing cities, without cost to the community.

By applying these regulations to land while it is still agricultural you are doing no injustice to the owners. If a railway company decides to lay out a new town site it must have that plan submitted to the Minister of the Province and must show a public preserve of five per cent. as open space, and conform to the requirements as to building lines, width of streets, height and character of buildings, etc.

The Highways Department of the Province will prepare a skeleton plan of the whole province showing the main arteries.

That plan will be handed to the Minister of Municipal Affairs and the main arteries must be not less than 99 or 100 feet wide. The definition which is given of a main thoroughfare is a highway which connects two populous districts or forms the main approach to a city or town, or is, in the opinion of the Highway Department or Commissioners, necessary as a main thoroughfare. The ordinary principal street will continue to be 60 to 66 feet wide, but main thoroughfares will be made from 99 to 100 ft. wide and narrow streets varying from 24 ft. to 44 ft. will be permitted in certain cases so that the average will still be 60 to 66 ft. In order to get the 99 or 100 feet you must provide for complementary narrow residential streets. Narrow streets should be allowed only in cases of streets less than a mile long where there are only private houses, or in small villages, or where streets are short connections between principal streets. It is understood on those narrow streets that the buildings opposite would always be 80 feet to 120 feet apart. Then there are other varieties of width. If you have a piece of land which happens to be very deep, say 500 feet deep from the street, and you don't feel disposed to put a street through the middle of it, to divide it into two depths of lots, you may develop it all facing on the one street.

We can avoid a large amount of expense in street construction by developing deep plots with narrow carriage drives. We can also give greater privacy to the residents than if they had to live on the busy streets conveying through traffic. We all have seen the condition in cities where the cost of street construction has become so great a burden that people have ceased to erect single homes and are erecting apartment houses covering the whole of each lot. No person should be permitted to build on more than 75 per cent. of a lot, in a business section, or 50 per cent. in a residential section, unless in the case of corner lots. Air space should be provided to a greater extent within the boundaries of private property; at present we have to get air space by making wide and expensively constructed streets. Each owner should contribute space to provide light to his own building.

It is necessary to keep on emphasizing that town planning is a means of prevention rather than cure. I mentioned about the tendency of cities to spread out into the open country. That gives us the key-note to the need of a policy to control the development all round existing cities. In the proposed Act for Manitoba it is possible not only for the City of Winnipeg to prepare a scheme for its own area but go

outside of the city and prepare a scheme in respect of the surrounding land. Any person who knows Ottawa knows we have not many slums in the city but a great many potential slums outside, just over its boundaries. I have been making a housing investigation into the conditions there and I have discovered some of the worst conditions on land that has been subdivided and developed in the last five or ten years. Houses are being built on land which has about two feet of water under the ground floors in April. In order to bring that land up to the proper level for building purposes the owners dump down garbage so that they can get a dry site on which to erect a home. It is not so much the slums of the past that are to be deplored, as the fact that we are not controlling new development in such a way as to prevent more slums. Why should we in Canada spend something like twenty million dollars more on fire prevention than a similar population is doing in older countries? I am told that we pay about three dollars per head per annum more for fire insurance than they do in some countries in Europe. This figure seems so high that we can hardly believe it, but it is at least certain that we have an enormously greater burden than other countries have to bear. That is a tax upon the industries of the country, upon your profession and upon every citizen. One of the chief causes of this waste is the want of effective control over building construction. Town planning by-laws and schemes comprise regulations controlling the use and development of the land having regard to convenience, proper sanitary conditions and amenity—the character and disposition of buildings and hence the question of regulation for fire would be an important feature of any by-laws or schemes. While aesthetic considerations are not of first importance they should not be lost sight of in town planning, nor should such plans be indifferent to what is practical in the reconstruction of the existing city. For instance Toronto wants some day to have a good approach between the new Union Station and the Parliament Buildings so that the Deputy Minister of Roads can drive his motor car in a straight line from the station right to his office under the shadow of the blossoming trees on a June day. We want him to be able to do that so that he can say to the visitor with a feeling of pride: "This is Toronto." Instead of an unsightly bill-board at Carrol's Point, Hamilton, advertising Toronto's harbour front to manufacturers we shall have Toronto so attractive that it will become its own advertisement. Why should it not be known as the city where beauty is respected in its public places and where healthy living conditions are possible for the poorest of its citizens? But we want

more science applied to the development of Toronto and indeed to the development of all our cities. Surveyors, like engineers, are practical men; they are practical enough to know that the science that counts for most is the science that has for its final object the raising of the standards of civilization and the amelioration of the human race.

DISCUSSION

Mr. W. A. McLean—Mr. President, with all of you I have listened with the very greatest interest to the address by Mr. Adams and I feel particularly gratified with the outlook he proposes with respect to that splendid driveway from the new Union Station up to the Parliament Buildings, because while I have heard a great many good things with respect to our city here when I have been in the United States and elsewhere, and it is always spoken of by visitors who have been here in the most flattering spirit, yet in my own heart I knew we had some serious defects in the City of Toronto and we see some of them right from this place in which we are sitting. Unfortunately we have simply grown as Topsy grew and we have become certainly topsy-turvy in that growth. Town planning can hardly be retro-active but at the same time there is a spirit that should be applied to our older construction and certainly in all our development we should be constructing to a plan in the older occupied portions as much as in the new and I am sure that Mr. Adam's speech is entirely in harmony with that idea.

Mr. Adams spoke of the tendency of manufacturers and home-seekers going out from the cities and towns for their homes. The tendency is one with which I have been very strongly impressed. The construction of new highways and good roads and the use of automobiles on them is one of the most striking features of our age. Other ages have been prominent for certain movements. To-day we are in the age of transportation. I don't know of anything so characteristic of our age as our advance in transportation, and we have that all over this continent and I assume it is so in England because in England I found people who occupied offices in the cities having their homes miles out in the country. Here we have people going out to Agincourt, out to Oakville and to other smaller places in our vicinity for their homes and as soon as they get out to these places the first call we hear from them is the call for a good road. They want a good road on

which they can go out daily from their office in the city to their home. On a good road twenty miles out is a short trip for an automobile, and a striking tendency to-day is for people to take their home out to the smaller places, and in these smaller places we must have town planning schemes if we are to overcome the defects which we see in our older centres.

I have been greatly impressed with what Mr. Adams has put before us. He has opened up a new and broader field for the profession of surveyors, and while I am sure there is a wish by others to discuss the subject I won't take up your time, I will only add that with all the good that has come from the Conservation Commission at Ottawa the outstanding feature to me is the splendid field that they have opened up through their town planning work at the head of which they have placed so efficient and ideal a man for that work as Mr. Adams. I wish to move that his address be placed in the Proceedings and with that, if I am in order, I would like to move a vote of thanks to Mr. Adams for having come to us to-day and contributed his excellent address. (Applause.)

Mr. Le May—I have listened with the deepest interest to Mr. Adam's address on the question of town planning, but I must say I think he has been hardly fair to the City of Toronto. In fact he omitted it altogether. He gave us a schedule of other towns which had taken some interest in town planning matters but the City of Toronto apparently is still in the dark and wandering along the ways of perversity. There are one or two points which he touched which I think we can make a few remarks upon. As illustrating the work that has been done in Toronto. First of all he mentioned the question of geodetic points for the purpose of tying together various city plans. I had an interview with Mr. Biggar of Ottawa last week and I have now made tentative arrangements towards having geodetic points fixed around the city limits and at other points in the City of Toronto.

The next point he touched on was monumenting block corners. This matter has received serious consideration in Toronto. In fact two years ago an estimate was prepared as to the cost of monumenting all corners of blocks inside the city. This cost amounted to something like \$90,000 and it was felt at the time the results would hardly justify this expense, the corners in the City being more or less well established. As far as corners outside of the city go that question was taken up in the amendment to the Survey Act, section 47. In the original draft it stated that monuments should be

placed at each street intersection thereby establishing the angles of blocks by permanent monuments. That sentence was left out in the final draft as passed, but I have hopes a suitable opportunity will arise when that can be straightened out and the section read as originally intended.

The next point was that of topographical plans. Under the City and Suburbs Plans Act the city authorities of Toronto have control over the laying out of perhaps 150 square miles of territory included within the five mile limit. It is a very big job to contour that but we made a satisfactory start two years ago. We have had to stop owing to lack of money and financial depression owing to the war, but at the time we were working we had ten square miles with ten foot contours, having everything that you could see with the naked eye shown on the plan. As conditions change when opportunity arises we will be able to continue that work. Failing that we have gone ahead over the rest of this 150 square miles and have projected streets which shall form part of the general plan to which subdivisions as submitted should be made to conform. Before doing that, however, we specialize on the question of arterial thoroughfares which Mr. Adams also touched upon. We laid out 81 miles of road having a minimum width of 86 feet. These roads were designed to connect points of importance on the city boundary main roads where they left the city with points of probable or present importance outside. Of course there are not very many points outside the City of Toronto where you can put your finger down and say, this is going to be a centre of population, but as near as we could possibly guess we picked out the intersections of roads and established villages and ran diagonal roads with a view to connecting with these points. As far as the projection of these roads into the city that is a question of very great cost which I do not think we are in a position to touch at the present time.

Something was also said about the approach to the University Buildings and Parliament Buildings. That question has been discussed for a good many years. It is a kind of hardy perennial, it comes up every time there is nothing else to be discussed. There again it is a question of cost. Mr. Adams took objection to riding on Terauley Street up to the Parliament Buildings, but even if University Avenue was extended to Front Street I doubt if the city fathers would think it advisable to run a car line on that street.

Mr. Adams told us now was the time for the surveyor to branch out and lay out subdivisions having more regard to the

natural features of the land. We have in Toronto very many subdivisions which have been carefully designed having regard to all those features. Unfortunately these have been designed as a unit and not with regard to anything laid out outside. This should not be done except under the absolute control of some central authority.

Another point on which Mr. Adams touched was the question of apartment houses. I would like to call attention to the by-law which has been in force in the City of Toronto for some years, which says in effect that the air space connected with an apartment house shall amount to 300 square feet for each flat of that floor of the building which has the greatest number of flats, and is far from such a condition as he illustrated. We have a condition which possibly does not give all the air space that perhaps seems desirable, yet we have an air space which amounts to 300 square feet on that floor of the building which shows the greatest number of apartments.

I don't think there are any other points that I could touch on. I would like to say that I have very much appreciated hearing what Mr. Adams had to say and I think the thanks of the Association are due to him in a very great measure. (Applause.)

The President put the motion, which, on a vote having been taken, was declared carried.

The President—It affords me pleasure, Mr. Adams, to tender you the thanks of the Association for your address to us this afternoon.

Mr. Adams—May I say a word by way of explanation of my having omitted Toronto in the number of places I mentioned as taking up town planning. I was referring, I think you will notice, to the places which were operating under town planning legislation, or dealing with the matter along the lines which we conceived to be necessary in order to prepare a comprehensive town planning scheme. Now I think that Toronto is doing a great deal, but I think it will be admitted at once that what it is doing is hampered by want of sufficient power. It will have great difficulty in getting the diagonals mentioned by Mr. Le May built and projected when the time comes to make them and the limitations of the Cities and Suburbs Act are very evident to those who have compared its provisions with town planning Acts in other provinces. To

begin with the Act only applies to cities of 50,000 and over which are in many respects the least necessary to be town planned, because we want to get cities planned while they are small. But the point in regard to Toronto is this, in spite of the great deal that is being done of an excellent kind it is unfortunately piecemeal in character and must be so until the city has more powers given to it. These questions of fixing great diagonal thoroughfares ought to be part of a policy of considering development of the intervening land, on the initiative of the authorities and not of the owner. While any city in a province having a town planning Act is preparing a town planning scheme no owner can do anything in regard to his land which will contravene the proposed scheme. For instance, St. John, N.B., is preparing a scheme for about 20,000 acres, some 10,000 acres in the city and 10,000 acres outside. St. John has obtained the authority of the provincial government for that scheme and during the next two years or so no other authority or owner can do anything except with the permission of the Town Planning Board. This means they have power to prepare their scheme without regard to what might be done to contravene it. One of your troubles in Toronto is that if you lay down a line of road the owner of the land interested by the road is going to try and take advantage of your scheme in the matter for obtaining compensation. I personally have been anxious to get in touch with Toronto people about this question. I hope Toronto will back up our efforts to get Ontario into line with the other provinces in the matter of legislation. There is one thing Toronto has yet to do, they are not one of the many cities and towns which have petitioned the government for town planning legislation. Toronto wants to take the earliest opportunity to be in the position of being what it should be, the leading city in Ontario in regard to promoting town planning legislation, as it is in regard to many other things and efforts.

Mr. Henderson—May I take the privilege of saying a few words? About two years ago some twenty or more municipalities around Toronto met in convention with a view of establishing a metropolitan area, having in mind the town planning idea and all that that means; they were very enthusiastic but the difficulty was that they had no exchequer. I was asked to meet them. I did come up from Ottawa three times and we did a lot of talking, but nothing practical can be done. The late Mr. Morley Wickett was the central mover and he had gathered here a number of the most enthusiastic municipal representatives, but there was the difficulty that they could not proceed practically because I understood that even the City

of Toronto refused to do anything financially to work out the scheme. Now all that difficulty would be overcome if there were provincial legislation such as Mr. Adams suggests.

Mr. Adams—I ought to say that at this time of day with the war on, town planning, which means the expanding of additional public money, is not advocated by the Commission of Conservation or by me, but what we advocate is the kind of town planning that can be carried on without any expenditure of money beyond the cost of preparing schemes. This is not a time to advocate expensive schemes but a time to conserve our resources.

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

REMINISCENCES OF AN OLD SURVEYOR—A WINTER IN THE MISSISSAGA.

By James Dickson, O. L. S.

Previous to Confederation, pine timber in Canada was not looked upon as an asset of any great value, or as a source from which any considerable revenue to the Crown was ever likely to be realized. The quantity was considered to be practically inexhaustible. Nothing was ever done to either regulate the cutting or to preserve it from destruction by fire. The cutting was done in a most reckless and extravagant manner. When a tree had been cut down, if there was any blemish of any kind, it was simply left to rot on the ground, furnishing fuel for fire, and what between that which was destroyed by fires every season and by careless cutting there was nearly as much destroyed as was taken to market. When a lumberman desired a right to take timber on a certain block of land all he had to do was to notify the Department of Crown Lands that he wished to procure a timber berth fronting on a certain stream, extending a certain number of miles up the river and so many miles back, and he wished the Department to issue instructions accordingly, to a certain surveyor whom he was privileged to name to make the survey and file a plan of the same with the Department, the lumberman to pay the costs thereof, when a license was then issued good for one year. A yearly rental of three dollars per square mile was all that was exacted, payable in the month of April, and a duty of one half-penny per cubic foot for all the timber taken out; this was all the revenue the Crown derived from the same.

The present writer assisted in making a survey of a limit a couple of months before he passed his final examination, on the Filis du Grand River, a tributary of the River Dumoine, on the Upper Ottawa.

We began at a given point on the stream and made a traverse of it by compass for ten miles, plotted the traverse and laid out a line at each end, drawn at right angles to a straight line connecting those points. These were projected five miles back and connected by lines drawn parallel to an imaginary

line connecting the principal bends in the river, maintaining as nearly as possible a mean distance of five miles from it. When Confederation became an accomplished fact, Miss Ontario abandoned short dresses, assumed the garb of womanhood, and became the head of her own household. She called wise men to her council, who soon realized that they had heavy responsibilities upon their shoulders. It would require large amounts of money to defray the expenses of this household and develop the resources of the country, and that the onus rested with them to devise ways and means to meet those expenses without plunging into debt.

North of the Muskoka and Parry Sound Districts the country was practically terra incognita, known almost only to the trappers, with the exception of the copper mines at the Bruce and one or two iron mines, its minerals were an unknown quantity. It dawned upon their minds that, notwithstanding our vast timber resources, between the lumberman's axe and fire, it was only a matter of comparatively few years when our forest wealth would be exhausted, and some means must be adopted whereby the Province might reap some benefit from its timber, so a new policy was adopted to see if it could not be made to yield a fair revenue.

Some years previous to Confederation the late E. P. Salter, P.L.S., had run a line due west from a point on the Ottawa River to Sault Ste. Marie, and at intervals of every eighteen miles projected a line at right angles to the south. This large territory lying south of the Salter line the Department of Crown Lands divided into berths, each six miles square, designating them by numbers, and also one tier of such berths north of the line, and advertised that a certain number of those berths, the number being designated in the advertisement, should be offered by public auction on a given date. They sent experts into the woods to estimate the quantity of lumber in the berths offered for sale, and to find out also the convenience of floodable streams, thereby enabling them to fix a reserve bid. The terms were to be cash, the acquiring of those limits at the auction would only entitle the purchaser to cut and remove the timber, that in addition to the purchase price they would require to pay five dollars per annum per square mile for ground rent, and an additional sum of so much per thousand feet, B.M., for all the timber taken out. The first of those sales was held in the autumn of 1872, when the amount realized exceeded the utmost expectation of the Government.

A number of such sales have been held almost every year since that date, the amount per square mile steadily rising each and every year, so that Ontario's Treasury has accumulated many million dollars from her pine.

The writer was engaged by a firm of lumbermen to take a gang of men and outline a number of berths which they had purchased butting on the Salter base line, and ascertain as nearly as possible what timber they contained, as they had made the purchase without having any examination made; in fact, had simply "bought a pig in a bag." The south-east corner of what is now the township of Otter was about the centre of those berths, that point being about a mile east of where the Salter line crossed the Mississaga River, and I concluded that the most convenient way to reach it was to land at Algoma Mills, purchase canoes, and ascend that stream to the Salter line.

I left home on November 11th, of that year, and proceeded to Toronto, one of my employees going with me to assist in purchasing winter supplies. These consisted of two double twilled cotton tents, ten barrels of mess pork, ten barrels of flour, one barrel of hard tack, a liberal supply of beans, a few raisins, rice and tea, as well as a small quantity of sugar. This variety of provisions was considered ample for that day. It was baked beans, cold pork and tea in the morning, a cold lunch of bread and pork, without tea at noon, bread and cold pork and tea, with possibly a plate of pea soup in the evening, with fried pork on Sunday mornings, and the men looked for nothing better. Neither lumbermen nor surveyors had then realized that bread and pork was the dearest food which we could give the men. The party assembled at Collingwood, consisting of two timber estimators, two chainmen, four axemen, a cook, and myself.

On reaching Collingwood we found the steamer "Waubuno," a Captain Campbell, which a few years afterwards went down with all on board in the Georgian Bay, loaded down with passengers and freight. We hurried on board the vessel, got under way late in the afternoon and made Owen Sound at 10.30 the same evening.

As this was intended to be the last trip of the season, the vessel was literally crammed with passengers and freight, and the only accommodation either my men or myself could get was to lounge around among the bags, boxes and barrels. Owing to the stress of weather the Captain did not venture out till 1 p.m. the next day. Saturday, the 16th, we steamed

out eight miles to Presquile, when the storm again came down, and we lay until 7.20, when a fresh start was made. As a gale accompanied by a blinding snowstorm increased in violence a few minutes after we started, the Captain ran in behind Cape Croaker. The anchor and chain were so covered up by freight that they could not be got out, but we were able to make fast by a line to the leeward side of an American schooner, riding at anchor. At daylight we again put out, and after battling with the elements for half the day the attempt to cross to Killarney was abandoned, and a course laid for Tobermory Harbor, which port we thankfully steamed into at sundown.

The gale continued with unabated fury till noon on the 19th, when it finally settled down, and the engine got to work at 12.30 p.m. In the middle of the next afternoon we arrived at Algoma Mills, where both men and supplies were disembarked. As soon as this was accomplished the vessel steamed on her way.

I now learned that I must abandon the idea of going up the Mississaga River as it was sealed up for the winter and I must find some other means to reach my objective point. The nearest, and in fact the only route, was to make my way to Thessalon and pack everything in from thence then chanced to be a large open bateau there from the Bruce Mines. It was large enough to hold my whole party and supplies. It was run by the owner and one man. They were trading with the Indians, allowing them five cents apiece for white fish, and paying them rusty pork at twenty cents per pound. He had also a barrel of "tangleleg," not by any means first brand of liquor, which yielded him also good profits in white fish. A small portion of the upper part of the vessel was decked over, where his trading goods were kept stored, and where he and his men could sleep. I engaged him to carry us to Thessalon for the sum of forty dollars, and as he had some other work to attend to, we did not get away until noon on the 24th, when we had everything on board. The craft was filled up to the gunwale, leaving room only for a small upright stove and a very limited supply of firewood. We started with a clear sky and fair wind and hoped to reach our goal before night. At 3 p.m. the wind rose to almost a gale, but the weather continued fair, but the Captain, without any apparent reason, took down the sail and cast anchor at 5.30 p.m., although we could have made our destination in another hour.

At 3 a.m. next day, after a brief calm, another storm burst upon us from the west and we lay tossing in the gale until daylight. Shortly after the gale sprang up an exclamation from one of the men caused all eyes to look up, when a yellow light of nearly a foot in diameter was seen enveloping the block at the masthead. This aroused the superstitious fears of some of the men and the certainty of impending disaster was freely discussed. As I could attribute the phenomena to natural causes I succeeded in allaying their fears somewhat. When daylight broke the light gradually faded. When the day became clear enough to see it sent the cold shivers through me to see the narrow escape we had had. The anchor chain was made fast to the mast amidships and passed through a wooden cleat nailed to the gunwale at the bow. The pitching of the vessel had caused the cleat to become loose and it was then held by only one nail. Had that parted we must have swung broadside to the storm and gone down, when it would have been "Goodnight to Marmion," for all on board. Our only chance was now to up anchor and about ship and run before the wind for some shelter till the storm should abate. Everything was coated with ice, but the anchor was raised, the jib hoisted, and the vessel headed before the wind. In less than two minutes the sail was torn from the bolt ropes. We managed to get a few feet of the frozen main sail hoisted, and ran back ten miles to a small sheltered cove, and I rose from my seat for the first time in twenty-three hours.

The Algoma Lumber Company had a camp there and we were all hospitably treated to a good warm meal. We got the tents on shore, pitched them and remained until the following day. Next morning, as the gale had worn itself out, and a light wind had sprung up from the east, we were under way once more at nine o'clock. There had been hard frost during the night and the little cove was coated with ice, through which we had to break our way. The wind was fair, though so light that it was sundown before we rounded Thessalon Point, which we did just in time to avoid another gale from the west, and passed the night in the house of a French fisherman, who, with a couple of Highland Scotch families a couple of miles up the river, were the only settlers between Byng Inlet and the Bruce Mines.

The problem now was to find the easiest route to Berth No. 194. I knew there was a Salter line, which started from its southwest corner and ran due south fourteen miles to Wabkigobkigobing Lake, eight miles from Lake Huron, also

that the line struck the lake near its west end. I now found an old lumber road started from the furthest up settlers' house, and extended half way to the lake. A son of a fisherman professed to know all the country and also where the line struck the lake, so engaging a fishing boat I got all the stuff three miles up the partly frozen river to the settlers, set the men to clearing out the road and with the young fisherman as guide, started out to locate the line. It did not take long to find out that my guide was like a ship at sea without either rudder or compass and when the time arrived to return home we hadn't even found the lake. When paying him his three dollar charge for his day's work, I accompanied the cash with a few chosen expletives, which generally in print are expressed by blanks.

Next day I had the camp pitched at the end of the lumber road and giving the men a course to steer and brush out a jumper trail I started out alone and located the lake without difficulty. I observed also that the country north of the lake, where the line should be, had been recently burned over. That day's work developed the fact that it would not be in the interests of my employers to spend any more time in road making. I therefore ceased operations on that line some distance south of the lake, leaving a clear space of eighteen miles of tump line work to where the survey would begin. I now engaged a settler's one-horse team to forward all our goods to the end of the trail, and striking off to the greenwood north of the lake with the assistance of an Indian whom I chanced to meet, I soon found the line and brushed out a trail through the burnt woods to the lake and on to the end of the road.

I was now confronted with another grave difficulty. The snow was coming down so rapidly that in a few days snowshoes for the whole party would be an absolute necessity. I sent one of the settlers to Bruce Mines, where I was assured they were always held in stock. He returned with only two pair. Here was another problem, but it has been said that a bushman is never at a loss for a rope so long as he can find a sapling which can be twisted into a wythe. I had observed that one of the settlers had a few calfskins which I purchased, and setting the Indian and his family, who were camped nearby, to snowshoe making, I soon had the whole party both soled and heeled.

This was before the long clear bacon era. All the flour and pork was in barrels, which it would be impossible to

transport by a tumpline, so we erected a scaffold, took the pork out of the lime and stacked it there to dry. The flour had also to be transferred to sacks. I divided the distance we had to carry into three stages of six miles each and to carry the pack six miles and return to camp constituted one day's work. I made three packs of each barrel of flour or pork, which would be a reasonably heavy load for a man to carry under the circumstances.

The country was not heavily timbered, but very hilly, not only was there a good deal of brushing to do along the line to make it reasonable good travelling with a load, but also a new trail had to be opened out for a considerable distance in order to get around abrupt hills, so in order to make six miles along the line usually meant a good deal more by the trails.

Snowstorms were of frequent occurrence and the falls heavy. While the snow was falling the weather was invariably very mild and the snow soft. As soon as the snowfall ceased, the weather invariably cleared and an intensely cold night followed so that the following morning the snow was invariably frozen hard and the snowshoeing was superb. Tent stoves were an unknown luxury in those days. Our two tents were pitched facing each other with a sufficient space between for a huge fire, and each man had one pair of blankets.

It took the party until the 21st of January to bring everything up to the objective point. It had taken so much longer to reach the work than I anticipated that I abandoned the idea of running the line with my theodolite and observing polaris that night in order to obtain the magnetic variation. I started work next morning by compass on the east boundary of Township Number 194. I sent the timber estimators out, one on each side of the line, instructing them to travel three miles at right angles, then two miles parallel and from thence back to the line, and report to me every night the quantity of timber which they had seen. I worked until the middle of February west along the Salter line, and having completed work in that direction returned to the starting point.

It now became apparent that owing to the long time consumed in getting in, and the unforeseen contingency, that the supply of flour would be exhausted before we could complete the work, and it would be absolutely necessary to get in four hundred-weight more, and the only way in which this could be done was for the whole party to go out to the point to bring it in.

At daylight on the morning of the 12th, I started on an eighteen-mile snowshoe tramp to Diamond's Lumber Camp, near the mouth of the Thessalon River, instructing the men to follow as far as the lumber camp, and there await my return from the Bruce Mines. With the flour I reached the camp at eight p.m. Next morning I engaged a settler's team, drove to Bruce Mines, purchased the flour and returned to camp the following day.

On the evening of Wednesday the 19th the whole party was back to the base line, and began moving to the east. The snow was now so deep that the blazes on the trees were only at long intervals to be seen above it, and no posts were to be found, consequently the line had to be brushed out and chained in order to find the corners of the berth, so that to cross the end of the berth occupied two days. From this date until the 21st of March I was occupied in running the east and west outlines of the several berths, and having an estimate made of the timber in each, then having completed all the work outlined in my instructions, with the exception of exploring the most easterly township, and the supplies again reaching a low ebb, I started all the party to pack out and strapping a blanket with a light upper sheet on my shoulders, with a light lunch in my pocket, an axe in my hand and revolver in my belt, I struck out alone on a southeast course to find out what timber was in the unexplored berth on the corner of which we were then camped. The day was dark, with a soft snow falling, the country was mountainous, alternating with small thick swamps, everything loaded down with snow, so that travelling was very fatiguing and progress slow. Towards evening the weather cleared and the usual hard frost set in. I selected a camp for the night where a good supply of dry wood was available, built a fire on top of the snow and spread a quantity of balsam bought for a bed. I had shot a partridge, which I skinned and cleaned and roasted on the end of a stick for supper, then after the evening pipe spread the rubber sheet and rolling myself in my blanket lay down for the night. To put it mildly the night was not the most comfortable I have ever passed. It was intensely cold, one of the coldest of the season. The fire had to be frequently replenished and as the snow melted underneath it gradually sank, so that when I woke in the morning I found myself lying by the side of a pit fully four feet deep with a few small smoldering embers at the bottom. Snatching a few mouthfuls of frozen bread and donning my snowshoes, I was under way ere the rising sun had begun to gild the tops of the tallest pine. The intense frost

of the night had so hardened the snow that travelling was ideal. My course lay a little west of south, and it crossed the Mississaga River at a rapid where the ice was no more than safe, and at an early hour in the afternoon made Walkigobaigobing Lake, some three miles east of the old trail. I made the lumber camp betimes in the evening. To say I was by now pretty well fagged out would not be adhering strictly to the truth, but after a good wash and a hearty meal, prepared in his best style by a first-class cook, I felt almost equal to donning the snowshoes again, although my legs did ache somewhat from mal de racquette. This was on a Saturday evening and I remained at the camp till the following Monday, when we went to the Bruce Mines to remain there until navigation opened. The only means of communication with civilization during the winter in those days was by dog train from Parry Sound to Sault Ste. Marie once every two weeks.

It wasn't until the 15th of May that I was enabled to send my men home by the steamship Manitoba, but a lack of funds compelled me to remain a few weeks longer, so that I didn't reach home until the middle of June.

We had passed the winter partly in what is now the Mississaga Forest Reserve, the country was all very mountainous and heavily timbered. None of it had been injured either by axe or fire. There were many deep ravines where long detours had to be travelled in order to reach the opposite bank. Many of them were unmistakable signs of the glacial period, granite cliffs hundreds of feet high and naked rocks fluted and polished as smooth as glass.

Some of the scenery was simply gorgeous, the lakes were numerous and large, some on top of, and others hidden deep down between the hills. All the water was clear as crystal and the signs found round empty Indian camps bore ample testimony that they were well stocked with fish.

On one occasion I stood on a mountain peak twenty-four miles from the shore of Lake Huron. The atmospheric conditions were perfect and I could see Cockburn and Drummond islands as plainly as though they were only a few miles distant, with a splendid birds' eye view of the whole intervening country. It looked like a gently undulating plain, the sombre woods broken here and there by small spots of white, indicating nestling lake or winding river.

During all my experience as a surveyor I have been exceptionally fortunate in having good men. I have very seldom had any difficulty with any, but almost invariably found my gang of one season ready to go out with me the next. But this winter was an exception. My employers had engaged all the men except two or three before we had reached the point where our work began. I observed mutterings of discontent, and the fact was soon forced upon me that though chief, I was not master. I knew there was no danger of the men leaving as they had no place to go, no chance of obtaining work elsewhere, and no money, while on the other hand if I discharged them I could not replace them with others and the whole winter would be lost, entailing heavy loss on the company. The trouble began with the cook, but the two timber estimators were the ring-leaders, with nearly the whole gang fully under their control. I felt that I was in for a hard season, but must put up with it. Almost daily I had to endure taunts and insults, which it was difficult to swallow. Let me give one instance out of many. It was a cold day, and having reached a point in the line where there was an abrupt descent and the men had to stand there till I came up with the instrument to give them the line, one of the estimators was present when I adjusted my instrument and directed them how to cut, he said in a menacing tone, "It is time to get dinner." I replied, "It is too early, it is only a little after ten o'clock, and will make the afternoon too long." Without another word he sprang forward and seizing me by the throat with one hand, and flourishing his axe in my face with the other, yelled, "Get dinner now." He was a big burly fellow, who would have shaken me as easily as a dog does a rat, so that it did not take me more than a second to make up my mind that it would be very undignified on my part to offer any further opposition, so I quietly said, "Make a fire boys and we will have dinner now."

During the Sunday we spent in the Diamond camp they must have shown something of their true natures for in bidding me good-bye upon my departure, the foreman said he did not see how I had managed to put in the winter with such a pack of scoundrels. Not only were the estimators false to me, but they also betrayed their employers. The quantity of timber they reported to me on the berths would not give a large lumber camp one winter's work, so the company sold out to another.

Some twenty years afterwards I had occasion to travel over one of the townships which had in the interval been

lumbered over and observed that it had taken four large camps four seasons to take out the pine timber on it.

Since that time I have had many ups and downs, and had my full share of hardships and a few narrow escapes, but for nerve testing experiences, for a paltry four dollars per diem, exclusive of Sunday, my winter on the Mississaga easily outranks them all.

DISCUSSION

The President—Gentlemen, you have heard Mr. Dickson's paper. What is your pleasure with it?

Mr. McMeekin moved, seconded by Mr. James, that the paper be received and printed in the report.

Mr. Stewart—I have pleasure also in seconding that. I have had a good deal of experience in that part of the country myself, and I thought it would be interesting, as it was. I thought perhaps he would treat more of the river. I remember a little experience on that river. I went up to make a survey, I forget the year, but there was no railway in that part then, and I went to Blind River first and went across. On the way up I was short of men, and I engaged a dockwalloper, picked him up on the way, and when we got to Mississagi Falls I thought we would camp for the night. I sent this new man that I had out to get some tent poles, and he was gone for about half an hour, and finally the cook called that dinner was ready. This fellow came in without any poles. I asked him if he hadn't found any poles. He said he had found some, but hadn't finished. I said, "Why didn't you bring them in?" "Why," he said, "I'm not going to make a damned horse of myself." I didn't go then, but I told him he could go back before he got any further. When we went out to look he evidently was cutting poles for a shanty, and got the largest timbers he could.

Another experience I had some time after on the same stream or in the neighborhood was, I had to survey a couple of townships—Mr. Speight will remember it very well—on the Spanish River. They were then building the Algoma branch of the C. P. R. That was several years after, and Mr. Speight may remember it. He may have been more fortunate than

I was, but I had a very poor lot of men, perhaps not quite so bad as Mr. Dickson's were. However, I hadn't a sufficient number, and some of those left; some Indians thought they had to go home to cut hay or catch fish after about three weeks, and I thought I would go up to Mississagi and try to get some men there. I went to Algoma Mills by a little steamer running up the river, and there got a boat and found a young Indian and a white man who had a boat. This white man was about the most degenerate of any I ever saw. The young Indian, I remember very well, had been very bright; he was educated at the Shinawauk Home. George Cosgrave was his name, and I remember very well ever so often we had in our little parish church in Collingwood paid a fee to keep George Cosgrave at school. I dare say he would have been a pretty good boy, but he apparently thought he should try to imitate the white man, and we got up to Mississagi, and a beautiful river it is, too, and we sailed up in a good sailboat, quite a large boat, and we had a good wind and got there in the evening and tried to get men, but I didn't get any at that time. They promised to come, but they never did, and I started back. The next afternoon towards evening we were not far out till they got quarrelling; they were drinking; they had a little whiskey with them. It got night and got dark, and we got out in the lake, and the wind went down, and they both got very drunk. They got fighting and were going to kill each other. I had the task of rowing the boat. It was a perfect calm, that wasn't so bad, but I had to keep those men from fighting, and didn't succeed in that either, and I was very glad when they both went to sleep. I had to row that boat about six or seven miles on the lake, and we got into Algoma Mills about three o'clock in the morning, and those men were sound asleep. I went up to the boarding-house of the men on the railway, and it was very cold by that time in the morning, and I roused them up and the man came, and I asked if he could give me a bed. He said he could. We went up a ladder into a loft. As soon as I got there I found I couldn't stay, and I backed down and sat up till morning, and the next morning I got to the stove as quickly as I could and got heated up to a certain extent and got out. I just mention this as one of the hardships we had to put up with. That was perhaps one of the most disagreeable nights I ever put in, the fact of being out in the lake, not knowing when a storm might come up, and having on my hands these drunken men going to fight. I found out during that time that it was not doing much good to keep young George Cosgrave at school all that time when he had such a tutor afterwards to cancel all the good he had

ever learned there. There are some other things I was going to say about that river, it is a very beautiful stream, but I have said enough, I think, and I just wish to move a vote of thanks to Mr. Dickson for his interesting paper.

The President put the motion, which, on a vote having been taken, was declared carried.

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

TORONTO HARBOR SURVEYS

By Norman D. Wilson, O.L.S.

Since the beginning of written history in Ontario a great number of charts or plans of Toronto Harbor and waterfront have been made, but few, on the other hand, which possess the merit of being made from original survey.

One of the first if not the first actual survey of Toronto Harbor of which we have any record is that made by Joseph Bouchette, Lt. Commander Royal Navy, in 1793.

In his work on the "British Dominions in North America," published in 1832, Mr. Bouchette describes the Harbour of Toronto as follows: (Vol. 1, p. 88),

"The Harbour of York is nearly circular, and formed by a very narrow peninsula stretching from the western extremity of the Township of Scarborough in an oblique direction for about six miles, and terminating in a curved point nearly opposite the garrison; thus enclosing a beautiful basin about a mile and a half in diameter, capable of containing a great number of vessels, and at the entrance of which ships may remain with safety during the winter. The formation of the peninsula itself is extraordinary, being a narrow slip of land, in several places not more than sixty yards in breadth, but widening towards its extremity to nearly a mile; it is principally a bank of sand, slightly overgrown with grass; the widest part is very curiously intersected by many large ponds that are the continual resort of large quantities of wild fowl; a few trees scattered upon it greatly increase the singularity of its appearance; it lies so low that the wide expanse of Lake Ontario is seen over it; the termination of the peninsula is called Gibraltar Point, where a block-house has been erected. A lighthouse at the western extremity of the beach has rendered the access to the harbour safely practicable by night. The eastern part of the harbour is bounded by an extensive marsh through which the River Don runs before it discharges itself into the basin.

"No place in either province has made so rapid a progress as York. In the year 1793, the spot on which it stands pre-

sented only one solitary Indian wigwam; in the ensuing spring it was selected by Governor Simcoe as the seat of Government for Upper Canada."

In 1818 Lieut. H. W. Bayfield, R.N., made a survey of the Harbour for the Admiralty.

In 1843 the peninsula and marsh were thoroughly surveyed by John G. Howard, City Engineer.

In 1867 the island was surveyed, and in 1873 the marsh, by Charles Unwin, P.L.S., for the City Council.

From this time onward various parts of the island, marsh or bay front were surveyed at different times, but no complete resurvey made until 1911-12, when comprehensive surveys were instituted by the City and the Harbor Commission.

The Harbor of Toronto was defined by statute of the Province of Upper Canada, 6th March, 1834, 4 Wm. IV. C. 23 Sect. 13. as follows:

13. . . . All that portion of the liberties of the said City (of Toronto) lying between the margin of the water on the north side of the Bay in front of the said city and the margin of the water on the north side of the marsh and bay east of the River Don and the southern limits of the said liberties, including the peninsula and island, shall constitute and form the Port of Toronto—4 Wm. IV. C. 23, Sect. 13.

As the British North America Act specifically retained all harbors and the control of marine matters to the Federal authority, the fee of the harbor waters as above defined automatically passed to the Dominion Government July 1, 1867. This affects surveys and surveyors to this extent that the Dominion Government alone can grant waterlots within the limits above defined, and that Ontario patents for such lots are technically invalid and worthless. As a direct corollary to this, all plans of application for waterlots, or in connection with unpatented lands must be certified to by the Surveyor as a Dominion Land Surveyor.

In passing it may be said that the Ontario Government have consistently issued patents for waterlots inside the limits of the Harbor in 1834, which patents the courts since the case of Attorney General for Ontario vs. Attorney General for Canada before the Privy Council, 1898 (A. C. 701), as consistently ignore. The result has been, however, that for the

majority of waterlots patented since 1867 patents have been obtained from both the Ontario and Dominion Governments.

By the Toronto Harbor Commissioners' Act, 1911, the limits of the Harbor were enlarged as follows:

The port and harbor of Toronto shall be deemed to include all the waters west of a line drawn due south astronomically one statute mile from the point where the east limit of the city intersects the water's edge of Lake Ontario at high water, east of a line drawn due south astronomically one statute mile from the point where a line drawn south astronomically from the west limit of the city on the Lake Shore Road intersects the water's edge of Lake Ontario at high water, and north of lines drawn from the southern extremities of the said two lines drawn through a point one statute mile due south astronomically from Gibraltar Point Lighthouse together with the dock and other waterfront property and waterlots within the city limits; also the docks, shores and beaches of the island and peninsula.—1-2 George V., Chap. 26, Sect. 5.

This description covers the entire waterfront of the County of York, and a small corner of that in front of Etobicoke, and encloses about 12,500 acres, but this area is only included for purposes of harbor jurisdiction. The fee to the land covered with water included in this extended harbor but outside the limits of the old is in the province, as heir to the residual assets of Upper Canada.

The Harbor Commission is a corporate body of five Commissioners, three of whom are appointed by the city, and two by the Dominion Government. It has very wide powers under the statutes creating it. The prime purposes of its origin are three in number.

1. To improve the dockage facilities of the Harbor, and develop Toronto as a lake port.

2. To develop the city's marsh and foreshore property for industrial purposes.

3. To improve the city's lakefront for park and recreation grounds.

In the Autumn of 1911 the Commissioners were appointed, and on December 26th of that year the City deeded to the Commission the major part of its waterfront property (ex-

clusive of the island), some 2,000 acres, of which hardly ten per cent. was dry land.

Surveys were commenced in February, 1912. The immediate requisite was a general plan of conditions along the waterfront with soundings over the marsh and bay, in order that a scheme of development could be prepared and estimates made. Before the ice left the bay and marsh soundings had been completed in two hundred foot squares. From that time onward until the middle of Summer, four parties were maintained on a detailed survey of the existing conditions of shore lines, buildings, wharves, tracks, etc., along the ten mile front.

These surveys of conditions were made as ordinary traverse with transit and chain, the bearings of the lines being reduced to the astronomic and the latitudes and departures of the lines calculated.

The notes were plotted first to a scale of 300 feet to 1", and secondly on sheets to 40' to 1". These sheets were later reduced to 100' to 1" by pentagraph.

Since these plans were first taken we have been amending them from time to time continuously to keep them up to date as changes have occurred. In 1914 a very complete survey of the island was undertaken, the party being placed in camp while the work was under way.

Mr. LeMay, the City Surveyor, had made a very thorough plan of the Island in 1911, with special reference to lease holdings and lot lines. The Harbor plan of 1914 on the other hand was one entirely of conditions, making no attempt to relocate the lot lines, though showing houses, fences, monuments, poles, sidewalks, park lands, the more valuable trees, etc. In addition, the land was completely cross-sectioned in 50 ft. squares, and the lagoons, lake and bay shores sounded.

This was a very thorough piece of work, as we profited by the experience of the previous seasons. That is to say, in this survey of the island, random traversing was discarded and a system of long ranges used. These lines were chosen with care and after some little trial, but with the result that the survey consisted of but two long range lines knit together and checked for chainage by a series of well conditioned triangles. There is no question of the comparative accuracy of this work over random traversing, or for the ease of plotting in the office.

Gradually as the harbor was surrounded with a network of traverse lines, we obtained the position by latitudes and departures, either by actual survey or by scale from the 40' plans of many prominent features along the waterfront, such as the lighthouses, etc. In this way by a single computation it was readily possible to pick up the meridian from any hub of which we knew the latitudes and departures.

The maximum allowable error of closing in these surveys of condition was placed at 1-10 foot per thousand feet, which limit was very well maintained, nevertheless errors accumulated, and it was felt advisable to have a more rigid government of our surveys, especially as I was anxious to have the bearings of all lines in whatever part of the harbor controlled by the same governing direction. During the winter of 1914 and extending into the summer of that year as the time was available I carried on a semi-precise triangulation of the waterfront. By this triangulation we obtained the position of the majority of the prominent spires and flag poles visible from the harbor, so that now by simply setting up an instrument and measuring two or three angles, the precise position of the point of set up is determinate.

For this work two base lines were measured, each about 2,300 feet long, one along the pier at the Eastern Channel, and one along the pier at the Western Channel, where the level concrete piers provided excellent conditions. These bases were measured several times on cold foggy days, taking temperature, pull on the tape, etc., and the mean lengths reduced to standard sea level conditions. When developed by a series of triangles across the bay, they were found to correspond within a quarter of an inch. This gave a base across the full extent of the bay nearly two miles long of reasonable accuracy, and from this base the survey proceeded by the ordinary methods of tertiary work. All three angles of the triangles were read twelve times accumulatively. Using an ordinary 5-inch transit reading to single minutes, estimated to 15 seconds, this gave an instrumental result to 2 seconds. It had been hoped to keep the closing error of the triangles within 5 seconds, but without success, due to the smoke, and the error averaged nearer 8 seconds. As nearly all our main stations were flag poles or points similarly inaccessible, it was necessary in perhaps the majority of instances to occupy subsidiary stations for measuring the angles, afterward reducing the angles so taken to the proper centre.

Besides about twenty stations on terra firma, the three lighthouses were occupied, as well as stations on the

roof of the Traders Bank Building, Scarborough Beach Tower; Harbord Collegiate Tower, Close Avenue School Tower, and the centre of the equatorial telescope of the Meteorological observatory. For this latter point Mr. Blake, the Astronomer, furnished the latitude and longitude, from which the geodetic positions of the other stations were developed. As well as their geodetic positions, the positions of all these points on the plane projection, that is their latitudes and departures were figured. To them were connected the traverse network of the previous years, and the whole continuous traverse of the waterfront recomputed and adjusted to the triangulation. We now have loose leaf blue print binders of pocket size in which are listed ties to the more useful hubs along the waterfront, some 120 in number, each about a quarter mile apart, giving as well the latitude and departure of the point and the bearing therefrom to some outstanding skyline feature.

It might not be out of place to remind those present that in the length of the waterfront of Toronto there is considerable convergence of the meridians—some 7 or 8 minutes in fact. On all harbor plans all lines are referred to a single governing line, which is the astronomic meridian through the origin of our latitudes, and departures, an arbitrary point in the bay adopted as the initial point of the base for sounding operations in 1912, and which happened to be within a few feet of the intersection of Yonge Street and the New Windmill Line.

Throughout the work, including on plans registered, the direction of lines is given by their bearings in accordance with the convention laid down in the Dominion Lands Manual, that is by the angle they make with meridian as measured through east, south and west from 0° to 360° . All distances are given in feet and tenths. Both of these conventions assist to clarify, ease and accuracy.

About August, 1912, the surveys of conditions being practically completed, attention was turned to the land survey end. As the great bulk of the Commission's property for which revenue could be expected consisted of the marsh, the restoration of Unwin's survey of 1877 was the first consideration.

Ashbridge's marsh, now the Toronto Harbor Industrial District, is one of the outstanding features of the topography of Toronto and occupied a very early place in its history. It

has from the first incorporation of the city been within its limits, and is to-day one of the greatest of its potential assets.

A little over a half mile west of the east limit of York Township, that is about the middle of Township lot 3, a sandy spur separates itself from the main land, and extends for some six miles westward, where it is fully a mile and a half south of the mainland. The easterly half of the area so enclosed is marsh or shallow bay, unfit for commercial navigation.

The township lots east of the Town of York, that is, east of the Don River, were variously patented. Lots 1 and 2 were described in the patent as extending to Lake Ontario, and rightly, as in these lots the high ground extends to a bluff at the water's edge. Lot 3 is the beginning of the sand bar. The patent description does not commit itself by describing the southerly boundary at all. Lots, 4, 6, 7, 8, 9, 11, 14 and 15, eight lots in all, are described as extending to the marsh. Lots 5, 10, 12 and 13, four in all, are described as extending to the front.

When the City of Toronto was incorporated in 1834, the marsh was included as one of its liberties. Whatever may have been thought about it in the meantime, in 1877, Mr. Chas. Unwin, P.L.S., was commissioned by the city to make a survey of it. Questions of ownership then seemed to be in dispute. At any rate Mr. Unwin was appointed by the city to meet the property-owners abutting on it, hear their views as to what they deemed to be the south limit of their lands, and if possible to get them to agree to a conventional line between them and the marsh proper, for which the city proceeded to apply for a patent.

Mr. Unwin succeeded to a degree. He got practically all the owners to agree verbally on the ground to conventional lines defined on the ground by ranges to trees or other objects, and proceeded to run these lines on the ground and to post them with cedar posts sheathed in sheet metal to resist fire. Subsequently some of the owners refused to sign the agreement with the city. Nevertheless, the city obtained from the Ontario Government a patent for 1,385 acres of marsh lands and water area on the 18th of May, 1880. On October 10, 1903, a Dominion patent was obtained for the same area.

Our first proposition then was to retrace Unwin's conventional line of 1877.

The possibility of finding any of the posts planted was very remote. The northern shore of the marsh was up to the time of the cutting of Keating's Channel in 1893 a matted

muskeg, not rooted to the bottom but aground at periods of low water, and floating in periods of high. After the construction of this drainage canal, this muskeg to the north of it, with high water and wind, aided by human agencies, gradually floated away. Evidence that at least some of the posts were not stable in position is given by a study of the water lot plans of the numerous small parcels of marsh lands patented to the various private owners to the north of the conventional line at various dates from 1880 to 1900. A plot of the south limits of these water lots makes the Unwin line somewhat resemble a snake fence. If any of Unwin's original posts were located by the surveyors of these water lots, as is most reasonable to suppose was done, it is at once apparent that the marsh was adrift.

Very careful chainage ties were given by Mr. Unwin to each angle in the conventional line. These ties were measured distances to points in the nearest street line, the course of the line being given by angular connection to the conventional line. No angular connection was given to the street lines, hence it was impossible to relocate the angular points in the conventional line with initial precision.

However, with little theoretical difficulty the kinks or angles in the line could each be located within a circle of four or five feet radius. It then devolved into a case of trial and error to so retrace the lines, that the dimensions and angular connections of the lines should be those of Mr. Unwin. Except for the physical difficulties in the way, such as oil tanks, railway yards, unwadable marsh and rotten ice around sewer mouths, it was a simple matter to adjust this limit to its exact position.

The west limit was also an easy matter, being defined simply by a bearing drawn from the intersection of the west limit of Parliament Street, and the north face of the old cribwork extending into the Bay on the south side of the old channel of the Don. This cribwork had long since rotted off below water level, but the stone filling, being not far below, with small expenditure of energy, a stone cairn was piled up at the intersection and a footing obtained to set up a transit.

A rather important and very interesting duty of the surveys staff was to search out and compile a plan of the water lots as patented within the harbor limits. There are something like 215 patents for water lots which have been granted in front of York Township—a motley collection of all sizes,

shapes and kinds—some granted by the Dominion and some by the Ontario Governments and some by both.

I think I am safe in saying that no class of surveys could profit more by extra care taken in their making.

The first water lot granted in Toronto was at the foot of George Street, on the east side. On May 14, 1803, this lot, two chains wide and five chains deep, extending from the water's edge, was granted to Duncan Cameron. This grant may have been questioned, for on September 30, 1817, the same parcel was again patented to him.

On November 4, 1803, a water lot on the east side of Frederick Street was granted to Wm. Allen.

The next patent was for the water lot, one chain wide and ten deep, on the east side of Princess Street, to D. W. Kendrick, November 2, 1808.

The block between Frederick and Sherbourne Streets seems to have been the maritime centre for the settlement, for the three other water lots in the block were granted to Jacob Herchmer, March 20, 1805, to Quetton St. George, December 19, 1807, and John Durham, May 18, 1811.

The years following the Treaty of Ghent were prolific of water lot patents, and by 1818, with the exception of one lot and the extensions of the streets, all the waterfront was private property from Jarvis Street to Sherbourne Street, besides two lots on the east side of Princess Street and one at Yonge and one at Church Streets.

Then apparently there was respite in the boom for ten years, or rather the citizens awoke to the fact that the fore-shore was being alienated, for in that year, 1818, we have Toronto's first boulevard scheme undertaken, when all the lands between what is now Front Street and the top of the bank, from Peter Street to Berkeley Street, were granted July 14, in trust to John Beverley Robinson, William Allan, George Cruikshank, Duncan Cameron, and Grant Powell, for a public walk and garden. This trust was afterwards by statute transferred to the city in 1853, and four years later the city was permitted to sell the lands.

In any event, no further patents for water lots were granted for fourteen years, until on May 31, 1832, a patent was issued to D'Arcy Boulton, Jr., for a water lot immediately

east of Church Street, and on February 11, 1833, an adjoining one to John Bishop, Sr.

Heretofore the various water lots had been patented of various lengths, but as an almost fixed rule, including ten acres between sides drawn in the production of the town lots on Palace (now Front) Street. With this last mentioned patent a new governing line makes its appearance, the Windmill Line, for, as described in the patent, this lot was to extend to a "line produced from the point near the site of the late French Fort west of Toronto Garrison to Gooderham's Windmill." This line was to form for 60 years the extreme southern end of wharf structures and private ownership in the harbor.

Gooderham's Windmill seems to have been a very outstanding feature at the east end of the harbor. It stood on the west side of what is now Trinity Street, less than one hundred feet from the shore, and appears to have been built about 1832.

The old French Fort was Fort Rouille, in the present Exhibition grounds, destroyed in 1759. The point of land described as near it is now occupied by Stanley Barracks, built in 1840-2. As part of their construction, a masonry revetment wall was built along this point of land. Just what disturbance was made to the contour of the point in doing this is unknown, perhaps far less than nature would have caused in the years elapsed since.

The year 1840 saw the beginning of a second waterfront plaza, the Esplanade. On February 21, 1840, all the foreshore from Simcoe Street to Berkeley Street, excepting the production of all streets out as far as the Windmill Line, and including the as yet unpatented strip between the top and bottom of the bank of the Bay, was deeded either to the city in fee or in trust for the riparian owners, on condition that an esplanade be opened up 100 feet in width for a public way, the Bay being filled out thereto, and that the bank be graded down. This work was still not completed ten years later when the Ontario and Huron Railway and Grand Trunk Railway obtained the city's consent to come in along the proposed esplanade.

Speaking of railways, it is noteworthy of the liberality with which they were treated in their early history that they possess certain large blocks of sometime water lots without patent, and solely by possession under their charter.

For the parcel between Spadina and Bathurst Streets, from Front Street to the Windmill Line, 55 acres, the Northern Railway (Grand Trunk) possess no patent, to the best of my knowledge holding same only by virtue of the Railway Act, which provides (14-15 Vict., Chap. 51) that "with the consent of the Governor-in-Council the railway may take so much of the public beach or of the land covered with the waters of any lake, river, stream or canal or of their respective beds, as is necessary for making and completing their said railway and works." Notwithstanding that this same area was granted to the City of Toronto under license of occupation March 25, 1853, and an Order-in-Council passed recommending that the same be patented to the city, possession appears to be nine points of the law, and the railway has possession.

At the other extremity of the city I can find no patent, and believe none exists, for the marsh lands reclaimed by the Grand Trunk on the banks of the Don, now their Don yards.

In 1893, by Order-in-Council dated June 12, the Windmill Line was extended southerly 644 feet between York and Princess Streets, tapering back to meet its original position at Spadina Avenue. The water lots lying between these lines were patented in 1893 and 1894, in every case to the owners of water lots to the north. All the continuations of the streets were patented to the city.

One or two interesting facts stand out in the search of these water lot patents along the Bay.

1.—From the first it would appear that the owner nearest the shore—even if separated by the public street or commons from the water—was recognized as the presumptive owner of the water lot lying in front of his property, and similarly

2.—When a water lot was granted and extension of the water lots southerly at a later time accrued to the benefit of the then owner of the original water lot.

3.—The east and west boundaries of the water lots were always the extension of the limits of the land lots, and were all drawn upon the same bearing, except in one instance of the Gooderham lots at the foot of Parliament Street, where they were granted at right angles to the shore, which was about 45 degrees to the angle of the lot lines. These lots were, however, later squared up to the general governing directions.

Theoretically, this makes the position of these water lot limits very definite, as theoretically all the lot lines in the town plot of York are parallel. In actual fact, they are not so by several minutes, which brings us to a subtle, unpleasant and ever-present problem in the surveys of the central waterfront. How should the street and lot lines be run? As a good example, consider Frederick Street or Princess Street. These streets were originally laid out from Front Street to Duke Street, two blocks, each four chains long, separated by King Street. The original blocks cannot be made to range, yet these streets are now extended eighteen hundred feet south of their original extremities.. What governs these extensions? Should they be the production of the block from Front to King Street or of the line joining the original extremities of the street, or should they be run on the bearing of the governing line of the town plot, or should we accept them as we find them on the ground?

As under the viaduct order and viaduct agreement, all the lands south of the Esplanade may ultimately come into the possession of the Harbor Commissioners for rearrangement and re-subdivision, I live in hope that this question may not become too pertinent.

But reverting to water lots, this time to those granted along the shores of the lake.

On January 8, 1855, W. C. Gwynne obtained the patent of a water lot at the foot of Spencer Avenue. On December 1, of the same year, his neighbor, J. B. Spragge, followed suit. Then after eighteen years, John G. Howard, Toronto's greatest philanthropist, on October 9th, 1873, obtained the patent for the water lot in front of lot 35. By 1880 all the water lots south of Parkdale were patented. To-day the entire shore from Bathurst Street to the Humber, except one lot 100 feet wide, applied for by the Harbor Commissioners, at Ellis Avenue, has been alienated from the Crown. East of Woodbine Avenue the patents are fairly modern, the first being 1880. One very narrow lot yet remains in the Crown.

Regarding surveys and patent descriptions for water lots, no field in surveying, in my opinion, can offer more room for improvement or for drastic Governmental intervention and regulation. It has not been my fortune to have to interpret any ultra modern patent description, that is, those put through since 1900, but I am not aware that there has been any very manifest improvement in the last decade.

For instance, do bank, high water, water's edge, edge of lake, all mean the same thing? If they do not, they ought to, and the idea should be uniformly expressed. Lake Ontario fluctuates in its levels over periods of years as much as five feet, which with a sandy beach causes a recession or encroachment of the water from three to five hundred feet. Does high water mark mean the most extreme reach of the waves on a single historical occasion, or is it the average reach of the waves at heavy storms?

Is the edge of the lake in a patent description, the waterline on the date of the patent, or the date of the plan attached to the patent, or the date of survey?

The Dominion Lands Manual gives a very explicit definition for "bank" as the edge of the land so long covered with water that vegetation has ceased to grow thereon, but unfortunately this definition is difficult to apply to a sandy beach along the Great Lakes, or any lake where great wave action occurs.

My personal predilection is to interpret high water mark as the contour of mean annual high water of the lake, elevations on the Great Lakes now fixed within very narrow limits (on Lake Ontario, very closely one foot above mean level).

However, to determine this contour on the ground might at times work a hardship on the surveyor, in the case of northern lakes, for example, of whose vagaries there is not so easily obtained data as of Ontario. However, at least the following should be done in every case of application for a water lot.

At least two permanent marks or monuments should be left on the ground, safe from erosion, and these monuments thoroughly referenced and tied in to original survey lines or registered plan. The bearing of the line between these monuments should be determined, astronomic if possible, and to them a survey of the shore line and water lot boundaries referred. Further, the elevations of these monuments should be determined above water level on the date of the survey, and sufficient levels taken along the shore to be able to obtain the waterline for increased or diminished height of the water, say the five-foot contour above and below waterline on date of survey located. Then at any time later the mean water level when determined could be interpolated. The outer limit of the lot should be fixed by the monuments, and should be defined

by right lines or regular curves, and not described as parallel the shore. I think sufficient time should be taken to check the lengths and bearings of the limits given by latitudes and departures, so as to ensure that the area will close, and to ward against gross blunders in scaled bearings, which are all too common.

The following are two rather typically indefinite descriptions:

1.—Grant to John G. Howard—23rd September, 1873.

Commencing where a post has been planted on the bank of Lake Ontario in the limit between Lots 34 and 35. Thence S. 16 degrees E., 10 chains into the lake. Thence in a north-westerly direction parallel to the bank 20 chains to west limit Lot 35. Thence N. 16 degrees W. 10 chains to bank of Lake Ontario. Thence southerly 20 chains to place of beginning.

The grant to the City of Toronto for the water lot in front of High Park and next adjacent to the last, dated August 17, 1876, is similarly described. The shore at this point is on the curve of Humber Bay. It is absolutely impossible to run parallel the shore and always be ten chains from it measured in a fixed direction other than radial.

2.—Grant to Thomas O'Connor—March 27, 1888.

This is the water lot in front of Scarboro Beach Park.

Commencing where the high water mark of Lake Ontario is intersected by the limit between Lots 3 and 4 in the said broken front concession. Thence on the original magnetic course of S. 16 degrees E. 12 chains more or less to attain a depth of 12 feet of water. Thence in the original magnetic course of north 65 degrees 18 minutes east 20 chains 47 links more or less until intersected by a prolongation south of the original limit between Lots 2 and 3 of the said broken front. Thence north 16 degrees west 12 chains to high water mark. Thence south-west along high water mark 20 chains 47 links more or less to place of beginning.

The precise point where 12 feet of water was located in Lake Ontario on the 27th of March, 1888, along the production of Lots 3 and 4, is absolutely indeterminate. At this very point I have seen fifty feet of beach ripped out by the waves one week, and replaced the next. While the twelve chains is

said to be more or less it is undoubtedly as good evidence as can be had where twelve feet of water was supposed to exist.

Reverting now to the Windmill Line. First established in 1833, as before described, it early became lost. In 1840 the point of land near the old French Fort was to some degree changed by the building of the revetment wall to protect the bank. Some time in the fifties Gooderham's Windmill was torn down.

In 1893 Charles Unwin, O.L.S., was employed by the city to retrace the Windmill Line. From evidence from it he determined the old position of the Windmill and ran the line through to Spadina Avenue on the ice. None of his original notes are extant, but a plan in the City Hall shows his line in relation to the wharves and docks, to which multitudinous ties are given. When I ran the line just twenty years later of the more than sixty ties given by Unwin, only four seemed to have any possibilities of being available. One splendid tie was given by Unwin to Gooderham & Worts' fermenting cellars, a stone building, still doing duty almost on the site of the old Windmill. Another tie still available was at Parliament Street, just a few hundred feet west. At Church Street an old pile dock still existed as in 1893, but so patched up and decrepit that the tie was impossible, but just west of John Street I dug up the corner of a crib of the old Waterworks dock, which provided a most excellent tie. Another check on the line was possible, for a mark with a cold chisel on the handrail or York Street Bridge was said to be its intersection with the Windmill Line by Villiers Sankey, late City Surveyor. When the Windmill Line was gotten through this point, checked admirably.

The old Windmill Line is now the very centre of the waterfront commercial life, and is all along built up with buildings, dock sheds, coal trestles, etc. It was soon seen that there was no hope of getting a range through on the line itself, but a twenty-foot offset to the south showed best possibilities. Between Bay and York Streets, the Cobban building, a five-storey structure with a flat roof, was a godsend. The point in line at John Street could be seen, but not the easterly one, so that the offset line was run through by trial as a double humped summit.

Just to mention some petty difficulties, every time the "Dalhousie City" came to port twice a day, its funnel was dead on line. Every time a steamer brought coal to the Electric Light dock we were blocked. To have been able to take

an axe and chop out a skyline through the masts and coal trestles would have at times afforded great relief. But the biggest nuisance of all of course was the smoke. Unless there was a south wind there was no hope of doing anything.

Ordinary pickets of course were useless on account of the distance and the maze of ships' rigging in the way, and large square sheet iron targets were used, painted alternately black and white.

When the line was straight between Parliament and John Streets it was produced by a similar use of stationary targets to Stanley Barracks and the Exhibition seawall. I think the Windmill Line is now sufficiently well marked on the ground to last another twenty years.

A word or two might be said of monuments planted. Our standard monument is a 3-inch iron pipe of whatever length is required, never less than four feet, more frequently ten or twelve feet, and some as long as eighteen feet, filled with concrete, and carrying an octagon shaped brass cap 3 inches across with a serial number and the words "Toronto Harbor Commissioners" in raised letters. The brass caps were at first attached by two bolts tapped into them from the underside and pressed down into the concrete. As some of the caps have become loose by the threads on the bolts stripping, we now are adopting another method, and leading the caps on. So far something better than 160 monuments have been placed along the waterfront, chiefly defining the northerly limit of the water lots, which is for the most part the northerly limit of the Commissioners' property, or else for various corners of the subdivision of the industrial district.

Many of these monuments are placed in two or three feet of water, in which case it was generally necessary to build a staging around its site to work from. If the ground underneath was sand or mud, the pipe was sunk with a force pump, as if one were taking borings. If the bottom was rock, a hole was drilled in the rock a foot or so deep, then a split bar put in and hammered until it spread enough to close the hole and take a grip, when the pipe was put over the bar and filled with concrete. When on solid ground the holes were dug with a posthole auger. In sand we used the force pump almost entirely, so that when working on the beach the first essential was to sink a barrel below water level for a supply well. Practically in all cases the top of the monument corresponds with the finished grade line of the filling to be placed.

For practically the whole extent of the harbor, except the central section, as yet incomplete, we have developed continuous plans of the harbor and adjacent properties on the scale of 40 feet 1 inch. These are land survey plans all from surveys actually performed in the field. The most important work of course was the defining of the north limit of the water lots. If sufficient information was not given on the water lot plan itself to locate fairly accurately the shore line, which was seldom, recourse had to be made to the shore line as given on the registered plan sheets or from notes of traverses of the shore as near to the date of patent as could be obtained. In many instances there undoubtedly was a lack of specific or satisfactory information, in which case the benefit of the doubt was always given to the private owners. Our policy in this respect has been throughout that the Harbor Commissioners can build a few inches or feet of land much more cheaply than they can go to law about it.

It gives me great pleasure to take this occasion to thank the City Surveyor and all the members of the Association in private practice in the city who, without exception, rendered me much valuable survey information and assistance, without which what has been accomplished might not have been so straightforward as it was.

DISCUSSION.

Mr. Speight—I am sure we have listened with a great deal of pleasure to this very informing and instructive address on the Toronto harbor by our good friend, Mr. Wilson. I am sure we are under a deep debt of gratitude for all the trouble and time he has taken in the preparation of this very excellent paper, and I have great pleasure in moving a vote of thanks be tendered Mr. Wilson, and that the paper be printed in the proceedings.

Mr. Le May—I have much pleasure in seconding the motion. I heartily endorse all Mr. Wilson said about the survey of these water lots in the front of the city. There was a time when the Harbor Commission was first instituted it was suggested that the City Surveyor should perhaps handle the job. After hearing this paper I am more than thankful to Providence that we were not asked to do it.

The President put the motion, which, on a vote having been taken, was declared carried.

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

MECHANICAL DRAINAGE

W. G. McGeorge, O.L.S.

One of the problems that the drainage engineers of South-Western Ontario have had to contend with is the drainage of lands which are too low to be efficiently drained by gravitation. In the Counties of Essex and Kent, in particular, there are large areas of land bordering on Lakes Erie and St. Clair and the River Thames, River Chenal Foarte and River Sydenham which vary in level from two feet below to two or three feet above lake level, and which, in addition, have been the dumping grounds for the waters from the higher lands. It is with the problems arising from the drainage of these lands, amounting in some cases to complete reclamation and in other cases to the making of farming operations which are precarious into safe and profitable ventures, that the writer proposes to deal briefly.

The drainage of lands of this character is provided for in the Municipal Drainage Act, the only difference from other drainage schemes being that schemes of this nature are initiated on a two-thirds petition of the owners of the lands benefited within the described area and not by a majority petition, as in the ordinary drainage schemes. In other respects the inauguration of a "pumping scheme" is identical with the inauguration of the ordinary drainage scheme where gravity is the agency employed in the removal of the water.

With the completion of the scheme, machinery is provided for its operation, a Commissioner being appointed for its management and annual by-laws being passed by the municipality for the raising of the monies expended on its operation. The provisions for the maintenance of drainage works apply, of course, to "pumping schemes."

The essentials of a scheme for the drainage of these low lands are, from an engineering standpoint, the prevention of outside or exterior waters from getting upon the lands comprising the area to be drained, and the collection and removal of the water from the said area; and experience has shown that it is desirable that all the lands within the scheme should

be of the same character, that is, so low that they cannot be drained by gravitation. It is not always possible to accomplish this, but there are two reasons why it is desirable. In the first place it is almost always cheaper to drain by gravitation than by mechanical means, and in the second place, in the actual operation of the works it avoids the friction between owners of "high lands" and owners of "low lands," the owners of the high lands very often objecting to the cost of the pumping necessary for the lower lands, and the owners of the low lands feeling that the water is not kept at a low enough level for their needs. The owners of the high lands very often seem to think that their rights are being taken from them when the marshes are drained and they are compelled to take their waters to sufficient outlets.

The accomplishment of this segregation of the low lands very often necessitates the construction of large external but frequently the earth excavated in the making of these drains can be utilized in the making of the banks or dykes which are necessary for the protection of the lands within the scheme. It is a very exceptional case where it is not better to divert the waters from the high lands than to let them into the scheme to be removed by mechanical means. In some cases these outlet drains are taken through the scheme with tight banks and the water taken from one part of the scheme to the other part, under the outlet drains, by siphons or tunnels. This has worked successfully where the area to be drained by means of the siphons is not extensive.

The height of the banks or dykes necessary for the protection of the scheme is governed by the outside conditions. If the lands are subjected to flooding from streams like the River Thames in times of freshet, the banks must be high enough to insure that the high water will not go over them and injure, not only the lands, but the banks themselves. Along the lake the banks can be kept back from the shore so that wave action will not destroy them and they should be high enough to take into account variations in the lake levels.

If the banks are being formed by the earth excavated in making external outlet drains, the drains are, of course, designed to take care of the waters and the banks are made high enough to be above the level the water will reach in the drains.

If external drains are not needed, the drains are made inside the schemes, the excavated earth being used for the

banks and the drains utilized to collect the internal waters and lead them to the pump.

The excavation of the drains is nearly all done by means of floating dipper dredges, and it is usually the case that the drains required will yield enough earth to form the banks, and that the dredges will pile the excavated earth in a form that will fulfil all the requirements of the bank. This is especially the case in clay or other substantial soil, but in peat or muck the problem is different and it may be necessary to go over the work several times in order to get a bank. If too much load is put on the bank near the drain, it may cave in or even if it does not cave, there may be so much settlement that the dredge will require to go over the course of the work several times in order to get sufficient bank.

In any substantial soil, banks are thus quite easily put up and there is no trouble from leakage, but in very deep muck or peat there is apt to be trouble with both the banks and leakage. Crossing old streams it may be necessary to resort to sheet piling to overcome these difficulties.

The internal drains should be such as to bring drainage facilities with reach of all the lands within the scheme. The locations of some will be governed to a great extent by the locations of the necessary banks and the location of the pump. Often by putting the drains along the roads, good roads will be made by the excavated earth and a double purpose will thus be served. Cost of necessary bridges will also affect the locations of the drains.

In some cases the ordinary principles of design of drains will govern the sizes of the drains, but often the sizes and forms will be governed by the types of machinery available for the work. For example in the counties of Kent and Essex the dredges available are especially suitable for drains of twenty to twenty-five feet bottom and top width of thirty to forty feet. Dredges cannot make good slopes but the specifications are usually made broad enough to cover this, the dredges being required to excavate everything within the sections formed by the depths, bottom widths and specified slopes (usually one to one). This will probably require the dredge to make a greater bottom width than specified. The object of making the work suit the machinery is economy of construction.

Making drains in this way will often result in larger drains than are actually required for the carrying of the water, but greater reservoir capacity is given to the scheme and this is a decided advantage. When large reservoir capacity is provided it is not necessary to operate the pumps so frequently and there is much less danger of damages to crops owing to exceptional rainfalls. In addition large drains and reservoir capacity ensure the water getting readily to the pumps. In schemes which are defective in this respect, the pumps have to be stopped frequently to wait for the water to come to them.

The depths of the internal drains may incidentally be governed by the necessity of going deep enough to get good soil to make banks, or by the depth of water required to float the dredges, usually four or five feet, but when not governed by these conditions, should be such as to give drainage for the lowest lands and those most remote from the drains and to give the necessary reservoir capacity. With the drainage of lands, settlement will take place to some extent and this should be considered in designing the drains. In peat or muck this settlement may amount to one or two feet, in other soils it will be less. The probability of tile drainage should also be kept in mind, and also the fact that it may be expensive and difficult to get a dredge in again after the scheme is constructed, to repair or deepen the internal drains and it is therefore desirable to give plenty of depth at the time of construction.

There are two or three conditions which will usually govern the location of the pumps in these schemes. First the pump should be in the lowest lands as this will facilitate the getting of the water to the pump; secondly it should, if possible, be so placed as to pump into an outlet which is not subject to freshet, so that the water will not have to be lifted any higher than necessary, and thirdly it should be located so that the waters from all parts of the scheme can be brought to it without too much expense.

It is not always possible to fulfil all these conditions and it seems that each individual case must be considered by itself and a conclusion reached after a consideration of all these factors. In some cases the question may arise of carrying the water to a sufficient outlet outside the scheme after it has been discharged from the pumps.

There are two kinds of pumps which have been used successfully for the removal of the water. Both of these have

their merits and consequently both have their champions among the people who have used them. In some places one kind has been tried and afterwards discarded in favor of the other, and in other cases the reverse has happened. It is only fair to state that in many cases the pumps have not been properly handled or protected, and the pumps have been blamed when the fault was the lack of proper drains and reservoir to get the water to the pumps. Where the pumps are only half supplied with water, the cost of removing the water is bound to be excessive.

The two types of pumps referred to are the centrifugal and the dash or scoop wheel. The centrifugal pump is the form usually supplied for drainage work, consists of a casing or well with inlet and outlet openings and with a horizontal fan revolving at a high speed at the bottom of the well. The inlet opening is at the bottom and the outlet is placed at the lowest level which the water at the outside or discharge is apt to reach. A discharge apron carries the water through the bank or dyke of the scheme. The fan is attached to a spindle or shaft which is carried on bearings supported by girders placed across the well. The spindle is revolved by gears and pulleys, by belt connection with an engine or by gears and direct connection.

The fan has properly curved arms, which force the water upwards in the well, partly by mechanical action and partly by centrifugal action, the greater the velocity of the fan, the greater being the discharge.

The advantage of the centrifugal pump is that it adapts itself to the constantly varying levels of the water inside and outside, without any necessary adjustments of the speed, etc. Of course as the lift increases, the discharge decreases and vice versa.

The efficiency of the pump depends on the friction in the pump itself and in the design of the arms of the fan, which arms should be curved and formed so as to facilitate the movement of the water, so that it will enter and leave without shock. The well or casing should be free from sudden enlargements or contractions or roughness that will interfere with the movement of the water.

A gate is provided in the discharge apron to keep water out when the pump is not in use.

The dash or scoop wheel has been in use for many centuries, but of course has been much more efficient since the advent of steam power. It consists of an axle on which are keyed flanges which receive and hold the ends of the radial arms or spokes. In the simplest form, planks are fastened to the arms to form scoops. The wheel revolves in a trough of masonry which is connected with the internal drain at one end and the outlet drain at the other by means of a discharge apron or flume which carries the water through or over the bank. The axles run on bearings supported on the masonry and the wheel is turned by a toothed pinion operating on a toothed circle, which is secured to the wheel at the outside ends of the arms. The counter-shaft which carries and turns the pinion may be direct connected with the engine or may be operated by belt and pulley connection.

In the properly made wheel the paddles or scoops are raised so as to run at an angle with the radial line, and the sides and back of the buckets are properly closed in. The wheel must be placed and designed so that the paddles will strike the water at an angle (angle of ingress), which is not too flat and will leave the water at an angle (angle of egress) which is large enough to ensure the water leaving the bucket quickly. And it is here that the difficulty in the dash wheel appears. The wheel can be designed for one condition of the water inside and out but will be less efficient as these conditions vary, which they always do especially inside as the water is lowered. The only thing to do is to design the wheel for the average conditions inside and out when the full capacity of the pump is most needed.

By making the wheel accurately and of a proper design and having very little space for leakage between the masonry and wheel, the wheel can be made to do good work. Some all-steel wheels have been made but have not given as good service as wheels of wood and iron. In many wheels there is a toothed circle or segment on each side of the wheel, and two pinions on the countershaft, but unless the wheel is perfectly made it is hard to get the two pinions to work and wear together. For this reason some wheels are made with one segment in the centre of the wheel and one pinion to drive it, and some have been made to drive from one side. In the latter cases, proper bracing must be put in the wheel. As a rule, the speed of a wheel cannot exceed six or eight feet per second, at the circumference without the water being carried higher than necessary.

Too much emphasis cannot be laid on the necessity of having the pump, either centrifugal or dash wheel, well down so as to provide deep drainage and to allow for settlement of the land.

It is a difficult matter to speak with authority of the relative merits of the two pumps. The centrifugal pump is probably the more scientific pump, but on account of its high speed requires more upkeep and requires that the power plant be kept highly efficient. For this reason a better class of mechanic should be in charge. The dash wheel is simple and easy to repair and operate and running as it does at a low speed, is not so hard to keep up and can be attended to by an ordinary handyman. As a rule the men in charge of these plants are not skilled mechanics because the pumping is at intervals only and the expense would be too great if a fully qualified engineer were employed.

The wheel is a powerful appearing machine and discharges its water with considerable disturbance and for this reason appeals to many laymen as being much more efficient than the quiet and speedy centrifugal pump and this accounts to some extent for the popularity of the wheel. It seems to be safe to say that for small lifts up to say six or eight feet either pump will give good service. For greater lifts, the centrifugal pump is the more efficient.

The power plant is usually a steam engine and boiler with coal (or natural gas if convenient) for fuel. The advent of "Hydro" may lead to electric motors being employed. The details of a power plant properly belong to the realm of mechanical engineering, but a civil engineer should make his specifications broad enough to cover the essential features, leaving the details to be worked out by the contractors who must produce an efficient power plant or else the assistance of a mechanical engineer should be secured.

The question of the capacity of the pumps required is an important question and a difficult one, involving as it does the questions of rainfall, run off, etc. If the area to be drained is all below lake level, it must depend entirely on the pumps for its drainage. If, on the other hand, the land is somewhat higher than the outside water level some relief can be had at times by gravitation. Flood gates are usually provided which can be opened if the water is higher inside the scheme than out. There is one fact that makes this valuable. In early

spring the lake waters are low and consequently in the spring, in some cases, considerable water can be let go. The amount of reservoir capacity in the scheme will also affect the speed with which it is necessary to remove the water by pumping. Good practice would seem to point to the necessity of having capacity for removing one inch per twenty-four hours off the whole area, where dependence is on the pump entirely, with less capacity where partial relief can be had by gravitation. Each particular case must receive consideration and it is impossible to lay down any general rule.

In connection with the pumping it might be well to point out that in the first inauguration of a scheme, where the soil is peat or muck, the water should not be lowered too quickly because of the effect on the banks. Quick lowering of the water may result in quick settlement of the banks in which case damage to the banks and drains may result.

The cost of these schemes is provided for under the provisions of the Drainage Act, the ordinary principles of assessments applying here as in other schemes. If the scheme consists of lands of the same nature and of equal facilities are given all parcels, the benefit assessment inside is simplified. For the outlet drains, the questions of benefit, outlet and injuring liability have to be settled.

The annual cost of operation, it would seem, should be worked out on somewhat the same principles as a benefit assessment, the relative elevations of the lands being the important factor.

In conclusion a few figures as to the extent of the schemes in operation and their cost might be of interest.

The areas of the schemes drained by mechanical means vary from five hundred acres up to five thousand acres of land. The smaller areas have small centrifugal pumps or small dash wheels of eighteen feet diameter and three or four feet width, and the large areas have one or more centrifugal pump each of as high capacity as twenty thousand gallons per minute, or large dash wheels of twenty-eight feet diameter and seven or eight feet width. Portable engines and boilers are often used in small ones while the large plants have stationary engines and boilers.

The excavation of the drains costs from seven to twelve cents per cubic yard, depending on the facility of getting into the work and the nature and extent of the work. The pumping plants cost from two thousand to ten thousand dollars. The

initial cost of the schemes has run from five dollars to as high as twenty-five dollars per acre. In the cases of the lower figures, it is only fair to state that considerable sums of money had already been spent in attempts at drainage by gravitation and banks and drains had been partly made in this way. Figures from ten to twenty-five dollars per acre would probably be more representative for efficient schemes. This cost is, of course, spread over a number of years as in other drainage schemes.

The probable cost of operation is difficult to get at as many schemes are badly managed and being improperly constructed are too expensive to maintain and operate, but it would probably be fair to state that efficient schemes can be operated at as low a cost as fifteen cents per acre, per year. This of course varies with seasons, with the management, and with the schemes. Some years the scheme may operate for less than ten cents per acre but this is exceptional.

This branch of drainage work has developed along the same lines that have governed other forms of drainage. Many obstacles have been overcome, mistakes have been made, jobs have been only half done because the people would not or could not spend enough for them to be done thoroughly, but the results have been the reclamation of thousands of acres of land otherwise almost useless. The extent of this may be realized when it is stated that in the Township of Dover alone there is (or at least will be by next year), about eight thousand acres of land depending on mechanical drainage.

DISCUSSION.

Mr. McCubbin—I have much pleasure in moving that Mr. McGeorge's paper be received and printed in the minutes. Mr. McGeorge has had a very extended experience in this class of work, and I may say he has given us the benefit of that experience in this paper. The Secretary and myself have been after Mr. McGeorge for a year or two to get this paper, and the paper itself, I think, has shown it would be worth while if we had to keep after him five or six years more in order to get it.

Mr. Bolton—I have much pleasure in seconding the motion.

The President put the motion, which, on a vote having been taken, was declared carried.

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

STANDARDIZING THE SCALES AND NUMBERING OF MAPS

By Douglas H. Nelles, D.L.S., M. Can. Soc. C. E.

One of the most important results of a surveyors' work is a plan or map, on which is shown geographically the results of his work in the field. The work of standardizing the scales upon which work is shown and of having a standard system of numbering each sheet in such a way that it will fit in and have its own place with other work on various scales, has not been taken up to any extent in Canada. Generally when any particular survey is made which results in a number of published maps, the different sheets are given an arbitrary number and an index map is published showing the relation of the sheets to each other. This means that unless one has the index map he cannot find out the numbers of the sheets adjoining the one in his possession.

The object of this article is to describe in detail a system worked out by the writer for the numbering of the five-minute sheets on a 1-10,000 scale, of the survey of Thirty-one-Mile Lake Watershed and to outline a general system, which can be applied to all published maps, in the hope that this association may appoint a committee to go into the matter of systematic scales and numbering of maps, and to embody the result of their investigation in the form of a recommendation to the Ontario Government that such a system be adopted for all maps published by them.

In order to have a standard system, the following three things are essential:—

1. A base map to which all other maps are referred.
2. Outlines of maps should be even divisions of Latitude and Longitude.
3. If possible the scale should be a multiple of the base map.

The base map which the writer has used is the International World Map on a scale of 1/1,000,000. The publication of this map has been agreed to by all the larger nations of the world, and it therefore might not be out of place to give a short history of its inception and some details of the technical agreements in regard to it.

In the year 1891 the first important step was taken towards obtaining a more uniform map of the world. *"In that year the International Geographical Congress at Bern raised the question, and the London Congress of 1895 passed a resolution recommending the scale of 1/1,000,000, or about sixteen miles to the inch, as suitable for a map of the world. This resolution was communicated to the various governments in the hope that this scale might be generally adopted.

"It was some time before this resolution produced much effect, but eventually Great Britain published a map of the United Kingdom on this scale, and commenced the publication of maps of Africa and Asia, while France and Germany commenced the issue and the United States the preparation of maps on this scale. Meanwhile the opinion of experts was coming round to the view that for the map of the world uniformity in many points other than scale is desirable.

"At the meeting of the International Geographical Congress at Geneva in 1908 the subject was again considered, and it was decided to recommend for the 1/1,000,000 scale map the adoption of a uniform design, i. e., that the projection, methods of representing hills and other details, the conventional signs, amount of detail to be shown, and other points should be similar throughout. The various governments were asked to prepare specimens on the 1/1,000,000 scale to illustrate their views as to style, etc.

"Great Britain then invited the different governments to appoint delegates to meet in London in order to consider draft proposals, which had meantime been elaborated, for the preparation of this map, and it was the delegates appointed in response to this invitation who met in London, on Tuesday, the 16th of November, 1909."

The following countries were represented by delegates: Great Britain, Canada (whose delegate was the late R. E.

*From "Nature," Vol. 82, 1909-10

Young, D.L.S.), Australia, United States of America, Austria-Hungary, France and Colonies, Germany, Hungary, Italy, Russia and Spain.

The result of the work of this committee was the passing of 13 resolutions regarding the construction of the map, etc. These were signed by each delegate, each of whom submitted a copy of them to his own government by which they were afterwards ratified. The resolutions adopted are as follows:

**“The undersigned, having been appointed by their respective Governments to recommend the system on which the International Map of the World, on the scale of 1 in 1,000,000, should be produced, submit the following resolutions. Each one of the resolutions was voted unanimously:—

General Resolution No. 1

It is desirable that a uniform set of symbols and conventional signs be adopted by all nations for use on the map of the world on the scale of 1/1,000,000, and that the limits of the sheets, etc., shall be uniform.

Area of Each Sheet, No. 2

(a) Each sheet of the map shall cover an area of 4 degrees in latitude by 6 degrees in longitude.

(b) North of latitude 60° N., and south of latitude 60° S., it shall be permissible to join two or more adjoining sheets of the same zone, so that the combined sheet cover 12, 18, degrees, etc., of longitude.

Limit and Number of Sheets, No. 3

(a) The limiting meridians of the sheets shall be at successive intervals, reckoning from Greenwich, of 6°; and the limiting parallels, reckoning from the Equator, shall be at successive intervals of 4°.

(b) Each sheet of the map shall bear an international number, as shown on the attached diagram, thus:

North B. 12

The zones, extending from the Equator on each side to 88° latitude are given letters from A to V preceded by the words North or South.

**From “Resolutions and Proceedings of the International Map Committee, assembled in London, November, 1909, with map index, conventional sheet, etc.” Can be obtained from Wyman & Sons, Ltd., Fetter Lane, E.C., London, England. (Price, 2s.)

The polar areas are lettered Z.

The sectors, from longitude 180° E. or W. of Greenwich, are given numbers from 1 to 60, increasing in an easterly direction.

(c) Each sheet shall, in addition, bear the name of the locality or most important geographical feature on the territory represented, and also the geographical co-ordinates of its central point.

(d) Each sheet shall show a small index diagram, giving the names and numbers of the eight surrounding sheets.

Degree Lines, No. 4

Each degree line shall be drawn right across the sheet.

Projection, No. 5

(a) It is necessary that the projection should fulfil the following conditions:

(i) The meridians should be straight lines.

(ii) The parallels should be arcs of circles of which the centres should lie on the prolongation of the central meridian.

(b) In view of the fact that on the scale proposed several suitable projections differ but little from each other, and that the contraction and expansion of the paper on which the map is printed affect all lengths on the map, and prevent it from being in fact exactly either orthomorphic or equivalent, it is not necessary to lay great stress upon the selection of a projection which has the best properties as to conformity or equivalence. It is, therefore, agreed to select a projection which can be easily constructed, and which permits every sheet to fit exactly together with each of the four sheets adjoining each of its four sides.

A modified polyconic projection, with the meridians as straight lines, satisfies these two conditions.

(c) The projection shall thus be constructed: Each sheet shall be plotted independently on its central meridian. The central meridian shall be a straight line marked off in degrees.

Through the points so marked circles are drawn to represent the parallels. The centres of the circles are situated on

the prolongation of the central meridian. The radius of any circle = $v \cot \lambda$, where v is the normal terminated by the minor axis, and λ is the latitude of the parallel represented.

Along the limiting parallels, i. e., along the circles forming the north and south edges of the sheet, the degrees of longitude are marked off in their true lengths to scale.

Corresponding points on the limiting parallels are joined by straight lines; these straight lines represent the meridians.

The meridians which are true to scale are those which are 2 degrees to the east and west of the central meridian respectively. The actual length of the central meridian is the true length to scale, minus the small correction which is necessary to effect this, and which is shown in a special table.

Hypsometric Colors and Contours, No. 6.

(a) The map shall be a hypsometric map, i.e., the successive altitudes shall be indicated by a system of colour tints.

There may, however, be published other editions without altitude tints, and these may be completed by tints or by additions required for other purposes.

(b) Normally contours shall be drawn at vertical intervals of 100 metres reckoning from sea level. But in very hilly districts the contours may be at larger vertical intervals, provided that they are spaced at 200, 500 or 1,000 metre intervals. In very flat country additional contours may be inserted provided that they are spaced at 10, 20 or 50 metre intervals.

(c) Minor features of importance, which would not be shown by the contouring, may be represented by shading, excluding hachuring, and in that case the method of lighting which is the most effective for the region will be selected.

(d) In parts where the country is not sufficiently surveyed to enable the contours to be drawn, the terrain shall be shown by broken contours or form lines.

(e) The form of the bed of the sea or of a lake shall be shown by blue contours, the vertical intervals being normally 100 metres, but intervals of 10, 20 or 50 metres may be used. The datum level in each case is to be the mean surface level of the sea, or of the lake for a given date.

Lettering, No. 7

(a) The lettering shall be in varieties of the Latin characters.

(b) In those cases in which the Latin characters are not in use in the country in which the sheets are produced, a supplementary national edition may be published.

(c) A distinction shall be made between the lettering applied to hydrography and that applied to other features. The former shall be in sloping characters, the latter in upright characters, except as provided for names applied to routes of communication.

(d) The attached classification of and general types of standard lettering are approved for use on the international 1/1,000,000 map. The question of gauge has been left entirely to the discretion of the cartographer. It is understood that the size of lettering will vary with the relative importance of the names.

(e) All figures denoting heights shall be uprights. Figures denoting depths shall be sloping.

(f) The lettering used for scales, sub-titles, and other explanatory matter appearing outside the sheet lines of the map shall be in upright Roman capitals and lower case.

Spelling and Transliteration of Names, No. 8

(a) The spelling of every place-name in an independent country, or self-governing dominion, using the Latin alphabet, shall be that adopted by the country or dominion.

(b) The spelling of every place-name in a colony, protectorate, or possession, shall be that adopted by the country governing the colony, protectorate, or possession, if that country uses the Latin alphabet, or publishes other maps in which the place-names are printed in the Latin alphabet.

(c) In the case in which certain important localities have also, in addition to the official name, another customary name notably different, the latter shall be printed on the map in small characters, underneath the official name.

(d) An explanatory legend shall be printed to show, with reference to the names on the sheet, the Latin letters

which are necessary to represent the same sounds in other languages employed in the international map.

(e) It is suggested that the governments of those European or extra-European countries which do not use the Latin alphabet, should publish an authorized system of transliteration.

(f) In the case of Chinese place-names, that transliteration shall be adopted which is used by the Chinese post and customs services. The same rule shall apply to other countries in which similar conditions obtain.

Colours, of Detail, No. 9

(a) Hydrographic features, including glaciers, shall be in blue.

Water shall be shown by a uniform tint of blue wash, and not by water-lining.

A distinction shall be made between perennial and non-perennial streams.

(b) Contours shall be in brown.

(c) Roads shall be in red.

(d) Railways shall be in black.

(e) The name of feature shall be printed in the same colour as the conventional sign of the feature itself, with the exception of mountain names, which shall be in black.

(f) The hypsometric tints shall be those of the attached colour scheme.

(g) Country lying below the mean level of the sea shall be shown by a special tint of dark green.

Scales, No. 10

(a) A scale of kilometres shall be drawn on each sheet.

(b) An additional scale of miles, or other national unit, may be drawn if required.

Heights, No. 11

(a) The heights above mean sea level shall be shown in metres.

(b) The values in feet, or other national unit, may be added, to the nearest unit, if desired.

(c) The heights of the mean levels of the surfaces of lakes and inland seas above mean sea level shall be given.

(d) The datum level both for heights and depths shall be the mean sea level, deduced in each country from tidal observations on its own coasts.

Conventional Signs, No. 12

(a) In the case of rivers, rapids and other obstructions to navigation are, as far as possible, to be indicated.

(b) Roads and tracks should be divided into two classes, those which are suitable for wheeled traffic, and those which are not.

(c) It is agreed that where it is decided to represent features provided for in the attached reference they shall be shown by means of the conventional signs given here.

In the case of details not provided for below other signs may be used at the discretion of each government.

(d) For convenience of reference and indexing, the inner margins of each sheet shall be provided with Arabic letters from top to bottom of each side margin, and with Roman numerals from left to right along both the upper and lower margins.

Two of each (letters or numbers) shall appear within each degree of latitude or longitude respectively (see sheet of conventional signs).

(e) At the foot of each sheet shall be printed a reference, explaining all the conventional signs used in that sheet.

(f) Each sheet shall bear a list of the principal sources of information from which it is constructed.

Exchange of Material, No. 13

In the case in which a sheet covers an area belonging to several neighboring countries, it is desirable that the Government producing the map should consult the governments of the other countries on the subject of the material available, especially as regards the nomenclature.

Ed. Bruckner	S. C. N. Grant
Vinzenz Haardt von Hartenthurn	J. Scott Keltie
E. Beurdeley	C. W. Darley
Ch. Lallemand,	R. E. Young
P. Pollachi	Loczy Lajos
Vidal de la Blache	T. Col. Eugenio Caputo
J. Partsch	Eugene Markow
Frhr. Von Tettau	Luis Cubillo
Albrecht Penck	Bailey Willis
Wilckens	S. J. Kubel
C. F. Close	

London, 22nd November, 1909. T. T. Behrens, Secretary.

Colonel C. F. Close, C.M.G., R.E., in his "Text Book of Topographical Surveying," describes the method for numbering map adopted by the British Government as follows: "It has been decided that, in future, all maps of Crown Colonies or British Protectorates which are $\frac{1}{4}$ degree, $\frac{1}{2}$ degree or 1 degree square, with meridians and parallels for their edges, shall be numbered according to the system approved by the International Map Committee in 1909. In this system each of the 1-1,000,000 map covers an area of 4 degrees in latitude by 6 degrees in longitude, the north and south edges being at every 4 degrees reckoning from the equator, and the east and west edges at every 6 degrees reckoning from the anti-meridian of Greenwich (180 E. or W. of Greenwich). There are, therefore, in each hemisphere 22 sheets, lettered A. to V. along any given meridian, and 60 sheets, numbered 1 to 60 along any given parallel. The system is shown for North America in diagram 3, plate 1.

"Each sheet is called 'North' or 'South,' according as it is north or south of the equator, and is further defined by its latitude letter and its longitude number. Thus, the sheet which covers the southern part of Greenland would be labelled 'North P-23.'

"Each of the sheets on the scale of 1-1,000,000 covers the same area as 24 sheets, each 1 degrees square, on the scale of 1-250,000. These latter sheets are indexed as per diagram 2, plate 1, so that the description of one of the 1-250,000 sheets of Greenland, according to this system, would be ^{North} _D P-34.'

"Each sheet on the scale of 1-250,000 covers the same area as 4 sheets, each $\frac{1}{2}$ degree square, on the scale of 1,125,000. These sheets are numbered as per diagram 4."



Diagram 4

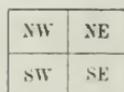


Diagram 5

The description of the 1-125,000 sheets of Greenland is therefore "North P-34."
D-111

Each sheet on the scale of 1-125,000 covers the same area as 4 sheets, each $\frac{1}{4}$ degree square, on the scale of 1-62,500. The latter sheets are indexed as per diagram 5, so that the description of one of the sheets of Greenland on the scale of 1-62,500

North P-34.
D-111-S.E.

"In the case of small definite areas, such as those surveyed during a boundary delimitation, or islands not exceeding in area a few thousand square miles, it would be absurd to adhere to this system, if it caused the map to be divided into an unnecessarily large number of sheets. In such a case the surveyor, in deciding on his sheet-system must be guided by common sense."

Plate 1 is a reproduction of a design for the bottom of the topographical sheets, composing the map of Thirty-one Mile Lake watershed (these sheets will not be published until after the war is over). The sheets are on a 1-10,000 scale and drawn so that each has for its outlines parallels of latitude 5 minutes apart and meridians of longitude 5 minutes apart, which represents an area of about 4 miles by 6 miles.

In arriving at the number of a sheet on this scale, which will show that part of the country of which it is desired to get a map, take the latitude and longitude of the central portion of the district and take out the number of the world map sheet from diagram 3. Then take out the letter of the degree in which it lies from diagram 2, and finally take out the number of the five minute sheet or sheets from diagram 1.

It will be seen from the above that if a man has in his possession one of these maps and wishes to obtain another of

the same scale of some other portion of the country 100 or even 3,000 miles away in Canada, he can in a minute take out its proper number to enter in his application, providing that he knows the latitude and longitude to within four miles. If the scheme for making precise, systematic, topographical maps of our Canadian cities and towns, on a scale of 1-1000 and also issuing an addition on a scale of 1-10,000, as outlined in the "Canadian Engineer" of January 6th and 13th, 1916, goes through, we will then have maps on a 1-10,000 scale scattered all over Canada. In England maps on nearly this scale, namely, 1-10,560, can be obtained for the whole of the United Kingdom. But even if city mapping is started and carried on, on a systematic basis, it will be a long time before all the cultivated portion of Canada is mapped on this scale. What we want in Canada is a denser population (whose numbers are from a country of a high moral standard) to produce the need of more accurate maps, and also to produce the money to pay for the making of them. The objection has therefore been put forward that if a few maps are issued using this system of numbering, people who happen to obtain a sheet will be writing continually to obtain sheets of country which has not been mapped. The correct answer to this objection from a legal point of view seems to be this: If a man writes for a map of some specific portion of the country, he generally wants it for some particular purpose; if the sheet for which he writes has not been published, it would seem but just that he should be sent a copy of a map which is available and which contains the most information regarding the district covered. All parties would then have the satisfaction of feeling that they had given and received the best that there was available.

In regard to the progress of the 1-1,000,000 World Map, Great Britain has mapped the whole of the United Kingdom and part of Africa on this scale. France has finished part of France; Russia has made a start; Germany has made a start in Germany, and finished some sheets of a part of China; the United States has started 12 or 15 sheets, and finished 3 or 4, which includes the "Boston Sheet, North K. 19," which is shown on plate 1, diagram 3, and is published by the U. S. Geological Survey, Washington, D.C. Canada has not yet started the publication of maps on this scale, because the contour or level information is not yet available. Topographical contoured maps of Canada have only been made of comparatively small sections of the country, which are scattered from the Arctic Ocean to the 49th international boundary line, and from the Pacific to the Atlantic Ocean. The four departments

of the Government which have made the greater part of the contour maps of Canada are: The Topographical Survey Branch of the Department of the Interior, the Militia and Defence Department, the Geological Survey, and the International Boundary Commission, of which W. F. King, C.M.G., is H. B. M. Commissioner for Canada. The figures for the area covered by contour maps by the first three departments are not available, but the table below gives an approximate area (the surveys being nearly but not yet finished) of the country mapped by the Boundary Commission. They include the area mapped on the Canadian side of the line only:—

Section of Boundary Line.	Length of Line in Miles	Area in Square Miles	REMARKS.
141st Meridian.	625	2,500	Extends two miles eastward from boundary on Canadian territory from Arctic Ocean to Mt. Natazhat, and the balance is photo-topography between Mt. Natazhat and Mt. St. Elias.
South-eastern Alaskan Coast Strip Boundary.	887	5,000	This is the amount of the topography on the Canadian side of the line, but the Canadian Commission mapped practically all the topography on the Alaskan side of the line as well, which makes a total of 36,000 square miles.
Pacific Ocean to Great Lakes.	1,660	2,010	Two miles wide from the Pacific Ocean to the summit of the Rocky Mountains. One mile wide from the Rocky Mountains to the Great Lakes.
St. Lawrence River to Atlantic Ocean.	728	345	From a half to a quarter-mile wide.
Total	3,900	9,855	

Total amount mapped on both sides of the boundary line, 44,710 square miles.

The fact that none of the World Map sheets have been published in Canada does not alter the value of the index to this system of maps being taken as a base to which all published maps can be referred. The International Geographical Convention has recommended that all countries publish their maps which are of larger scales than 1-1,000,000 upon such scales as shall be a multiple of 1-1,000,000.

In Canada, to a large extent, we are doing this. The Chief Geographer publishes wall maps of Canada on scales of 35, 58 and 100 miles to the inch. These are, of course, smaller scales and do not count, but what is called the "Standard Topographical Map of Canada" is published upon scales of 1-500,000 and 1-250,000, which are multiples. The International Boundary Maps along the 141st Meridian and along the 49th Parallel are on the multiple, 1-62,500, which is nearly a mile to an inch. The International Boundary Maps of the South-eastern Alaskan Coast strip will be published on the multiple 1-250,000. The proposed city and district maps on scales of 1-1,000 and 1-10,000, respectively, are also multiples.

This multiple system of scales for maps, having for their limiting edges parallels of latitude and meridians of longitude, seems to be the best scheme through which to get a standard system of numbering maps. The scales that have been mentioned so far in the course of this paper, if we include the scale of 1-380,360, or 6 miles to an inch, would seem to cover about all the needs we have for maps at present. When we use a much larger scale than 1-1,000 the map becomes a detailed structural plan and not a map.

It is a question as to whether the British system of numbering, by bringing the numbers from the world sheet right down through all the scales to the last one on the list, could not be improved upon. The one advantage is that the name of any sheet put in the form of a fraction does not take up very much more space and looks neat, but it is rather difficult to form an image in one's mind of the diagrams which each number or letter represents.

If the system shown in plate 1 were adopted in Canada, each sheet of each scale would be referred directly to a degree block, so that it would only have three distinguishing names. Except in the case of the 1-1,000 city map, which on account of its large scale would have to be referred to the 1-10,000 scale, and again in the smaller scales which would be published in degree blocks, there would only be two distinguishing names.

For instance, taking the various scales up separately, we would have:—

The 1-1,000 Scale.*

This would be called "City," and would be published in 30 second blocks, of which there would be 100 in one "District," or 1-10,000 scale sheet, as per diagram 6. The name of a 1-1,000 sheet would then be

100	08	06	04	02	00	98	96	94	92	90	88	86	84	82	80
90	87	85	83	81	79	77	75	73	71	69	67	65	63	61	59
80	76	74	72	70	68	66	64	62	60	58	56	54	52	50	48
70	68	66	64	62	60	58	56	54	52	50	48	46	44	42	40
60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15
20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5
10	9	8	7	6	5	4	3	2	1						

18	18	14	13
12	11	10	9
8	7	6	5
4	3	2	1

4	3
2	1

Diagram 6
5 minutes
1-1,000 scale, sheet index

Diagram 7
1 degree
1-62,500 scale, sheet index

Diagram 8
1 degree
1-125,000 scale, sheet index

City 79
 District 57
 Degree 0
 WorldNorth L-18

This being the name of the sheet, under this system upon which the Geodetic Survey of Canada building would be shown.

The 1-10,000 Scale.*

The distinguishing name for sheets on this scale would be "District." The maps on this scale would be in 5 minute blocks, of which there would be 144 to a degree, which would be numbered as per diagram 1, plate 1.

On plate 1 the name has been drawn out in order to make the system plainer. With the system established for all maps, the name would read thus:

District 11
 Degree 1
 WorldNorth L-18

*See "Canadian Engineer," January 6th and 13th, 1916.

The 1-62,500 Scale.

The distinguishing name for this scale would be "Mile," as it is nearly a mile to an inch. The degree would be divided into sixteen 15 minute blocks, as per diagram 7. The name for one of these sheets, which would include the same ground as District sheet 11 above, would be thus:

Mile	4
Degree	1
World	North L-18

The 1-125,000 Scale.

The distinguishing name for this scale would be "Two-mile." The degree would be divided into four 30 minute blocks and numbered as per diagram 8. The name for one of these sheets, which would include the same ground as District Sheet 11 as above, would be thus:

Twomile	2
Degree	1
World	North L-18

The 1-250,000 Scale.

The distinguishing name for this scale would be "Four-mile" and would be published in degree blocks. The name for one of these sheets which would include the same ground as District Sheet 11 would be thus:

Fourmile, Degree	1
World	North L-18

The 1-500,000 Scale

The distinguishing name for this scale would be "Eight-mile," and would be published in two degree blocks. The name for one of these sheets, which would include the same ground as District Sheet 11 as above, would be thus:

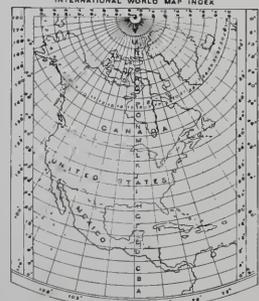
Eightmile, Degrees	I. and J.
World	North L-18

If all published maps in Canada were to be got out according to the above system of scales and numbers, a small map



LAT. 48 55 75 53

- CONTOURS
- CONTOURS NOT WELL DEFINED
- WATERCOURSES
- DECIDUOUS WOODS
- CONIFEROUS WOODS
- MIXED WOODS
- COUNTRY BURNED OVER
- ROADS
- ROADS NOT VISIBLE
- FENCES
- TRAILS
- BUILDINGS
- TELEPHONE LINES
- POST OFFICE
- BENCH MARKS
- TRIANGULATION STATIONS
- TOPOGRAPHICAL STATIONS
- LOT POSTS



INTERNATIONAL WORLD MAP SHEET NORTH LIB.



DEGREE I.

INDEX TO 8 MINUTE SHEETS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

DIAGRAM NO. 1

SURVEYED IN 1913
POLYGONIC PROJECTION
CONTOUR INTERVAL IS 25 FEET
BASED UPON PRIMARY TRIANGULATION, NORTH AMERICAN DATUM
DATUM IS MEAN SEA LEVEL, D.S.C. 1913, BASED ON U.S.G.A.C.S. ADJUSTMENT 1903

SURVEYOR IN CHARGE DOUGLAS H. NELLES O.L.S.
TRIANGULATION J.H. MOORHOUSE, W.S. BOMERVILLE
TRAVELLES A. RAIBOOTH
LEVELS T.P. REILLY, J. ERATZ O.L.S.
LAKE OUTLINES C.R. WESTLAND O.L.S.
FARMS & CLEARINGS C.R. WESTLAND O.L.S.
PHOTO-TOPOGRAPHY W.S. BOMERVILLE, G.T. PRINSEP
PLOTTED BY DOUGLAS H. NELLES O.L.S., C.R. WESTLAND O.L.S., G.T. PRINSEP
DRAWN BY J. BOWIE

TO GIVE A STANDARD SYSTEM OF NUMBERING MAPS ON A 1:62,500 SCALE 1" CANADA, ONE DEGREE OF LATITUDE AND LONGITUDE IS DIVIDED INTO FIVE-MINUTE SHEETS AND NUMBERED FROM 1 TO 60 AS PER DIAGRAM NO. 1, EACH DEGREE BEING REFERRED TO AN INTERNATIONAL WORLD MAP SHEET AS PER DIAGRAM NO. 3. AN INDEX TO THE WORLD MAP SHEETS IS SHOWN IN DIAGRAM NO. 2.

DATE OF PUBLICATION

DIAGRAM NO. 2

DIAGRAM NO. 1

SHEET NO. 8, OF DEGREE I, OF INTERNATIONAL WORLD MAP SHEET NORTH LIB.

of Canada on a scale of 100 miles to the inch could be published with a projection of single degree latitude and longitude lines ruled right across the sheet. The outlines of the world sheets could be shown in heavy lines, and then designated by letters and numbers in the margin. On the back of the map, which would be 23 by 38 inches in size, could be printed a full index of the World Map, on the same scale as diagram 3. Diagrams 1, 2, 6, 7 and 8 could also be printed with a few words of explanation, and then, providing all scales and numbering of maps in Canada were systemized, a person possessing this general index could order by its proper number any map, on any scale, that he wished to have, and know that if the map on that scale for that particular part of the country had not as yet been printed he would be sent the best that there was in print which would come the nearest to what he wanted.

This seems to be coming back to the index map system again, but remember this one proposed is one which would cover all maps on all scales. And, again, a person not having the general index map, but having a copy of any map, could always order another of the same scale and also several other scales from the diagrams on the sheet in his possession. In fact, to go a little further, the plate of the general index diagrams, once having been engraved, could be printed in the back of every map on every scale without much extra cost.

This paper was written rather hurriedly, and the subject matter is not arranged as well as it might be; but if it meets with your approval and it is thought worth while to form a committee upon this subject, the committee will have a general groundwork upon which to base their investigations.

DISCUSSION.

The Secretary—I would move, seconded by Mr. McKay, that a vote of thanks be tendered to Mr. Nelles for preparing this paper, and that it be received and printed in the proceedings.

The President put the motion, which, on a vote having been taken, was declared carried.

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

THE BOARD OF EXAMINERS.

By Willis Chipman, O.L.S., D.L.S., B.A.Sc.

1763

Although the Marquis de Vaudreuil signed the Articles of Capitulation at Montreal on Sept. 9th, 1760, yielding to a superior British force under General Amherst, the war continued in Europe and the Indies until the Autumn of 1762, when preliminary negotiations for peace were considered and the articles were signed on Feb. 10th, 1763.

Between 1760 and 1763 many French families returned to France reducing the population of Canada to seventy thousand people, practically all in what is now the Province of Quebec; possibly two thousand whites then resided in what is now the Province of Ontario.

1768

By Royal Proclamation under the Great Seal in October, 1763, civil government was instituted in the Province of Quebec, including what is now the Province of Ontario and certain posts along the Great Lakes. By this proclamation lands were granted to the officers and soldiers who had been engaged in the great war, the field officers receiving 5,000 acres, captains 3,000 acres, subalterns 2,000, sergeants and non-commissioned officers 200, and privates 50 acres. Very few, however, appear to have availed themselves of the generosity of the Government, and the majority of the soldiers are reported to have left Canada in disgust.

1764

The English Law was introduced by proclamation on Sept. 17th, 1764, and in this year a Trigonometrical Survey of the River St. Lawrence was commenced at Bic, 170 miles below Quebec, the work progressing year by year until 1775, when it was interrupted by the American Invasion of the Province by Arnold and Montgomery.

This survey was under the direction of Capt. Samuel Holland with a corps of Assistant Surveyors, many of whom no doubt were officers of the Royal Navy. Capt. Holland had been appointed Surveyor General of the Province of Quebec, Sept. 10th, 1764, and John Collins of Quebec, was appointed by him as Deputy Surveyor General on Sept. 8th. of the same year. During the Revolutionary War, Capt. Holland was at New York with the British Army, but resumed his duties at Quebec on or before the close of hostilities.

1775

In the list of Land Surveyors published by the Department of Crown Lands, 1862, the names of the following Surveyors appear as having been appointed prior to 1775:—

Samuel Holland—1764.

Jeremiah McCarthy.

John Collins—1764.

Wm. Chewett—1774.

James McDonnell.

It is possible, however, that Messrs. Peachy, Marlett and Pauling were appointed before that date as the year is not given in the list, but it does not appear that they made any important Government surveys independently.

The St. Lawrence survey was resumed in 1776 and completed in that year to the head of the Galops Rapids.

1776

On July 24th, 1778, the Province of Quebec was sub-divided into districts, the upper province comprising four districts named: Lunenberg, extending from Point Aux-Baudette to mouth of River Gananoque; Mecklenberg, from the River Gananoque to the mouth of River Trent; Nassau from the River Trent to Long Point (Lake Erie), and Hesse, the residue of Canada to the westward. The limits between the districts were to be run due north from the points mentioned. These subdivisions were, however, only on paper as the land surveys had then only been commenced along the Upper St. Lawrence.

1778

1783 At the close of the Revolutionary War there was an influx of Royalists from the United States, officers and soldiers with their families seeking new homes in the Canadian wilderness.

Land grants were made to the disbanded soldiery on a similar basis to that followed in 1764, but the grants to subalterns and privates were increased from 50 acres to 200 acres. Grants were also made to civilians who remained loyal to the Crown, and whose properties in the United States had been confiscated. Then followed our first boom in Land Surveying.

1785 The first ordinance respecting surveys and the survey of lands was passed by the Legislature of Quebec in 1785 (25 Geo. III. Cap. 3). By this ordinance the candidate for appointment was required to submit to an examination by the Surveyor General or the Deputy Surveyor General as to his fitness, capacity and character, also as to the sufficiency of his surveying instruments, and before entering upon his duties he was also required to give good and sufficient security to His Majesty in the sum of fifty pounds (£50), for the faithful discharge of his duty.

This ordinance being short it is given in full, also the oath taken by Provincial Deputy Surveyors, in 1792.

“Concerning Land Surveyors and the Admeasurement of Lands.

“Whereas it is highly necessary in order to secure to His Majesty’s subjects the peaceable possession of their landed property, by preventing frequent and vexatious suits, that such persons only should be appointed Surveyors of land as are properly qualified.

“And that all and every survey to be made should be done and performed in a manner, the best to secure the rights of His Majesty’s subjects, be it therefore ordained in Chief of this Province, by and with the advice and consent of the Legislative Council thereof, and by the authority of the same, it is hereby ordained and enacted that a meridian line shall be properly drawn and marked, at the

most convenient place, in or near the towns of Quebec, Three Rivers and Montreal, by the Surveyor or Deputy Surveyor General of this Province; and by which all surveyors shall regulate and rectify their several surveying instruments once in every year at least and in the presence of the Surveyor or Deputy Surveyor General or other persons by them or either of them duly authorized for that purpose. And all and every surveyor of lands. is hereby required to demand and obtain from the said Surveyor or Deputy Surveyor General or persons authorized as above said, a certificate, that their several instruments, to be used and employed in surveying are good and sufficient. And in the certificate to be granted shall be set down and expressed the variation found at the period of making such certificate as aforesaid.

“That from and after the publication of this Ordinance no person shall act as a public surveyor of lands, nor be appointed to act as such, until he shall have been duly examined by the Surveyor or Deputy Surveyor General, as to his fitness and capacity, his character, and the sufficiency of his instruments as abovesaid, and have obtained the certificate above mentioned. II.

“That all and every person to be commissioned and appointed to act as a land surveyor for the districts of Quebec or Montreal, shall, before he enters upon the duties of such appointment, give good and sufficient security to His Majesty, in the sum of fifty pounds, for the faithful discharge of his duty; and shall take the following oath, in His Majesty’s Court of Common Pleas for the district wherein he may be appointed to act as abovesaid. III.

(Signed) Henry Hamilton.

By command of His Honor the Lieutenant-Governor.

(Signed) Alex Gray, A.C.L.C.

Here follows oath.

“I do solemnly swear that I will be true and faithful to the trust reposed in me as Provincial

Deputy Surveyor, and most carefully attend to the interests of the Crown in the performance of the different duties I shall be engaged in.

“That I will strictly observe the ordinances, rules and regulations now in force, or which may be hereafter established for the administration of the Land Granting Department, that I will punctually execute with fidelity and despatch whatever orders and instructions I may from time to time receive from the Governor, Lieut.-Governor, or person administering His Majesty’s Government and the Executive Council of this Province, the Surveyor General thereof, and every other my superior officer, in all matters respecting the duties of my office; that I will keep exact and regular journals and records of all my transactions therein, perform the services I shall be employed upon without unnecessary delay or expense, and make faithful reports on my return of all useful discoveries which I may meet with in the course of my surveys, and that I will at all times and upon all occasions honestly and conscientiously discharge the several functions of a Deputy Surveyor with the strictest diligence, impartiality and justice.

“So help me God.”

1786 Wm. Chewett, who had been employed for twelve years in the office of the Surveyor General at Quebec, was sent in 1786 to take charge of the land surveys then being made along the north side of the St. Lawrence above Montreal. It would appear that the actual surveys were being prosecuted by Jeremiah McCarthy, but whether he was employed in laying out the front concession or on the survey of the post road from Montreal to Kingston the writer has been unable to ascertain.

1789 This road survey was completed in 1789. Between 1790 and 1791 about thirty townships appear to have been surveyed or partially surveyed, in what was afterwards known as Upper Canada, these townships being located along the south shore of the Grand River, the north shore of the St. Lawrence about the Bay of Quinte, and at York, Niagara and Detroit.

In 1784 the population of Canada was about 120,000, of whom only 10,000 were in the upper part of the Province. By 1790 the population had increased to 150,000 of whom 20,000 was estimated as being in Upper Canada.

1790

Upper Canada was set apart as a separate Province in 1791, although at that time it was practically an untenanted forest with scattered settlements along the St. Lawrence to Kingston; on the Bay of Quinte, the Niagara frontier, at Amherstburg, at Detroit, on the River Thames, on the lower part of the Grand River (Haldimand County) also a few trading and military posts.

1791

From a report of Capt. Holland, dated Jan. 31st, 1791, we learn that the following Surveyors were then in active practice and equipped with satisfactory surveying instruments:

James McDonnell—Elizabethtown and Kingston.

Hugh McDonnell—Elizabethtown and Kingston.

Jeremiah McCarthy—St. Thomas (Quebec).

——— Germain.

——— Plamidon.

Wm. Chewett—Lake St. Francis—1774.

Phillip Frey—Detroit and Niagara—1785.

Wm. Fortune—Grand (Ottawa) River—1788.

Patrick McNiff—Grand (Ottawa) River—1788.

Jesse Pennoyer—River St. Lawrence—1788.

Alexander Aitkens—Kingston and Toronto—1789.

Theodore Depencier—Rideau River—1789.

J. B. Bedard.

Joseph Bouchette—Lake Ontario—1791.

Augustus Jones—Niagara and Toronto—1791.

From the published list of Surveyors it would appear that about 20 surveyors were appointed from 1788 to 1791 inclusive, including

Wm. Fortune, Alexander Aitkens, John Stegmann, Joseph Bouchette and Augustus Jones, all of whom were actively employed on the early Government surveys in this Province. About the same number had been appointed prior to 1788.

1792

Newark (Niagara) and Kingston were then the only villages in the entire Province. Governor Simcoe selected Newark as his capital, the first Parliament assembling there in 1792. Simcoe appointed Captain David W. Smith as Surveyor General of the Province and Wm. Chewett as Deputy, but the latter was the actual Director of Surveys, having had about eighteen years' previous experience in Quebec, and on the upper St. Lawrence in the Lunenburg District.

In Mrs. Simcoe's diary the following entry appears respecting the Surveyor's plans of that period:—

“March 15th, 1792.—I find our maps to be little better than sketches, little of the country having been surveyed. The surveyors draw slowly, I am told, when they want to suit their maps to the paper, do not scruple cutting off a few miles of the river or adding to it.”

Mrs. Simcoe was an artist, and prepared many maps and sketches, and we may assume that drawing paper was expensive, but her criticism cannot be applied generally. The maps of the St. Lawrence by Major Holland's staff are models of accuracy and beauty, and the plans of Wm. Chewett will compare more than favorably with those prepared by surveyors a century afterwards, but it should be borne in mind in examining the plans of townships in the Lunenburg District, by Chewett, that many of them were projected plans or plans prepared for the allotment of lands to settlers. Many grants of land were issued by the Crown to settlers in the townships now included in the Counties of Leeds and Grenville in the year 1796.

As further evidence that the surveyors were qualified the following extract is given from the records respecting the examination of Lewis

Grant, who practised for many years in Eastern Ontario in the vicinity of Prescott.

It may be noted that the County of Stormont at this time extended from the St. Lawrence River to the Ottawa River.

“Pursuant to an Order from His Excellency John Graves Simcoe, Esquire, Lieut.-Governor and Commander-in-Chief of the Province of Upper Canada, etc., etc., etc.

“I have examined Mr. Lewis Grant previous to his being appointed one of the surveyors of the said province, relative to his knowledge in the Theory and Practice of Surveying and Drawing, viz.:

“In the necessary parts of arithmetic.

“In the necessary parts of geometry and trigonometry.

“In the necessary parts of surveying, such as:

“Viz.—Surveying a regular or irregular field by the circumferentor or chain, and finding the content of the same.

“Surveying a small river on the ice, and protracting the same, by the theodolite and traverse table.

“Surveying a large river, intersecting its opposite side, and protracting the same, by the theodolite and traverse table.

“Surveying and laying out a township, regular or irregular, and protracting the same, by the theodolite, traverse table and sector.

“In fixing a meridian, and finding the variation of the compass.

“In finding the latitude by the sun’s meridian altitude.

“In levelling, for the purpose of making aqueducts, etc., etc.

(Signed) W. Chewett,
Acting Sur.-Gen.

“Examined during the 25th, 26th and 27th Aug., 1792. Grand River, in the County of Stormont. 27th Aug., 1792.”

1796

The settlements along the upper St. Lawrence which commenced in 1783, and at other points in Upper Canada, extended in advance of the surveys. Land boards were created in each of the four districts, and it would appear that the surveyors who were engaged in the surveys of the townships took an active part in the allotments, which were made by writing the lots and concessions on slips of paper, shaking them well in a hat (the surveyor's hat), and drawing one at a time. The name of each settler was marked on the lot drawn, but the official grant was frequently delayed for years.

After the settlement of the U. E. Loyalists there followed an immigration from the north-eastern part of the United States, with a few from Great Britain, all seeking land.

1812

The war of 1812-1814 with the United States checked settlement, and temporarily stopped surveying work. At the close of hostilities, however, another flood of immigration set in from Great Britain that continued uninterruptedly until the Rebellion of 1837-38.

The population of Upper Canada in 1812 was about 80,000 and that of Lower Canada 220,000.

About twenty-eight land surveyors were appointed in Upper Canada between 1792 and 1812, including Reuben Sherwood, Lewis Grant, Abraham Iredell, Lewis Kotte, Wm. Hambly, Joseph Fortune, Samuel S. Wilmott, Mahlon Burwell, Wilson Conger and Robert McLean. Twenty were appointed between 1812 and 1818, when the first Survey Act of the Province was passed.

1818

The Act of 1818 was entitled: An Act to repeal an Ordinance of the Province of Quebec, passed in the twenty-fifth year of His Majesty's reign, intituled “An Ordinance Concerning Land surveyors and the Admeasurement of Lands,” and

also to extend the provisions of an Act passed in the thirty-eighth year of His Majesty's reign, intituled "An Act to Ascertain and Establish on a Permanent Footing the Boundary Lines of the Different Townships of This Province," and further to regulate the manner which lands are hereafter to be surveyed.

We will, however, confine ourselves to those sections of this Act and succeeding Acts which refer to the qualifications of Surveyors. Sections V, VI, VII and VIII of the Act of 1818 (59th George III. A. D. Cap. XIV.), read as follows:

"And be it further enacted by the aforesaid: That from and after the passing of this Act, no person shall act as a surveyor of lands in this Province, until he shall have been duly examined by the Surveyor-General or Deputy Surveyor General thereof, as to his fitness and capacity, and shall have obtained a license from and be appointed to act as such by the Governor, Lieutenant-Governor, or person administering the Government of this Province, for the time being; and shall have entered into a bond, with two sufficient sureties, in the sum of five hundred pounds, to His Majesty, his heirs and successors, for the due performance of his office and shall have taken and subscribed the oath of allegiance, and the following oath, before the Surveyor General or Deputy Surveyor General of this Province:

V. Qualification
of Surveyors.

Bond to be
Given.

And Oath Taken
By Them.

"I, A. B., do solemnly swear that I will well and truly discharge the duty of a surveyor of lands, agreeably to the law, without favour, affection or partiality, when and as often as I may be required thereto by any person or persons, or by the rule or order of any Court of Justice, and which I will faithfully and without unnecessary delay, submit to the party requiring the same, or the court directing my duty, also a plan of survey, if required. So help me God."

"Provided always, That this Act shall not extend, or be construed to extend, to prevent any person or persons from acting as a surveyor of lands in this Province, who is now authorized to

Exception in
Favor of Persons
Now Authorized.

act as such by virtue of a license from the Governor, Lieutenant-Governor, or person Administering the Government of this Province.

VI. Surveyor,
General or
Deputy Surveyor
General to
Examine
Applicants and
Administer
Oaths.

“And be it further enacted by the authority aforesaid. That it shall and may be lawful for the Surveyor General or Deputy Surveyor General of this Province, to examine applicants to survey, and if found competent, to grant certificates to that effect, and to administer the foregoing oaths, which oaths shall be deposited in the Surveyor General’s Office.

VII. License to
be Granted to
Surveyors.

“And be it further enacted by the authority aforesaid, that it shall and may be lawful for the Governor, Lieutenant-Governor or person administering the Government of this Province, to grant licenses to such persons as are well recommended, on their producing satisfactory certificates from the Surveyor General or Deputy Surveyor General of this Province, of their competent knowledge of the theory and practice of surveying in all its branches, to survey in this Province during their good behaviour.

VIII. Chain
Bearers to be
Sworn.

“And be it further enacted by the authority aforesaid, That each and every chain bearer shall take an oath to act as such justly and exactly, according to the best of his judgment and abilities, and to render a true account thereof to the surveyor by whom he may have been appointed to such duty, which oath the surveyor employing such chain bearer is hereby authorized and required to administer.”

By the provisions of this Act the surveyor’s bond was increased from £50 to £500, but in other respects the qualifications and requirements remained practically the same as those provided in the Act of 1785 and may be summarized as follows:

(1.) The technical and practical knowledge of surveying was ascertained by examination conducted by the Surveyor General or Deputy Surveyor General.

(2.) The successful candidate was granted a license by the Governor, Lieutenant Governor or person administering the Government of the Province.

There was no provision in this Act for service under articles and no doubt appointments were frequently made by favor.

Immigration increased rapidly after the overthrow of Napoleon at Waterloo, and the Act of 1818 was passed at the opening of an era of prosperity in this Province similar to that which we have witnessed in the Western Provinces during the last ten years.

In 1821 the population of Upper Canada had increased to 115,000, and we may assume that in 1818 it was about 100,000.

Between 1818 and the Union of the Provinces in 1841, about 118 Deputy Provincial Surveyors were appointed by the Surveyor General. The population of Upper Canada had increased in this period from 100,000 to 450,000.

1841

The Union of the two Provinces of Upper Canada and Lower Canada was assented to by their representative Legislatures in the latter part of the year 1839, and the Union Act was passed by the Imperial Parliament in July, 1840, but did not come into force until Feb. 10th, 1841.

The City of Kingston was selected as the first capital, and for three years the sessions of Legislature were held there. The capital was then changed to Montreal, and after the burning of the Parliament Buildings in 1849 by a political mob, the capital alternated between Toronto and Quebec.

Whether the surveyors appointed by the Surveyor General of Lower Canada were permitted to practice in Upper Canada and vice versa is a matter that is not referred to in the Act of 1818, but there can be little doubt that surveyors appointed in the Province of Quebec prior to 1792 were permitted to practice in Upper Canada.

1842 In 1839 an Act was passed to extend the provisions of the Act of 1818 and in 1842 an Act was passed granting authority to licensed surveyors to administer an oath in certain instances and to protect them in their duty in surveying lands.

1849 Between 1818 and 1849 about one hundred and ninety surveyors had been appointed to practice in Upper Canada by the Surveyor General.

In this year all preceding Acts respecting surveyors and surveys were repealed, including the ordinance of Quebec of 25 Geo. III. Cap. III., U. C. 38 Geo. III. Cap. I, U. S. 59 Geo. III. Cap 14, U. C. 2 Vic. C. 17 Con. 4 and 5 Vic. C. 9.

The 1849 Act is the basis of our existing Survey Act and no radical changes have been made in it to the present time.

The important provisions in this Act respecting Surveyors may be summarized as follows:

(1.) No one was admitted to practice as a land surveyor unless he had attained the full age of twenty-one years, had served as an apprentice to a land surveyor for three years and had passed the prescribed examinations. Land surveyors for the Province of Lower Canada were to serve six months in actual practice in the field with a land surveyor in Upper Canada, and land surveyors admitted to practice in either of Her Majesty's Dominions other than Upper Canada were to serve twelve successive months actual practice.

(2.) Candidates for admission were to undergo an examination before a Board to be appointed for the purpose, the Board of Examiners to be composed of the Commissioner of Crown Lands and six other persons to be appointed from time to time by the Governor, Lieutenant-Governor or person administering the Government of the Province for the time being, and who shall take an oath of office, and any three of such examiners shall form a quorum.

The examiners were not only to conduct the examinations but it was their duty to cause all per-

sons applying for admission for practice to produce satisfactory certificates as to character for probity and sobriety, and to perform such practical operations in their presence as they shall require previous to receiving their certificate, also to answer such questions on oath with regard to actual practice in the field and with regard to his instruments.

The board or the majority thereof were authorized to appoint from time to time a proper person to act as secretary and to keep a record of the proceedings.

The board was to meet at the office of the Commissioner of Crown Lands on the first Monday in each of the months, January, April, July and October in every year unless such Monday were a Holy-day, in which case they were to meet on the day next thereafter not being such Holy-day.

(3) After securing his certificate the Land Surveyor was required to enter into a bond jointly and severally with two sureties to the satisfaction of the Board of Examiners in the sum of two hundred and fifty pounds currency, to Her Majesty, Her Heirs and Successors for the due and faithful performance of the duties of his office, and is also required to subscribe the oath of allegiance and the oath of office.

From this date surveyors were known as "Provincial Land Surveyors," the word "Deputy" being dropped from the title.

This Act became effective in both Provinces, certain sections of the Act being applicable to one or other Province only.

The first meeting of the Board of Examiners, appointed by Commission June 28th, 1849, was held in Toronto on July 2nd of that year at which meeting the following were present:

Hon. H. Price, Commissioner of Crown Lands.
Joseph Bouchette, Montreal.
Alphonso Wells.
Andrew Russell.

The last named was Surveyor General of this Province at the Union of the Provinces, and in 1857 was appointed Assistant Commissioner of Crown Lands, which position he held until 1870. It would appear that he was never admitted as a land surveyor in this Province.

Alphonso Wells was admitted as a surveyor in April, 1842, but his residence is not given in the records.

At the second meeting of the Board held on Oct. 23rd, 1849, the name of A. Larue appears as one of the Examiners, but his name does not appear in the list of surveyors.

A biographical sketch of Lieut.-Col. Joseph Bouchette is to be found on page 152, 1895 Proceedings with portrait. He was born in Canada in 1774 and from the list of land surveyors published in 1877 it would appear that he was appointed a Deputy Surveyor in Jan., 1791. This may be true but it does not appear probable. He was appointed Surveyor General of Lower Canada in 1804 and held this office until his death in April, 1841. He was, however, a Surveyor in Lower Canada, practicing for many years, dying about thirty-five years ago. Joseph Bouchette, who attended meetings of Examiners in 1849 and subsequently, was a son of the Lieut.-Col., but his name does not appear in the list of surveyors of this Province. In 1841 Joseph Bouchette, Jr., succeeded his father as Chief of the Department of Surveys and Crown Lands. Joseph Bouchette, Jr., died in March or February, 1881. Robt. S. W. Bouchette, of 4633 Sherbrooke Street, Westmount, Que., is a nephew of Joseph Bouchette.

Edward Taylor Fletcher, who was appointed surveyor on April 28th, 1842, was the first Secretary of the Board, which position, however, he only held for one year when he received appointment as Secretary to the Board of Examiners for Lower Canada and removed to Quebec. Thomas Devine was then appointed Secretary. Mr. Fletcher succeeded Mr. Joseph Bouchette as Superintendent of Surveys in 1878, a position which he occu-

pied until 1882, when he retired to take up his residence with his son in Victoria, B. C. He was admitted as a Surveyor in Lower Canada on the 15th of March, 1842, and remained a member of the Corporation until his death. He was Secretary-treasurer of the Board of Examiners until 1885, also a member of the Board for a number of years. He died at Victoria on Feb. 1st, 1897, age eighty years.

In 1849, 1850 and 1851, six meetings of the Board were held, the Board comprising Messrs. Price, Bouchette, Russell and John Booth of Elizabethtown, who qualified as a surveyor in 1816.

By 14-15 Vic. Cap. 4, 1852, the Survey Act was amended, and a new Board of Examiners was appointed. By this Act the new Board was to consist of nine members, including the Commissioner of Crown Lands, and it was provided that instruments binding to services of apprentices were in future to be filed with the Secretary of the Board.

1852

By Commission dated Aug. 28th, 1852, the following surveyors were appointed as members of the Board of Examiners:

Joseph Bouchette—Jan. 21st, 1791—Montreal, Quebec.

Andrew Russell—Surveyor General.

John Booth—1816—Elizabethtown.

Publius V. Elmore—June 2nd, 1821—Belleville.

David Gibson—Dec. 27th, 1825—York Mills.

John K. Roche—Dec. 1st, 1841—Port Hope.

J. Stoughon Dennis—Jan. 4th, 1842—Weston.

Wm. Hawkins—Oct. 31st, 1852—Toronto.

The first meeting of the new Board was held on April 5th, 1852, which was attended by Messrs. Gibson, Hawkins, Roche and Dennis. F. F. Passmore was appointed Secretary. At the meeting held on July 5th, John Booth was also present.

There is no record of Elmore having attended any Board meeting, and it is probable he did not accept the appointment.

1853

During 1853 and 1854 the Board meetings were attended by Messrs. Gibson, Hawkins, Roche and Dennis, and it would appear that Sanford Fleming was appointed in 1855 as he attended the Board meeting on April 5th. Mr. Fleming was appointed land surveyor on April 28th, 1849.

No change appears to have been made in the membership of the Board for some years thereafter. At the majority of meetings Mr. Gibson acted as Chairman.

1855

In 1855 the Act was further amended, 18 Vic. Cap. 83, the important changes being provision for preliminary examinations. Sections six, seven and eight of this Act were as follows:

“6. No person shall be admitted as an apprentice with any provincial land surveyor unless he has previously passed an examination before one of the Board of Examiners, or before one of the members thereof, or before some surveyor deputed by the Board for the purpose, as to his knowledge of Vulgar and Decimal Fractions, the extraction of the Square and Cube Root, of Geometry, Plain Trigonometry, Mensuration of Superficies, and the use of Logarithms, and shall have obtained a certificate of such examination and of his proficiency, from such Board. 18 V. c. 83, s. 4.

“7. Before being so examined he shall pay into the Fee Fund the sum of ten dollars as the fee due by him on such examination, and a further sum of two dollars to the Secretary for the said certificate. 18 V. c. 83, s. 4.

“8. Applicants for such examination previous to apprenticeship, shall give one month's notice to the Secretary of the proper Board, of their intention to present themselves for examination and pay to such Secretary a fee of one dollar for receiving and entering such notice. 18 V. c. 83, s. 4.”

Under section "6" the Board appointed the following as local examiners:

Publius V. Elmore—Dec. 22nd, 1821—Belleville.
 James West—Sept. 27th, 1825—Heck's Corners.
 Arthur Rankin—April 6th, 1836—Sandwich.
 Thos. Allehin—Sept. 29th, 1837—Paris.
 Alex Vidal—June 8th, 1842—Port Sarnia.
 Robt. Bell—June 16th, 1843—Ottawa.
 Albert P. Salter—Sept. 2nd, 1844—Chatham.
 J. M. O. Cromwell—Oct. 1st, 1846—Perth.
 Chas. L. Davies—April 12th, 1852—London.

Mr. Rankin does not appear to have accepted the appointment.

In 1856 an Act was passed respecting the Geological Survey of Canada (19-20 Vic. Cap 13.) By Section 3 of this Act the Director of the Geological Survey was appointed a member of the Board of Examiners.

1856

The Survey Act was also amended, the subject "Geology" being added to the qualifications for admission to practice.

In 1857 (20 Vic. Cap. 37) provision was made for admitting persons receiving university degrees as Engineers or Land Surveyors upon passing the Preliminary Examinations, paying the prescribed fees, and upon serving not less than twelve months.

1857

The first preliminary examination was held Jan. 6th, 1857, Abraham Tuck being the first candidate to present himself, but he does not appear to have presented himself for final examination subsequently.

At this meeting of the Board, Joseph Cauchon, Commissioner of Crown Lands; Joseph Bouchette, Andrew Russell, Wm. Hawkins and John K. Roche were present.

David Gibson, John Stoughton Dennis, John Booth were not present at this meeting, but attended subsequent meetings of the Board in the year. John Booth appears to have acted as Chairman when present, in the absence of the Commissioner.

1858 At the January meeting of the Board in 1858, Sir Wm. E. Logan was in attendance, and it would appear that Prof. Edward J. Chapman, of Toronto University, was then appointed Examiner in Geology and Mineralogy, which position he held until 1892.

In October, 1858, Andrew Russell resigned from the Board and the Secretary, Thomas Devine, was appointed in his stead.

1859 In 1859 the Statutes of Canada were consolidated, and we find therein a revised Act respecting Land Surveyors and the Survey of Lands, which remained practically unaltered until after Confederation.

In October, 1859, Mr. J. K. Roche, who had been a member of the Board since its organization in 1849, was drowned in Balsam Lake, and in the following May the death of John Booth occurred.

The meetings of the Board were held at various places in the City until 1859 when accommodation was provided in the Parliament Buildings on Front Street West. These buildings were erected in 1832, but after the Union they were only used for meetings of Parliament in 1849, 1850 and 1851, also in 1856, 1858 and 1859, after which date they were used as a military barracks until Confederation.

1860 In April, 1860, Mr. F. F. Passmore, who had acted as secretary for eight years, was appointed as member of the Board. Mr. Chas. Unwin was appointed Secretary in January, 1860. The January meetings were held in Mr. Passmore's office and afterwards in the East Wing of the Parliament Buildings, Front Street West.

1861 In April, 1861, a proposed "Bill" to amend the Survey Act, submitted by the Secretary of the Association of Provincial Land Surveyors and Architects at Ottawa, was considered by the Board, but did not meet with its approval.

1864 In January, 1864, the death occurred of David Gibson, Chairman of the Board for many years. He was succeeded as Chairman by Wm. Hawkins,

and Thos. Fraser Gibbs of Adolphustown was appointed to the vacancy.

Mr. Gibbs attended the January, 1865, meeting, but after diligent enquiry the Board was not successful in discovering the proper person before whom Mr. Gibbs should be sworn in, and after several days waiting in vain for instructions from the Attorney-General at Quebec, Mr. Gibbs returned to his home, and it was not until 1872 that he took his place at the Board.

From the Union of the Provinces until Confederation on July 1st, 1867, the Province of Upper Canada increased rapidly in population from 500,000 to 1,500,000, and the records of the Board shew that 305 land surveyors were authorized to practice in this period, 72 of whom were appointed between 1842 and 1849 when the first examinations were held.

1867

At the first meeting after Confederation only three members of the Board attended—Dennis, Passmore and Chapman. Sanford Fleming had then removed to Halifax.

At the meeting in January, 1868, the Hon. Stephen Richards, Commissioner of Crown Lands, attended, also the following: Thos. Devine, Chairman; J. S. Dennis and F. F. Passmore. Mr. Unwin resigned the Secretaryship and A. J. Scott was appointed. Between the July meeting and the October meeting Mr. Scott's death occurred, also that of Wm. Hawkins, Chairman of the Board.

1868

On October 23rd Mr. G. B. Kirkpatrick was appointed Secretary, which position he held until Incorporation in 1892.

From April, 1869, to 1886, Thos. H. Johnson, Assistant Commissioner of Crown Lands, was a member of the Board, which comprised Messrs. Dennis, Passmore, Devine and Prof. Chapman, but Col. Dennis did not attend the meetings after July, 1870.

1869

1872

In 1872 several minor amendments to the Survey Act were passed, the most important relating to the admission of Provincial Land Surveyors in the Province of Quebec.

At the January meeting, 1872, reference was made to the fact that there were then four vacancies on the Board. At the July meeting Mr. Gibbs was sworn in and in April, 1873, three new members, Hugh Wilson, Mount Forest; Peter S. Gibson, Willowdale, and A. C. Webb, Brighton. There was now a full Board, and we would naturally expect that some important amendments in the Survey Act would have followed, but it would appear from the minutes of the Board that no changes were even proposed.

1874

The Hon. T. B. Pardee, Commissioner of Crown Lands, attended the Board Meeting on Jan. 5th, 1874.

1877

In 1877 Sections 91 and 92 of C. S. C. Cap. 77, referring to plans were repealed and certain forms and schedules added to the Act.

1878

In Jan., 1878, Wm. Ogilvie suggested certain changes in the Survey Act, and in January of the following year, Otto J. Klotz appeared before the Board in support of a Bill prepared by F. H. Lynch-Staunton of Hamilton, proposing important changes in the Survey Act including a reconstruction of the Board of Examiners. Those present at the Board meeting were Messrs. Devine, Passmore, Webb, Gibson, Wilson and Chapman, who decided against the Bill.

1879

Upon the resignation of the Assistant Surveyor General, Thos. Devine, who was also Chairman of the Board, in October, 1879, Mr. Passmore was elected chairman, which office he held until his death.

1880

In 1880 the Act was amended by substituting for "Director of Geological Survey." "The Professor of Minerology and Geology in University College, Toronto." Prof. Chapman, however, had been a member of the Board probably as a representative of the Director of the Geological Survey for many years. Section 12 of the Act was

repealed and a new section substituted therefor respecting persons who had received University degrees or diplomas as engineers or surveyors, and also respecting persons who had studied at the School of Practical Science. It was also provided that Dominion Land Surveyors were to be admitted if the Board of Examiners were of the opinion that the qualifications required by the Dominion Board were sufficiently similar to those of the Provincial Board.

A new Act respecting Land Surveys and the Survey of Lands was passed in 1887, 50 Vic. Cap. 25, which was incorporated in the R. S. O. 1887 C. 146, with the various amendments made to C. S. C. 1859. There was no change affecting the Board of Examiners or qualifications of candidates, but important sections were added respecting the preparation of plans.

1887

From 1873 to 1892 there was no change in the personnel of the Board, which comprised Messrs. Passmore, Gibson, Wilson, Webb and Chapman, with the Commissioner of Crown Lands or the Assistant Commissioner occasionally in attendance.

1890

The death of Hugh Wilson occurred on Nov. 7th, 1890, when in Toronto to attend a Board meeting. Major A. C. Webb died on May 29th, 1891, and F. F. Passmore on Jan. 10th, 1892.

The last meeting of the old Board was held at the Parliament Buildings on Front Street on April 4th, 1892, the members present being: The Hon. A. S. Hardy, Commissioner of Crown Lands, P. S. Gibson, Alexander Niven, who had been appointed early in the year, and Prof. E. J. Chapman.

1892

At this meeting seven Surveyors passed their final examinations.

On April 14th, 1892, an Act to incorporate the Association of Ontario Land Surveyors and to amend the Act Respecting Land Surveyors and the Survey of Lands was assented to. (55 Vic. Cap. 34).

1892

By this Act the Association of Ontario Land Surveyors, which had been a voluntary association since its organization in 1886, was constituted a body corporate, and the examination and admission of candidates for the study or practice of the profession were transferred to the Association.

It was also provided that the Board of Examiners should consist of the Chairman of the Council, four other members of the association to be appointed by the Council, and two to be appointed by the Lieutenant-Governor in Council.

Of the four appointed members of the first board of examiners by the Council, two were to hold office for two years and two for three years, and at the expiration of the second year the Council were to appoint two members of the Association as Examiners to hold office for three years. Of the two members of the first board appointed by the Lieutenant Governor, one was to hold office for two years and one for three years, unless when made to fill an unexpired portion of a term. The Chairman of the Council was also chairman of the Board of Examiners and three members of the Board were to form a quorum.

There can be no doubt whatever but that, not only the Surveyors but the general public, benefitted by the passage of the Act of 1892 which prefaced a new era in land surveying in this Province.

From the union of the two provinces in 1841 to Confederation in 1867, the seat of Government was as follows:

Kingston	.....	1841-1843
Montreal	.....	1844-1849
Toronto	.....	1850-1851
Quebec	.....	1852-1855
Toronto	.....	1856-1859
Quebec	.....	1860-1864
Ottawa	.....	1865-1867

Although the Statutes provided that the meetings of the Board were to be held at the office of the Commissioner of Crown Lands, for part of the time they were held at the office of Mr. Charles Unwin in York Chambers, Toronto Street, also at the office of Mr. Passmore.

The members of the Association of Ontario Land Surveyors owe a debt of gratitude to the Board of Examiners, who from 1849 to 1892 endeavored to maintain a high standard of practical efficiency in the profession of land surveying. Cabinets changed from time to time, but the Board was not disturbed by the Government. Notwithstanding the necessary changes in the personnel of the Board there was a continuity of policy, conservative and dignified, as is shown by a perusal of the minute books of proceedings.

It is possible that they may have occasionally acted arbitrarily, or they may have interpreted too literally the Survey Act but we must bear in mind before passing judgment, that all government officials prior to Confederation and for some time thereafter were a class apart. Although the Board of Examiners had arbitrary power, and all the members thereof were in active practice there is no instance on record of any member of the Board having shown favoritism, nor was an such charge made against the Board by disappointed candidates, who occasionally endeavored to obtain certificates without proper qualifications.

It has been frequently claimed by Surveyors that a more scientific and accurate method of making township surveys, somewhat similar to that followed in the survey of Dominion Lands, should have been adopted at Confederation, or in 1873, when several new members were appointed to the Board, and that the Board should have introduced legislation to that effect. The policy of the Government in paying for surveys at a low price per acre precluded any radical change, but the Board may have erred in not making an effort to improve the method of survey.

of the Board may be of interest.

The appended excerpts from the minute book

The writer desires to express his indebtedness to Mr. Geo. B. Kirkpatrick for his assistance in the preparation of this paper also for the valuable information contained in papers formerly presented by Mr. Kirkpatrick and published in the Proceedings from time to time. Mr. Charles Unwin also kindly furnished data of value.

The members of the Board served as follows:—

			Qualified as Surveyor	Date of Death
Joseph Bouchette ..	1849-1850	1 year	1876	(?)
Andrew Russell	1849-1859	10 years	....	1888
John Booth	1849-1860	11 years	1816	1860
J. K. Roche	1851-1859	8 years	1841	1859
David Gibson	1851-1864	13 years	1825	1864
Wm. Hawkins	1851-1869	18 years	1832	1869
J. S. Dennis	1851-1869	18 years	1842	1885
Sanford Fleming ...	1852-1867	15 years	1849	1915
Thos. Devine	1859-1879	20 years	1846	1888
F. F. Passmore ...	1860-1892	32 years	1846	1892
E. J. Chapman	1863-1892	29 years	....	1905
T. H. Johnson	1869-1875	6 years	....	1887
T. F. Gibbs	1873-1876	3 years	1841	1893
Hugh Wilson	1873-1890	17 years	1858	1890
P. S. Gibson	1873-1890	19 years	1858	....
A. C. Webb	1873-1891	18 years	1862	1891

The Secretaries were as follows:

Ed. T. Fletcher ...	1849-1850	1 year	1842	....
F. F. Passmore ...	1852-1860	8 years	1846	1892
Chas. Unwin	1860-1868	8 years	1852	...
A. J. Scott	1868-1868	1 year	....	1868
G. B. Kirkpatrick ...	1868-1892	24 years	1863	...

*Appendix to Mr. Chipman's Paper on the Board of
Examiners.*

**EXTRACTS FROM MINUTES OF BOARD
MEETINGS**

Resolved: That this Board is of opinion that Mr. W. D. P.'s servitude has been irregular and that he be required to serve a further period of twelve months in actual practice with a licensed surveyor in order to obtain a better knowledge of the profession.

P. 16, Book 2
April 5th, 1859

Resolved: That the Hon. the Commissioner of Crown Lands be respectfully informed that since the appointment of this Board it has been without any recognized or permanent place to hold its meetings, having at different times been held in rooms provided either by the Crown Lands Department, the Parliament Buildings, the Canadian Institute, the Mechanics' Institute, or in the private office of the Secretary of the Board.

P. 29, Book 2
July 5th, 1859.

That the records of the Board, the indentures of the several apprentices now on fyle, with other documents periodically accumulating and the standard measure of length of Upper Canada, have at present no greater place of security than the private office of the Secretary in a building which is unprovided with a "safe" or other place of possible security against the results of accident by fire.

That this Board respectfully solicits the consideration of the Hon. the Commissioner of Crown Lands, and requests that in any appropriation that may be made of the Public Buildings belonging to the _____ Government in Toronto, that two rooms may be reserved or left readily accessible to the Board for their quarterly meetings and that the same may be suitably furnished with tables and chairs and a desk sufficient to contain the records and other property of the Board.

Resolved: That the Secretary be instructed to acknowledge the receipt of the telegraph from the

P. 37, Book 2
Oct. 5th, 1859

Assistant Commissioner referring the Board to Mr. Begley, who would provide rooms in the Parliament Buildings for holding the examination, and state why the accommodation was not available and that this Board would respectfully urge upon the Government through the Honourable the Commissioner of Crown Lands the justice due to it of setting apart two rooms in some one of the unoccupied Government buildings here and providing the same with the necessary furniture for holding the quarterly examinations.

P. 58, Book 2
April 2nd, 1860

Resolved: That Mr. Passmore, having completed his duties as Secretary, the members of the Board desire to place on record their high appreciation of the valuable services so long rendered by him as Secretary and they likewise have much pleasure in giving him a hearty welcome to a seat at the Board where they will continue to be benefited by his advice and co-operation.

P. 62, Book 2
April 6th, 1860

Resolved: That whilst this Board is at all times desirous of elevating the standing of the profession, it does not consider it expedient at present to repeal the test of qualification established by the 12th Vic. Cap. 35 Sec. 3, and the 19 and 20 Vic. Cap. 13 Sec. 3, and to immediately re-enact the same with the addition of botany, terrestrial magnetism, meteorology and zoology subjects as incommensurate with the ordinary practice and remuneration of a Provincial Land Surveyor at the present day.

Resolved: That while the Board does not consider it essential to the attainment of high proficiency in the surveying profession, that the law as it now stands should be materially amended. The Board is nevertheless of opinion that in the event of any new bill being brought before the legislature it would be desirable to add to the tests of qualifications of candidates some of those embraced in the Civil Service examinations, such as requirements Nos. 1 and 2 and 3 in Section 20 inasmuch as some candidates otherwise well qualified have been very much deficient in those common branches of education.

Resolved: That Messrs. W—— and C—— having been examined and considered competent were duly sworn in. Messrs. R—— and S—— were requested to make further study and present themselves at a future meeting of the Board.

P. 77, Book 2
July 10th, 1860

Resolved: That a certificate be granted to the following gentlemen on their producing a Theodolite or Transit, respectively, which shall satisfy any member of this Board as to its efficiency and which said instrument shall be the private property of the said candidate.

P. 79, Book 2
July 10th, 1860

Mr. U—— having produced to the Board sufficient proof by baptismal certificate, and also a certificate from his father that he had now attained the age of "twenty-one" was duly sworn in on the 2nd of July, 1860.

P. 80

Received and read a communication from G. F. Austin, corresponding secretary of the Association of Provincial Land Surveyors and Institute of Civil Engineers, and Architects, at Ottawa, forwarding to this Board a "Bill" containing certain alterations and amendments to the Statute now in force regulating the admission of Land Surveyors, and the survey of lands in this Province and requesting the co-operation of this Board to enable the same to become law.

P. 107, Book 2
April 5th, 1861

The proposed "Bill" so submitted was read and after some discussion was laid over for further consideration.

The Board of Examiners of Land Surveyors for Upper Canada have had under consideration a proposed "Bill" for the qualifications required for preliminary and final candidates for Surveyors, are of the opinion that the Act as it now stands has been found adequate to meet all the requirements of the profession and this to a high standard.

P. 112, Book 2
April 5th, 1861

They have found on a comparison of the proposed "Bill" with the Act now in force that the subjects required are nearly the same in the pure mathematics.

In the new "bill" botany, natural philosophy, etc., have (been) introduced. These are subjects this Board are of opinion are not required by Land Surveyors. They respectfully beg to decline to take any action in forwarding the proposed "Bill."

P. 123, Book 2
July 9th, 1861

Resolved: That H. J. C. and H. C. be also granted a certificate on producing to some member of the Board a good and sufficient surveying instrument (being the bona fide property of such candidate) and receiving from such member of the Board a written approval thereof, which shall be forwarded to the Secretary and filed among the records of this Board.

P. 134, Book 2
July 7th, 1862

Toronto, Jan. 7th, 1862.

Sir,

The Board of Examiners of Land Surveyors for Upper Canada will be obliged if you will give your opinion as to the question: "If a student passes through the regular session for one or two years at any university what length of time must he be articulated for supposing the academical year to be eight months. See page 865 Concol. Stat. Canada.

I have the honor to be, sir,

Your Obedient Servant,

Chas. Unwin, Secretary.

The Honorable the Solicitor General,

Toronto.

(Answer)

The Statute generally requires a service of three years, but when the student has attended the regular sessions of a University for at least two years and has received his degree or diploma, then twelve months' actual service with a surveyor is only required, but if the student has attended the university, for a less period than two years, or rather if the course of study at the university does not require more than, say, twelve or eighteen months, then the **actual service** must be two years or eighteen months as the case may be.

The object of the Statute in my opinion was to insure **three years' actual service** under a Sur-

veyor or three years' study and service, such actual service to be at least one year.

(Signed) Jos. C. Morrison.

Court House, Toronto, 8th Jan., 1862.

Resolved: That the Secretary be authorized to procure a desk to file away and keep in order the papers connected with the Board of Examiners of Land Surveyors for Upper Canada.

P. 146, Book 2
April 14th, 1862

Resolved: That the Secretary be directed to make application to the Honourable the Commissioner of Crown Lands for the following articles for the use of the Board of Examiners of Land Surveyors for U. C., viz.:

Pages 172 and 173
Book 2
Jan. 8th, 1863

- 1 Ream of letter paper,
- 5 Quires of foolscap.
- 1 McLean's Almanac for 1863.
- 1 Pen knife.

1 book to record "name" and date, etc., of indentures of file.

2 Books in lieu of having isolated examinations sheets, viz., 1 for preliminary and 1 for final examinations.

- 1 Coal scuttle and hearth brush.

Mr. A. P——— was examined orally before the Board and being found incompetent in practical knowledge was recommended to go with some Surveyor who is running side lines.

P. 174, Book 2
Jan. 9th, 1863

In reply to the communication of Mr. B——— dated 9th January, 1863, requesting that the Board would be pleased to reconsider its decision in his case, and to recommend him to Parliament to get a Private Bill or at least not to throw any obstacle in the way of his obtaining such an Act.

P. 179, Book 2
Jan. 13th, 1863

That inasmuch as it has not been made to appear to the Board that the said applicant has ever been bona fide apprenticed his request cannot be complied with.

P. 6, Book 3
April, 1863

Resolved: That the Secretary laid before the Board a letter dated 31st January last from the Assistant Commissioner of Crown Lands, of which the following is an extract:

“It must, however, be brought before the attention of the Board, that the expenditure must be retrenched—in fact, the expense should be limited, so as to not exceed the receipt derived from fees; for instance, when a quorum can be had of resident members, no necessity exists for calling in—at considerable expense—the aid of others residing at a distance, but if it should so happen the details must be given, and the voucher attested a greater number should not be required to attend than will constitute a quorum.

“The item of rent, etc., has been also gradually increased until it has reached, I find, the sum of \$30, which must be looked to, and more economical arrangements made; unnecessary expenses of stationery, etc., must be avoided, etc., etc. It is very desirable that, if possible, the Board should be self sustaining, and I trust that every effort will be made to that end.”

The Board directs that the Secretary shall reply to this letter in the following terms.

The Board begs respectfully to inform the Assistant Commissioner of Crown Lands that it is scarcely necessary to enter into details as to the manner in which the expenses of the Board may be kept within the receipt derived from fees, inasmuch as the Board has at all times been most anxious to see that object accomplished and has been studiously careful to keep the expenses at the lowest possible point.

The Assistant Commissioner appears to be under the apprehension that the members of the Board have been in the habit of attending the quarterly meetings for the sole purpose of getting the Statutory allowance of \$5 per diem, whether or not their presence was required—but as the very reverse has been the case, the Board deems it proper that such a misapprehension should be dispelled. The great difficulty has in-

variably been to get a sufficient number of members together to form a quorum and very frequently the business of the Board has been delayed and embarrassed in consequence of this difficulty.

Not unfrequently and after repeated and urgent applications, members have attended to make up a quorum at great personal inconvenience.

Since this question has been raised by the Department the Board feels it due to its members to refer briefly to the duties performed by the Board of Examiners, during the eleven years ending 31st of December last, and the net cost of same to the Province.

The total number of persons who have appeared for examination during that period has been 464, of these 225 have been for preliminary and 23 for final examination. Of these, 150 final and 179 preliminary candidates have passed, leaving 89 final and 46 preliminary candidates rejected or withdrawn. The total net cost of these examinations to the province according to the public accounts and those of the Secretary has been the sum of \$484.04, which includes all printing expenses, house rent, fuel, postage and every other expense—equal to \$44.00 per annum, or \$1.05 per head of the total number of candidates who presented themselves.

The Board respectfully submits that the cost is exceedingly small in proportion to the number of examinations and without at all desiring to set a high value on the services rendered to the country by the Board as constituted under the Statute in allowing only those to enter the profession who are well qualified to perform the duties thereof in a creditable manner, and in rejecting a large number (89 final and 46 preliminary) who are permitted to practice without undergoing a rigid examination might, from a want of proper skill and professional experience, have laid the seeds of endless litigation and difficulty throughout the country.

Whilst the Board fully agrees with the assistant commissioner that it is very desirable that, if

possible the Board should be self-sustaining, it is respectfully submitted that if it has not proved quite so the fault cannot be attributed to any extravagance or any other improper conduct on the part of the Board or any of its members. Those members who have most regularly attended the quarterly sittings have done so, not on account of the emoluments allowed by statute as the letter of the Assistant Commissioner would seem to imply, but from a high sense of public duty—and it may further be observed that the Secretary has at all times been required to do a great deal of work and spend much of his time in connection with the duties of his office for which he has had no remuneration whatever, and his only reward has been the knowledge that he was doing a public service.

Under these circumstances it seems unreasonable to expect a further reduction in the expenses connected with the examinations, and while the Board would gladly respond to the wish for retrenchment as expressed by the Assistant Commissioner, it cannot, looking to the proper administration of its affairs, hold out a prospect of any material reduction in the expenses of management.

Carried unanimously.

It was also moved, seconded and resolved: That the Board would most respectfully recommend to the Department of the Honorable the Commissioner of Crown Lands that the Secretary be paid the sum of fifty dollars for extra services rendered by him since the last session in arranging, copying, and compiling the "examination sheets" for the last eleven years into the books provided for the purpose and for preparing indices to the "correspondence," "minutes" and other documents of the Board since it was first established, all of which has been done in a manner highly creditable to the Secretary and satisfactory to the Board.

Carried unanimously.

Mr. P——, not having had the actual field practice for which he was returned at the last meeting, was again returned.

Mr. P—— appeared before the Board and was examined orally and having also satisfied the Board that he had had more practice since the last time he presented himself at the last general meeting in April, for which he was then returned, and being otherwise found duly qualified he was sworn in by the Chairman.

P. 21, Book 3
July 10th, 1863

Resolved: (1) That the examinations of Messrs. W—— and S—— are respectively satisfactory to the Board and that they be given diplomas accordingly, it being a condition that they respectively possess good and sufficient instruments. Resolved further that Mr. D——, having been found deficient in practical surveying, particularly in drawing division lines, in the use of the instrument, and in astronomy, he be recommended to further qualify himself, when he can again come up for examination.

P. 54, Book 3
Oct. 7th, 1864

Resolved: (2) That the Secretary be directed to make application to the Honorable the Commissioner of Crown Lands, to be allowed to purchase the following articles of stationery for the use of the Board at the prices mentioned. One bottle of ink, 88 cts.; one stick of sealing wax, 20 cts.; one packet envelopes, 20 cts.; one box cream laid envelopes, \$1.37; 1½ ream 8-in. note paper, \$1.50; two quires of B. S. foolscap, 75 cts.; 50 parchment certificates and seals, \$13.75. Amounting altogether to \$18.65.

Mr. Thomas Fraser Gibbs laid before the Board his commission as member thereof in the room of the late David Gibson, Esquire.

P. 56, Book 3
Jan. 2nd, 1865

After diligent enquiry and having been unsuccessful in finding out the proper person before whom the next member, Mr. Gibbs, should be sworn in, the Attorney General was at length telegraphed in the following words, viz.:

Jan. 3rd, 1865
P. 57, Book 3

“Who is competent to swear in Mr. Gibbs, the new member Board of Examiners of Surveyors? Please answer immediately.”

The testimonials of the candidate were examined and the examination continued throughout the day.

Board adjourned about 5 p.m. until the following day at 10 a.m.

Chas. Unwin, Secretary.

P. 58, Book 3
Jan. 4th, 1865

Mr. Passmore went with Mr. Gibbs, to see the Chancellor, who advised a special dedimus.

Mr. Russell was then telegraphed as follows: "Chancellor suggests a special dedimus. Please make it for Chairman of Board and telegraph so that member may be sworn in immediately."

P. 62, Book 3
Jan. 6th, 1865

That whereas Mr. Gibbs, lately appointed by the Government to the seat at the Board rendered vacant by the death of the late Mr. Gibson, having come to Toronto for the purpose of attending as Examiner, but after spending some days here vainly endeavoring to find the proper official before whom he should be sworn in, had to return home. The Board would strongly recommend Mr. Gibbs' case to the favorable consideration of the Commissioner of Crown Lands, and trust that he may be paid in the same way as if he had been sworn in. And that the Secretary in representing the facts to the Department enclose at the same time a copy of this resolution.

P. 63, Book 3
April 3rd, 1865

Mr. Gibbs not having been sworn in Mr. Russell, the Assistant Commissioner, was telegraphed in the following words: "Has it yet been decided before whom Mr. Gibbs is to be sworn in?"

The following answer was received to the above at 2 p.m.: "The Attorney General has not yet decided."

P. 65, Book 3
April 5th, 1865

1. Resolved: That the examination of Mr. L——— for surveying license has been satisfactory as far as the said examination has been proceeded with, but inasmuch as said candidate is "under age" he must present himself at some future meeting of the Board for further examination and produce a certificate of his having attained the full age of "twenty-one years."

The papers forwarded by Provincial Land Surveyor D. S. ——— relative to the preliminary examination of W. O. ——— were examined in connection with said O. ———'s correspondence thereon and it was resolved:

P. 74, Book 3
Jan. 3rd, 1866

"That the Secretary be instructed to write Mr. O. ——— regretting that through accident that gentleman's papers did not receive attention at the last meeting of the Board, but at the same time informing him that in consequence of the slovenly condition of his letters and papers and numerous erasures in the latter and bad spelling, the Board cannot consent to issue his certificate at present, nor can they hold out a prospect of doing so at any future time without a great and manifest improvement in those particulars."

Mr. C. ———, who was examined in July, 1865, but who was then under age and had no instrument (See resolution page 69), having produced certificate of birth and a good theodolite, was this day sworn in by the chairman, Mr. Hawkins.

P. 80, Book 3
April 2nd, 1866

Mr. H. ——— was examined before the Board as to the nature of his practice with P. L. S. J. ———, who is also a member of Parliament, as it was to be supposed that Mr. J. ——— could not attend to his pupil and his Parliamentary duties as well. Mr. H. ——— said that he had, as near as he could remember, about nine months of actual practice in the field with Mr. J. ———.

P. 63, Book 3
April 5th, 1866

Resolved: That a certificate of having passed the preliminary examination required by law be granted to Mr. O. ———, and that the Secretary be instructed to inform the said candidate in reply to his application, dated March 21st, ult., requesting permission to be allowed to ante-date his articles of apprenticeship, that such request cannot be complied with.

P. 84, Book 3
April 6th, 1866

Secretary laid before the Board a requisition for stationery, and was instructed as follows, viz.: 10 foolscap envelopes, 20c; bottle of mucilage,

P. 75, Book 3
Jan. 3rd, 1866

15c; 6 qrs. B. S. foolscap, \$1.20; 1/2 ream note paper, \$1.38; 250 envelopes, 75c; 1 box steel pens, 20c; 1/2 doz. red tape, 35c; 2 sticks red wax, 20c; 1 almanac, for 1866 (stiff cover), \$1.25; 2 1/2 doz. elastic bands, 63c; 2 quires letter paper, 50c; total, \$5.81."

P. 114, Book 3
Oct. 23rd, 1868

1. Resolved: That the members desire to place on record their sense of the great loss the Board has sustained in the death, since the July meeting, of the late chairman, Wm. Hawkins, Esq., and also by the death during the same period of the late Secretary, Allan J. Scott, Esq. (Carried.)

P. 179, Book 3
Oct. 2nd, 1871

Resolved: That the papers submitted to this Board by Mr. S. G. B—— are considered sufficient to entitle that gentleman to be articulated for a period of one year only, with a surveyor practising in this Province, such papers are: 1st, His Commission as Lieutenant in the Royal Engineers; 2nd, a communication to the Rev. G. B—— by direction from the Earl of Kimberly (signed, Robert G. W. Herbert), stating that the said S. G. B—— held the office of Assistant Surveyor General in the service of the Colonial Government of Hong Kong from 1865 to 1868. (Carried.)

Page 40, Book 4
July 11th, 1874

Resolved: That any person having practised in any other of Her Majesty's Dominions as a Land Surveyor, who may be desirous of availing himself of the benefit of the 11th Section of the "Survey Act" to serve only twelve successive months of actual practice in order to be admitted as a Land Surveyor in this Province shall in every case, after submitted satisfactory proofs to the Board of Examiners of his having so practised as a Land Surveyor heretofore, **present himself before the Board** at one of the quarterly examinations to be tested as to his proficiency. (Carried.)

(Signed) Thos. H. Johnson, Chairman of Bd.

Dept. of Inland Revenue,
Ottawa, Sept. 19th, 1877.

P. 152, Book 4
Sept. 19th, 1877

Thos. Devine, Esq.,
Dep. Surveyor General,
Toronto.

Sir:--

Having completed the verification of your standard bar it was delivered to Mr. Murphy on Monday and I have now the pleasure to endorse an indenture of the verification. You will observe that your bar is somewhat short of the standard length, but the error is so small as to be of no importance in relation to its practical use. Nevertheless, I think it is desirable that all measures used as standards of comparison should have their exact value strictly defined. I have, therefore, taken considerable trouble in defining the exact value of this particular standard, which is, perhaps, the most important of any lineal standard used in the Province of Ontario. I may observe that the defining lines on your bar as compared with those on the Dominion Standard are so coarse that it became necessary to measure their breadth, and on doing so I discover a measurable difference between the two defining lines; this difference is equal to .00057559 inch and I have, therefore, computed the length of the bar to the centre of the defining lines. I am very glad to have had the opportunity of making these comparisons, and shall endeavor to obtain similar comparisons of the surveyors' standards used in the other provinces.

I have, etc.,

(Signed) A. Brunel, Commissioner.

This indenture made at Ottawa the seventeenth day of September, A.D. one thousand eight hundred and seventy-seven. Witnesseth that a brass bar made by Messrs. Troughton and Simms, of London, England, and purporting to bear defining lines at a distance apart, equal to the standard English Yard, when the said Brass Bar is at a temperature of 62° of Fahrenheit, has been submitted for verification by Thomas Devine, Esq., P. L. S., Deputy Surveyor General and Chairman of the Examiners of Land Surveyors for the Pro-

P. 153, Book 4
Sept. 19th, 1877

vince of Ontario, and that the said brass bar has been verified by comparison with the Dominion Standard A and that it is shorter than that standard by .001168353 inches, its positive length from centre to centre of the defining lines at a temperature of 62° being 35.998831647 inches.

Given under my hand at the Standard Branch of the Dept. of Inland Revenue in the City of Ottawa, this 17th of September, 1877.

(Signed) A. Brunel, Commissioner of Inland Revenue and of Standards for the Dominion of Canada.

P. 156, Book 4
Oct. 6th, 1877

Sir: I beg to acknowledge receipt of your communication of Sept. 19th, inclosing an indenture of the verification of the standard English measure of length in the possession of the Bd. of P. L. S. for Ontario, for the purpose of comparing therewith the standards to be kept by each P. L. S. in accordance with Sec. 28, 22 Vic. Cap. 77 Con. Stat. of Canada, and stating that it is shorter than the Dominion Standard A by .001168353 inch but that the error is so small as to be of no importance in relation to its practical use. I have to request that you will inform me what provision is made for the verification of the standards now used by P. L. S. as issued to them in accordance with the above recital Act, as well as their chains, tapes, and other instruments for measuring and whether Instructions have been issued to the inspector of weights and measures in the different localities to examine and stamp said standards when brought for that purpose by P. L. Surveyors, and what action Land Surveyors ought to take in the premises.

As the standards now used by them are exact copies of the standard bar verified by you, will it suffice to have them stamped or must they procure another from you. I may observe that the standard bars they use have the standard yard on one side and five links on the other, that the bars are made of pine wood boiled in oil, and fitted with brass plates at the distances necessary for the graduation thereof.

I have, etc.,

(Signed) Thomas Deviné, Chairman of Board.

The Board also took into consideration the communication of P. L. S. Wm. Ogilvie to Hon. the Attorney General, and with reference to his strictures on the Survey Act, and the changes he would like to see made, were of the opinion that the apparent or real discrepancy in the reading of Sections 71, 72, 84 of 22 Vic. Cap. 77 Con. Stat. of Canada, arises from the fact that the convergence of the meridians was not taken into consideration when the Act was passed, and that the intention of the frames of the Act was evidently that lines which were to be considered parallel thereto, which view has been concurred in by the Department of Crown Lands as well as by the Courts of Law, and P. L. Surveyors generally, that as to the joys in side roads it is a matter to be arranged by municipal councils, and that when joys are made between private parties they can settle any inconvenience by mutual deeds.

Board adjourned at 4 p.m.

Geo. B. Kirkpatrick, Secretary of Board.

P. 162, Book 4
Jan. 10th, 1878

The members of the Board of Examiners of Land Surveyors for Ontario, in session assembled, desired to express to their Chairman, Thomas Devine, Esq., F.R.G.S., on the eve of his departure for Europe, their cordial good wishes for himself and family; they cannot but feel that their labors have been lightened by his uniform urbanity and the ability and zeal displayed by him in promoting the best interests of the profession, and in co-operating with them in the desire to elevate the standard of scientific requirements.

(Signed) F. F. Passmore, Chairman.

School of Practical Science,
Oct. 6th, 1880.

G. B. Kirkpatrick,
Dear Sir:—

I am sorry to have to inform you that the candidates R—— and R—— examined by me this afternoon have passed a very poor examination. This, I think, they will admit themselves. At the same time, if they have given satisfaction to the examiners in the other and (professionally) more important branches of their examination, I

P. 207, Book 4
Oct. 7th, 1879

P. 230, Book 4
Oct. 6th, 1880

do not wish to throw any obstacle in the way of their being allowed to pass. I leave this, therefore, entirely to the consideration of the Board. Indifferently as they did with me they might have done worse,

Yours very truly,
(Signed) Edward J. Chapman,
Examiner in Geology, etc.

P. 53, Book 5
Feb. 10th, 1885

Office of the Board of Examiners,
Land Surveyors—Prov. of Ontario,
Toronto, Feb. 10th, 1885.

The members of the Board of Examiners, having heard with deep regret of the death of Lt.-Col. J. Stoughton Dennis, C.M.G., late Deputy Minister of the Interior, and senior member of this Board, desire to place on record their application of the merits, public and private of their late colleague. To him the profession is indebted in no small degree for its honorable status at the present time. His labors as Surveyor General of Dominion Lands and Deputy Minister of the Interior, in inaugurating and perfecting the system of surveys in the north west are known and appreciated far and wide.

The members of the Board desire to convey to Mrs. Dennis and family their sympathy for the loss they have sustained, and their heartfelt prayer that the God of all comfort may sustain her and them in their bereavement.

P. 141, Book 5
Nov. 11th, 1890

Mr. Hugh Wilson, P.L.S., a member of this Board, having arrived in the city for the purpose of attending the present meetings and having been taken ill, died at the Rossin House on the 7th instant. The Board deeply feeling the loss, hereby desire to place on record their great and sincere regret at the decease of their brother member. (Carried.)

(Signed) F. F. Passmore, Chairman of Board.

P. 158, Book 5
Nov. 11th, 1891

The Board of Examiners of Land Surveyors for Ontario, with great regret have to record the decease of their fellow member Mr. Adam Clarke Webb, of Brighton, which event occurred on May

29th, 1891, and while we kindly remember the important services which he rendered to the Board and the loss which we feel, we at the same time desire to express our sympathy with Mrs. Webb and family in their greater loss and bereavement. (Carried.)

(Signed) F. F. Passmore, Chairman of Board.

The Board of Examiners desire to place on record its sense of the great loss it has experienced in the death of Frederick F. Passmore on January 10th, 1892. First as Secretary of the Board, then as member of the Board, and of late years as Chairman of the Board, in each of these relations his aim and object always has been the good of the profession. In paying this tribute of respect to his memory the Board feels it only voices the sentiments of the Surveyors of the Province at large in saying that they have each lost a friend and advisor, and that deep sympathy is felt for the family of their late colleague, and directs that a copy of this resolution be forwarded to the family. (Carried.)

(Signed) Peter S. Gibson, Chairman of Board.

P. 163, Book 5
April 5th, 1892

Resolution No. 1. Whereas under the Act to incorporate the Association of Ontario Land Surveyors and to amend the Act respecting Land Surveyors and the survey of Lands, the former Board of Examiners cease to exist and a new Board has under said Act been formed; be it resolved that all examinations conducted by the former Board in part are hereby adopted and that the candidates who may have partially passed their examinations be only required to fulfil the requirements set forth in the resolution of said Board and the minute thereof. (Carried.)

(Signed) Villiers Sankey, Chairman of Board.

P. 178, Book 5
Nov. 12th, 1892

(This Association is not responsible as a body for the opinions expressed in its Papers by Authors.)

OUTLINE OF WORK CARRIED ON BY TOPOGRAPHICAL DIVISION OF THE GEOLOGICAL SURVEY.

W. H. Boyd, Chief Topographer Geological Survey

The Topographical Division was organized in 1909. It started in a very small way, and has steadily grown until at present it consists of one chief topographer, one editor, one triangulator and computer, one assistant triangulator, three topographers, six junior topographers, and three topographical assistants. When it is considered that the division has trained all of its own topographers, the numerical strength of the staff at the present time will not seem so small as it might at first sight.

The methods employed for topographical mapping are photographic, plane-table intersection, and plane-table traverse. The complete mapping of an area is not necessarily confined to one of these three methods; sometimes two of the methods are combined, and in some cases all three of the methods have been used on the one map area, the combination being chiefly governed by the character of the country being mapped.

The following diagram shows all the methods adopted by the Topographical Division as a standard for obtaining the mathematical control over any map area. This diagram embraces all of the methods of mapping used by the division in what is considered their order of importance and relative value. The selection of the particular methods for obtaining the control is governed by the scale on the map, contour interval, and character of country, also the use for which the map is intended:—

Complete Diagram of Control.

Primary Control	Horizontal	}	1. Triangulation, directions, 8 in. Theodolite, 2 seconds.
			2. Triangulation, repetition, 6 in. Transit Theo., 10 seconds.
			3. Traverse, Transit, 20 or 30 seconds and tape.
	Vertical	}	a. Levelling, reading to 1-1,000 ft.
			b. Zenith distances, reading to 30 seconds.
Secondary Control	Horizontal	}	4. Triangulation for camera stations, transit to 1 minute.
			5. Triangulation plane-table and telescope alidade.
			6. Traverse, transit and micrometer eyepiece, transit 30 seconds or 1 minute.
			7. Traverse, transit and stadia.
	Vertical	}	c. Levelling, ordinary.
			d. Vertical angles to 1 minute.
Tertiary Control	Horizontal	}	8. Photograph intersections.
			9. Plane-table intersections.
			10. Plane-table and stadia or micrometer eyepiece.
	Vertical	}	11. Compass and telemeter.
			e. Vertical angles to 1 minute.
			f. Hand levelling.

Filling In	Horizontal	12. Plane-table, tape, wheel or pace.
		13. Compass, tape, wheel or pace.
		14. Compass, time or estimation.
	Vertical	g. Aneroid barometer.

Sketching, Continuous Contours.

Sketching of land forms from Photographs.

“	“	“	Plane-table stations.
“	“	“	Traverse lines.

The publishing scales adopted by the division for their maps are as follows: 400, 800, 1,000 and 2,000 feet to 1 inch, 1-62,500, 1-125,000 and 1-250,000. The contour intervals adopted are 10, 20, 25, 50, 100, 200, 250 and 500 feet.

The data shown on the different maps are essentially the same, and differ only with the limitations of the different scales. They comprise works and structures, such as dwelling houses, roads, railways, trails, bridges, etc.; drainage and relief features.

With regard to the scales, 1-62,500 and 1-250,000, a standard size of sheet is adopted. For the 1-62,500 the sheet is a 15 minutes of latitude and longitude, or the equivalent in area to it; for the 1-250,000, the sheet is one degree of longitude by 30 minutes of latitude, or the equivalent in area to it.

Standard note-books are provided for keeping field notes. These are ruled up and printed in accordance with the requirements of each method of survey.

Triangulation for the primary control of a sheet or series of sheets is carried on separately by the division. The system is the same as the Tertiary triangulation of the U. S. Coast and Geodetic Survey. A 6-inch Berger transit, reading to 10 seconds, is used. Zenith distances are also observed.

A certain amount of high-grade levelling is also carried on in connection with the topographical mapping in low rolling country. A 15-inch Y-level and target rods, reading to 1-1,000 of a foot are used. The customary precautions to minimize and eliminate errors are taken.

When the topographer leaves for the field no elaborate instructions are necessary. He is told the area to be covered, the scale and contour interval, and the general method of survey. This is quite sufficient, as he is thoroughly familiar with the requirements for each particular class of work. This is the great advantage in having topographers who have been trained in the division itself.

The following is a list of the topographical work done by the division since its organization:

Map.	Scale.	Contour Interval.	Approx. Land area in Sq. Miles.
Slocan, B.C.	$\frac{1}{62500}$	100	265
Beaverdell, B.C.	$\frac{1}{62500}$	100	165
Victoria, Van. Id., B.C.....	$\frac{1}{62500}$	20	52
Saanish, Van. Id., B.C.....	$\frac{1}{62500}$	20	78
Deadwood, B.C.	$\frac{400 \text{ ft.}}{1 \text{ in.}}$	20	0.5
Sooke, Van. Id., B.C.....	$\frac{1}{125000}$	200	230

Duncan, B.C.	1 125000	200	375
Nanaimo, B.C.	1 62500	20	140
Cowichan, B.C.	1 250000	200	1,370
Alberni, B.C.	1 250000	200	1,435
Orillia, Ont.	1 62500	20	150
Frank Landslide, Alta.....	800 ft. to 1 in.	20	3.5
Blairmore, Alta.	1 62500	100	195
Brechin, Ont.	1 62500	20	200
Kirkfield, Ont.	1 62500	20	180
Moncton, N.B.	1 62500	20	230
Bridge River, B.C.....	1 125000	200	575
Windermere, B.C.	1 125000	200	740
St. John, N.B.....	1 62500	20	130
Prescott, Paxton and Lake Mines, Texada Id., B.C.....	400 ft. to 1 in.	20	1.2
Vananda, Texada Id., B.C.....	2000 ft. to 1 in.	50	6
Beaverton, Ont.	1 62500	20	180
Sutton, Ont.	1 62500	20	70
Barrie, Ont.	1 62500	20	180
Upper White River, Yukon.....	1 250000	500	900
East Sooke, Van. Id., B.C.....	2000 ft. to 1 in.	20	12
Flathead Coal Basin, B.C.....	1 62500	50	44
Flathead, B.C., and Alberta....	1 250000	200	800
Thetford and Black Lake, Que..	1 62500	20	245
New Glasgow, N.S.....	2000 ft. to 1 in.	10	65
Rainy Hollow, B.C.....	1 250000	250	900
Revelstoke, B.C.	1 125000	250	1,500
Ainsworth, B.C.	2000 ft. to 1 in.	50	30
Crow's Nest, B.C., and Alberta..	1 250000	200	800
Sheep River, Alta.	1 62500	20	140
Mayo River, Yukon	1 250000	200	800
Highwood River, Alta.	1 250000	200	800
Sudbury, Ont.	1 62500	20	120
Zymoetz River, B.C.....	1 62500	100	70
Total land area mapped.....			14,177 sq. miles

High-grade exploratory surveys have also been made in the last two years of the following: Athabaska Lake, complete survey of whole lake; scale, 4 miles to 1 in. East coast James Bay, from Rupert House to Fort George; scale, 4 miles to 1 in.

This Association is not responsible as a body for the opinions expressed in its Papers by Authors)

BALANCING A TRAVERSE SURVEY

By John T. Ransom, B.A.Sc., D.L.S., O.L.S.

At the request of Mr. L. V. Rorke, Secretary of our Association, I have great pleasure in submitting this paper, which is upon a subject that I have recently spent some little time in investigating and trust that it will prove useful and interesting.

The following problems were before the writer in connection with determining the best possible means of balancing a traverse survey.

Problem 1.

Where angular measurements are made carefully by means of a Theodolite, but distances are measured by Stadia, Lugeol or Rochon micrometers or some such means for measuring distances. Chain measurements might be made.

Problem 2.

Where bearings of courses were determined by compass and distances measured by any of above means.

These problems were resolved into the following cases:—

To Balance a Survey

(1) Where bearings are assumed or known by check to be correct and not subject to any change, all the errors of closure being distributed among chainages of courses.

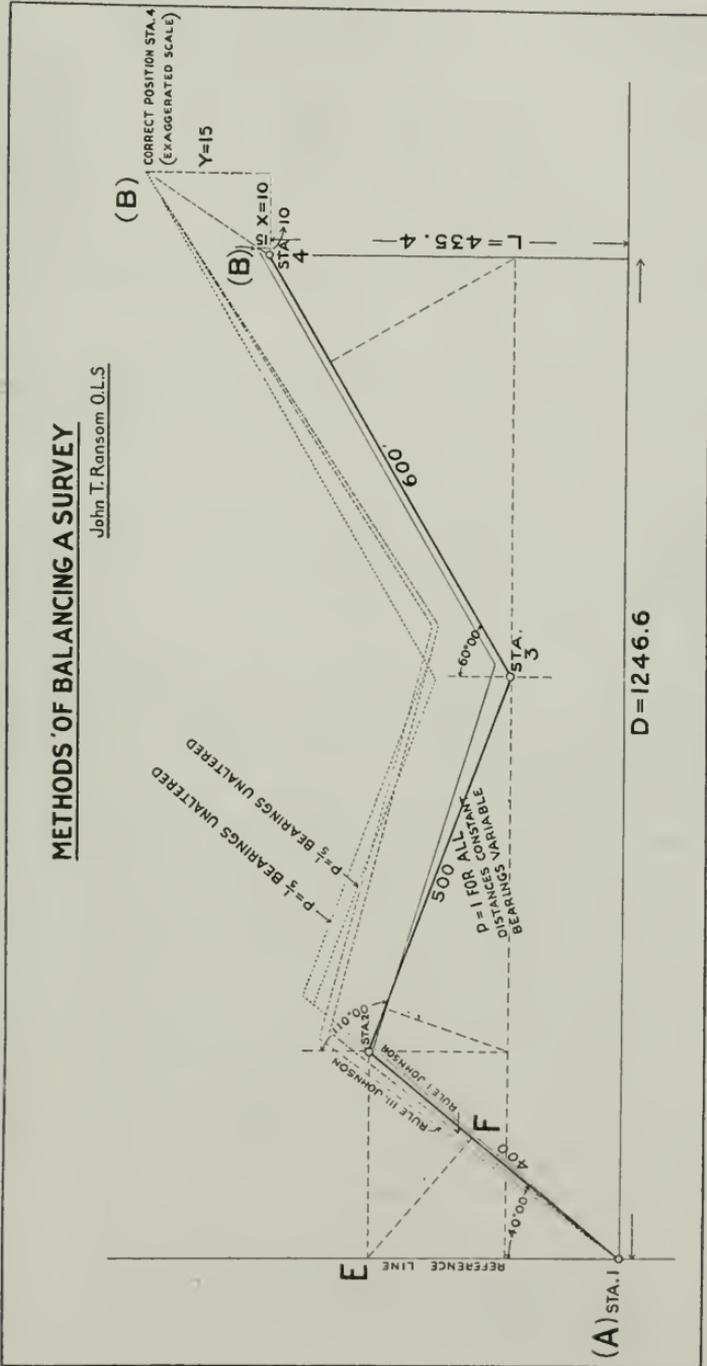
(2) Where chainages of courses are assumed to be correct and not subject to change, all the errors of closure being neutralized by adjustment of the bearings.

(3) Where errors are assumed to be as much due to erroneous bearings as to erroneous chainage and adjustments are made to both.

Under the heading "Rules for Balancing a Survey" in Johnson's Theory and Practice of Surveying (page 200) rules are laid down as to the method of procedure in cases similar to 1st and 3rd of above. The second case as above is not mentioned.

METHODS 'OF BALANCING A SURVEY

John T. Ransom O.L.S.



Quotation from Johnson's Theory and Practice of Surveying, pages 200-201:

"Rule 1.—As the sum of all the distances is to each particular distance, so is the whole error in latitude (or departure) to the correction of the corresponding latitude (or departure), each correction being so applied as to diminish the whole error in each case.

"Rule 2.—Determine the relative difficulties to accurate measurement and alignment of the several courses, selecting one course as the standard of reference. Thus, if the standard course would probably give rise to an error of 1, determine what the errors for an equal distance on the other courses would probably be, as $1\frac{1}{2}$, 2, 1, 0.5, etc. Multiply the length of each course by its number, or weight, as thus obtained. Then we would have:

"As the sum of all the multiplied lengths is to each multiplied length, so is the whole error in latitude (or departure) to the correction of the corresponding latitude (or departure), each correction being so applied as to diminish the whole error in each case.

"These two rules are based on the assumption that the error of closure is as much due to erroneous bearings as to erroneous chaining, which experience shows to be true in needle compass work.

"If, however, the bearings are all taken from a solar compass (or attachment) in good adjustment, or if the exterior lines are run as a traverse with a transit, so that the angles of the perimeter are accurately measured, then the above assumption does not hold, as it is highly probable that the error of closure is almost wholly due to erroneous chaining. Especially would this be highly probable if the azimuth is checked by occupying the first station on closing and redetermining the azimuth of the first closure, as found the traverse, and comparing it with the initial (true or assumed), azimuth of this course. If it thus appears that the traverse is practically correct as to angular measurements, it may be fairly assumed that the error of closure is almost wholly due to erroneous chaining. In this case use—

"Rule 3.—As the arithmetical sum of all the latitudes is to any one latitude, so is the whole error in latitude to the correction to the corresponding latitude, each correction being so applied as to diminish the whole error in each case. Proceed similarly with the departures.

“In the solution given on page 199, the first rule is applied. In ordinary farm surveying it is not common to give the lengths of the courses nearer than the nearest even link or hundredth of a chain. In balancing, therefore, the same may be observed.”

With reference to above quotation from Johnson, Rule 1 satisfies the condition of the problem or case 3 as previously mentioned by me. However, when Rule 3 (Johnson) is applied, the conditions of the problem (Case 1 by me) are not satisfied.

To apply this Rule 3, the bearings of the courses must be altered to satisfy the changes made in latitude and departure. Apparently in some measure this Rule 3 meets the particular conditions better than Rule 1, but in the case where a check has been obtained at the close of the survey on the bearings which were carefully ascertained throughout and the final bearing is found to be correct (this case is mentioned in Johnson, page 205), or even in cases as mentioned in Problem 1 by me, this rule (3) fails and is clearly inapplicable.

The question has been often asked on examination papers: “To state Rules for Balancing a Traverse Survey.”

Johnson's Rules are, I believe, quoted since they are the only rules at present ordinarily taught.

It is the writer's opinion that the inapplicability of Rule 3 as pointed out in this paper should be pointed out in future whenever possible, since students and especially those writing on examinations, are only too eager and inclined to memorize and cram up rules without regard to their absolute or even relative accuracy or their practical application.

In the derivation of the necessary formulae in this paper, the principles of Least Squares and Calculus are made use of, but all the steps taken in the derivation are shown so that even without a previous knowledge of Least Squares a reader may readily comprehend these steps.

For those who may be sufficiently interested in the general method of derivation of formulae and their practical usefulness I would recommend that they refer to—

Merrimens Least Squares,
Chauvenet, Vol. II., Practical Astronomy,
Close, Text Book on Topographical Surveying,
Crandall, Geodesy and Least Squares.

In which they will find mention made to the application of **Least Squares** to the problem in question or similar problems.

The material for this paper was not gathered or collected, however, from any text books, but is the result of the writer's personal investigation and application of mathematical principles.

When does Rule 3 (Johnson) hold true and when not?

Let d_1, d_2, d_3 , etc., be departures of courses.

Let l_1, l_2, l_3 , etc., be latitudes of courses.

Let $\ominus_1, \ominus_2, \ominus_3$, etc., be bearings of courses.

Let T be the arithmetic sum of departures.

Let P be the arithmetic sum of latitudes.

Let X be the closing error in departures.

Let Y be the closing error in latitudes.

Let Δd_1 be the correction to be applied to d_1 .

Let Δl_1 be the correction to be applied to l_1 .

Then by Rule 3—

$$\Delta d_1 = \frac{d_1}{T} \cdot X$$

$$\Delta l_1 = \frac{l_1}{P} \cdot Y$$

But if bearings are not to be altered Δd_1 and Δl_1 must bear the same relation to one another, as d_1 and l_1 , i. e.,

$$\frac{\Delta d_1}{\Delta l_1} = \frac{d_1}{l_1} = \tan \ominus_1$$

∴ We must have

$$\frac{d_1}{T} \cdot \frac{X \cdot P}{Y \cdot l_1} = \tan \Theta_1$$

but

$$\frac{d_1}{l_1} = \tan \Theta_1$$

∴

$$\frac{X \cdot P}{Y \cdot T} = 1$$

or

$$\frac{X}{Y} = \frac{T}{P}$$

This result may be stated as follows:

When the closing error in departure is to the closing error in latitude as the arithmetic sum of the departures is to the arithmetic sum of the latitude, Rule 3 (Johnson) is true and may be applied, otherwise it is not true.

Can Rule 1 (Johnson) be applied to balance a survey without altering bearings; i. e., can it be properly substituted for Rule 3?

Using same notation as before, and further letting the sum of all the courses be Z,

Then Rule 1.

$$\frac{S_1}{Z} \cdot X = \Delta d_1$$

$$\frac{S_1}{Z} \cdot Y = \Delta l_1$$

but

$$\frac{\Delta d_1}{\Delta l_1} \text{ must equal } \tan \Theta_1$$

∴

$$\frac{\Delta d_1}{\Delta l_1} = \frac{S_1}{Z} \frac{X \cdot Z}{S_1 \cdot Y} = \tan \Theta_1$$

or

$$\frac{X}{Y} = \tan \Theta_1$$

which is the condition that must be satisfied, but since Θ is different for each course, $\tan \Theta$ is, therefore, different or varies. Therefore for all courses $\frac{X}{Y}$ cannot equal $\tan \Theta$ and

Rule 1 cannot be substituted for Rule 3 and fulfil necessary conditions.

It might be said that for rough surveys of closed figures this Rule 3 is sufficient and satisfactory for assisting in ascertaining the area. It might also be said, however, that if the survey is rough in nature why bother with adjustment or to use Rule 1 would be satisfactory. Again, by the method to be brought out in what follows, the writer does not claim that for ascertaining the area of a closed figure it differs very widely from results obtained by said Rule 3.

It is sufficient to say, however, that the following methods of adjustments give the most probable solution, although entailing slightly more computations, and that these solutions are adaptable to more variety of problems and exactly satisfy the conditions set.

It is interesting and important to investigate the effect of constant errors (for instance error in length of chain) in connection with the two kinds of traverses.

- (a) Traverse which closes on initial station.
- (b) Traverse connecting two fixed points.

In case (a) it is at once evident that any constant error proportional to length of course would not show up upon summing up departures and latitudes. The sides of closed figure could have quite erroneous values without it being evident.

However in case (b) constant errors proportional to length of courses would be accumulative and noticeable upon checking.

Let D be the algebraic sum of departures.

Let L be the algebraic sum of latitudes.

And X and Y as before the closing errors in departure and latitude respectively.

For constant errors it is readily seen that—

$$\frac{X}{Y} = \frac{D}{L}$$

Or

$$\frac{X}{D} = \frac{Y}{L}$$

Or stated in words, the tendency is for constant errors to move the final station of traverse along a line joining the initial station with said final station.

It follows that if an amount was added to or subtracted from each course in proportion to the relative lengths of the courses then the final point would move along a line joining the initial and final points or stations of traverse.

The particular amounts to be added to or subtracted from each of the courses would be—

$$\frac{X}{D} s_1 \quad \text{for course } s_1$$

$$\frac{X}{D} s_2 \quad \text{for course } s_2$$

and so on.

If traverse survey has been carefully made between two fixed or known points and any appreciable closing error is

found it should be noted whether the relation $\frac{X}{Y} = \frac{D}{L}$

exists and if so it would be reasonable to suppose that the closing error was principally due to constant errors in measurements proportional to lengths of courses. It would most likely be necessary to carry out an investigation to ascertain the cause of such constant errors.

Case 1.

Chainages only to be corrected. Derivation of formulae. Let us assume a particular traverse survey where

S_1, S_2, S_3 , etc., are the measured distances

$\Theta_1, \Theta_2, \Theta_3$, etc., are the bearings of courses referred to meridian passing through initial station

P_1, P_2, P_3 , etc., are the "weights" of each measured distance

K_1, K_2, K_3 , etc., are the most probable values of distances

$\Delta S_1, \Delta S_2, \Delta S_3$, etc., are the necessary most probable corrections to be applied to distances

D be the algebraic sum of departures

L be the algebraic sum of latitudes

X and Y be the closing errors in departure and latitude.

Now the conditions that must be fulfilled are represented in the following equations—

$$(1.) \quad K_1 \sin \Theta_1 + K_2 \sin \Theta_2 + K_3 \sin \Theta_3 + \text{etc.} \quad - (D+X)=0$$

$$(2.) \quad K_1 \cos \Theta_1 + K_2 \cos \Theta_2 + K_3 \cos \Theta_3 + \text{etc.} \quad - (L+Y)=0$$

But we have also from the observed distances—

$$S_1 \sin \Theta_1 + S_2 \sin \Theta_2 + S_3 \sin \Theta_3 + \text{etc.} \quad - (D+X) = -X$$

$$S_1 \cos \Theta_1 + S_2 \cos \Theta_2 + S_3 \cos \Theta_3 + \text{etc.} \quad - (L+Y) = -Y$$

Differentiating (1.) and (2.) we obtain the following differential co-efficients—

$$\frac{d(1.)}{dK_1} = \sin \Theta_1, \quad \frac{d(1.)}{dK_2} = \sin \Theta_2, \quad \frac{d(1.)}{dK_3} = \sin \Theta_3, \quad \text{etc.}$$

$$\frac{d(2.)}{dK_1} = \cos \Theta_1, \quad \frac{d(2.)}{dK_2} = \cos \Theta_2, \quad \frac{d(2.)}{dK_3} = \cos \Theta_3, \quad \text{etc.}$$

Now,

$$K_1 = S_1 + \Delta S_1$$

$$K_2 = S_2 + \Delta S_2$$

And making use of Taylor's Theorem we obtain:

$$(3.) \quad \Delta S_1 \sin \theta_1 + \Delta S_2 \sin \theta_2 + \Delta S_3 \sin \theta_3 + \text{etc.} - X = 0 \\ \Delta S_1 \cos \theta_1 + \Delta S_2 \cos \theta_2 + \Delta S_3 \cos \theta_3 + \text{etc.} - Y = 0$$

Introducing (Theory Least Squares) the condition that the sum of the squares of the most probable residuals or corrections is a minimum, we have:

$$P_1 \Delta S_1^2 + P_2 \Delta S_2^2 + P_3 \Delta S_3^2 + \text{etc.} = \text{a minimum}$$

Differentiating we get:

$$(4.) \quad P_1 \Delta S_1 d\Delta S_1 + P_2 \Delta S_2 d\Delta S_2 + P_3 \Delta S_3 d\Delta S_3 + \text{etc.} = 0$$

And along with this equation we also have upon differentiating (3.) the equations—

$$(5.) \quad \sin \theta_1 d\Delta S_1 + \sin \theta_2 d\Delta S_2 + \sin \theta_3 d\Delta S_3 + \text{etc.} = 0 \\ \cos \theta_1 d\Delta S_1 + \cos \theta_2 d\Delta S_2 + \cos \theta_3 d\Delta S_3 + \text{etc.} = 0$$

To solve these three co-existing equations—

Multiply (4.) through by -1 ,

Multiply the first equation of (5.) by A ,

And multiply the second equation by B and form the sum of these products, which is

$$d\Delta S_1 (A \sin \theta_1 + B \cos \theta_1 - P_1 \Delta S_1) \\ + d\Delta S_2 (A \sin \theta_2 + B \cos \theta_2 - P_2 \Delta S_2) \\ + d\Delta S_3 (A \sin \theta_3 + B \cos \theta_3 - P_3 \Delta S_3) \\ + \text{etc.} = 0$$

But for this equation to hold, each term must be equal to zero, so we must have—

$$(6.) \quad A \sin \theta_1 + B \cos \theta_1 - P_1 \Delta S_1 = 0 \\ A \sin \theta_2 + B \cos \theta_2 - P_2 \Delta S_2 = 0 \\ A \sin \theta_3 + B \cos \theta_3 - P_3 \Delta S_3 = 0$$

etc.

Now multiplying the first of these equations by $\frac{\sin \theta_1}{P_1}$,
 the second by $\frac{\sin \theta_2}{P_2}$, etc., and adding the products, we have:

$$\begin{aligned}
 & A \left\{ \frac{\sin^2 \theta_1}{P_1} + \frac{\sin^2 \theta_2}{P_2} + \frac{\sin^2 \theta_3}{P_3} + \text{etc.} \right\} \\
 & + B \left\{ \frac{\sin \theta_1 \cos \theta_1}{P_1} + \frac{\sin \theta_2 \cos \theta_2}{P_2} + \frac{\sin \theta_3 \cos \theta_3}{P_3} + \text{etc.} \right\} \\
 & \qquad \qquad \qquad -X=0
 \end{aligned}$$

Since $\Delta S_1 \sin \theta_1 + \Delta S_2 \sin \theta_2 + \Delta S_3 \sin \theta_3 + \text{etc.} = X$.

And similarly multiplying by $\frac{\cos \theta_1}{P_1}$ etc., we have

$$\begin{aligned}
 & A \left\{ \frac{\sin \theta_1 \cos \theta_1}{P_1} + \frac{\sin \theta_2 \cos \theta_2}{P_2} + \frac{\sin \theta_3 \cos \theta_3}{P_3} + \text{etc.} \right\} \\
 & + B \left\{ \frac{\cos^2 \theta_1}{P_1} + \frac{\cos^2 \theta_2}{P_2} + \frac{\cos^2 \theta_3}{P_3} + \text{etc.} \right\} \\
 & \qquad \qquad \qquad -Y=0
 \end{aligned}$$

These equations may be expressed in the following manner
 —where $[\quad]$ represents “the algebraic sum of the parti-
 cular quantities.”

$$\left[\frac{\sin^2 \theta}{P} \right] A + \left[\frac{\sin \theta \cos \theta}{P} \right] B - X = 0$$

$$\left[\frac{\sin \theta \cos \theta}{P} \right] A + \left[\frac{\cos^2 \theta}{P} \right] B - Y = 0$$

Where the factors A and B are known as the “correlatives”
 of the equations of condition.

The values of these correlatives may be found from the above equations and substituted in (6.), whence the required corrections are obtained:

$$\Delta S_1 = \frac{1}{P_1} (A \sin \theta_1 + B \cos \theta_1)$$

$$\Delta S_2 = \frac{1}{P_2} (A \sin \theta_2 + B \cos \theta_2)$$

$$\Delta S_3 = \frac{1}{P_3} (A \sin \theta_3 + B \cos \theta_3)$$

etc., for any number of courses.

The question now arises what values are to be given to the weights P_1, P_2, P_3 , etc.

Taking the lengths of the courses into consideration we might reasonably use:

$$P_1 = \frac{1}{S_1}, \quad P_2 = \frac{1}{S_2}, \quad P_3 = \frac{1}{S_3}, \text{ etc.,}$$

$$\text{Or } P_1 = \frac{1}{S_1^2}, \quad P_2 = \frac{1}{S_2^2}, \quad P_3 = \frac{1}{S_3^2}, \text{ etc.}$$

$$\text{Or perhaps } P_1 = \frac{1}{S_1^4}, \quad P_2 = \frac{1}{S_2^4}, \quad P_3 = \frac{1}{S_3^4}, \text{ etc.}$$

There are so many factors to consider in applying to measurements their proper weights, especially when measurements are made in so many different ways, for instance, by chaining, micrometer measurements, stadia, odometer, pedometer and perambulator measurements, etc., that it would require a discussion of too great a length for this paper.

It is evident that for distances determined by chain or methods in which the accuracy of the measurements is affected by the nature of the ground, weights should be applied to each

course, taking into account the nature of the ground as well as the length. Weather conditions would also have an important bearing upon the determination of weights.

Where P is taken equal to the reciprocal of the length of each particular course, i. e., $P = \frac{1}{S}$. Then formulae take the form:

$$\begin{aligned} [d \sin \theta] A + [d \cos \theta] B - X &= 0 \\ [l \sin \theta] A + [l \cos \theta] B - Y &= 0 \end{aligned}$$

Where d is departure of course, as d_1, d_2, d_3 , etc., and l is latitude of course, as l_1, l_2, l_3 , etc.,

$$\begin{aligned} \text{And } \Delta S_1 &= Ad_1 + Bl_1 \\ \Delta S_2 &= Ad_2 + Bl_2, \end{aligned}$$

etc.,

Re the application of these formulae it is to be noted that the signs of $d \sin \theta$ and $l \cos \theta$ for any course are always positive, but that the sign of $d \cos \theta$ is not necessarily positive.

When the signs of the latitudes and departures of a course are the same, i. e., either both +ve or both -ve then sign of $d \cos \theta$ for that course is positive.

When, however, the signs of the latitudes and departures of a course are opposite the sign of $d \cos \theta$ is negative.

Again, the sum of all the quantities— $d_1 \cos \theta_1 + d_2 \cos \theta_2 + \text{etc.}$, is made algebraically.

Careful attention must be paid to the signs of the closing errors X and Y . The closing errors X and Y are measured from the position of the last station as given by traverse to the known fixed point upon which traverse closes and the sign of X and Y will be determined accordingly.

Where P is taken equal to the reciprocal of the square of the length, i. e., $P = \frac{1}{S^2}$, the formulae takes the form:

$$\begin{aligned} [d^2] A + [d \times 1] B - X &= 0 \\ [d \times 1] A + [1^2] B - Y &= 0 \end{aligned}$$

And—

$$\begin{aligned} \Delta S_1 &= S_1 (Ad_1 + Bl_1) \\ \Delta S_2 &= S_2 (Ad_2 + Bl_2) \\ \Delta S_3 &= S_3 (Ad_3 + Bl_3) \end{aligned}$$

etc.

In this discussion the positions of the final and first stations of survey with respect to one another were assumed to be accurately (or absolutely) known. This case could only occur, however, when these two stations were one and the same point, otherwise we would only know the position of the final station with respect to the first station to within a certain degree of precision and this condition would necessarily enter into the adjustment of the survey in some cases.

The relative accuracy or degrees of precision of the many ways and means of making measurements and of determining the position of points on the surface of the earth absolutely or with respect to one another affords a very large field for scientific research and, although considerable has been attempted and many very important truths, ways and means, have been brought to light, this large, and, it seems, ever extending field still presents itself for the exploration of the surveyor. I appreciate the value of mathematical investigations, but I ask the question: "Is it not true that we need more experimental data?" Theory and practise go hand in hand. Surveying to-day, I feel, is not recognized (at least in this country), as such an important profession or calling as it was, according to Mr. J. L. Lang, "in the days of Ancient Rome," or more time and funds would be given up to experimental investigation. The ordinary practising surveyor, however, has not the time nor the means to carry out extensive research. We must look to public bodies or institutions for results.

Case 2

Bearings only to be adjusted or corrected.

As the general method of derivation is similar to that given in previous case, it is only necessary here to give the results of the several steps.

Together with notation already adopted, let—

$\theta_1, \theta_2, \theta_3,$ etc., be observed angles or bearings.

$\beta_1, \beta_2, \beta_3,$ etc., be most probable values of said bearings.

$a_1, a_2, a_3,$ etc., be most probable corrections to said measured angles.

Then rigorous condition equations are:—

$$(1.) \quad S_1 \sin \beta_1 + S_2 \sin \beta_2 + S_3 \sin \beta_3 + \text{etc.} - [D+X] = 0$$

$$(2.) \quad S_1 \cos \beta_1 + S_2 \cos \beta_2 + S_3 \cos \beta_3 + \text{etc.} - [L + Y] = 0$$

Actual observation equations:—

$$S_1 \sin \theta_1 + S_2 \sin \theta_2 + S_3 \sin \theta_3 + \text{etc.} - [D + X] = -X$$

$$S_1 \cos \theta_1 + S_2 \cos \theta_2 + S_3 \cos \theta_3 + \text{etc.} - [L + Y] = -Y$$

Forming differential co-efficients, and note here that the values $\theta_1, \theta_2, \theta_3,$ etc., are substituted for $\beta_1, \beta_2, \beta_3,$ etc.

This is permissible when corrections are small and their second and higher power may be neglected.

$$\frac{d(1.)}{d\beta_1} = S_1 \cos \theta_1, \quad \frac{d(1.)}{d\beta_2} = S_2 \cos \theta_2, \quad \frac{d(1.)}{d\beta_3} = S_3 \cos \theta_3, \text{ etc.}$$

$$\frac{d(2.)}{d\beta_1} = S_1 \sin \theta_1, \quad \frac{d(2.)}{d\beta_2} = S_2 \sin \theta_2, \quad \frac{d(2.)}{d\beta_3} = S_3 \sin \theta_3, \text{ etc.}$$

So that as in previous case:—

$$-X + S_1 \cos \theta_1 a_1 + S_2 \cos \theta_2 a_2 + S_3 \cos \theta_3 a_3 + \text{etc.} = 0$$

$$-Y - S_1 \sin \theta_1 a_1 - S_2 \sin \theta_2 a_2 - S_3 \sin \theta_3 a_3 - \text{etc.} = 0$$

Introducing condition that sum of squares of residuals is a minimum, and solving, as in previous case, we get:—

$$AS_1 \cos \theta_1 - BS_1 \sin \theta_1 = P_1 a_1$$

$$AS_2 \cos \theta_2 - BS_2 \sin \theta_2 = P_2 a_2$$

$$AS_3 \cos \theta_3 - BS_3 \sin \theta_3 = P_3 a_3$$

etc.

From which may be deduced:

$$A \left[\frac{l^2}{P} \right] - B \left[\frac{lxd}{P} \right] - X = 0$$

$$A \left[\frac{lxd}{P} \right] - B \left[\frac{d^2}{P} \right] + Y = 0$$

And also:

$$a_1 = \frac{1}{P_1} (Al_1 - Bd_1)$$

$$a_2 = \frac{1}{P_2} (Al_2 - Bd_2)$$

$$a_3 = \frac{1}{P_3} (Al_3 - Bd_3)$$

etc.

Where a is in circular measure, to obtain a in seconds of arc, we have:
(In secs. of arc)

$$a_1 = \frac{1}{P_1 \sin 1''} (Al_1 - Bd_1)$$

$$a_2 = \frac{1}{P_2 \sin 1''} (Al_2 - Bd_2)$$

$$a_3 = \frac{1}{P_3 \sin 1''} (Al_3 - Bd_3)$$

When bearings are taken with a compass, it seems reasonable to suppose that errors are as likely to occur in the readings of the needle over short courses, as well as over long distances. The probability of an error in direction of a course is not, therefore, dependent upon the length of the course.

There is undoubtedly more to be said than this with regard to errors in bearings, but I shall consider it reasonable and sufficient to take $p = 1$ for all courses. The formulæ then take the form:

$$\begin{aligned} A [l^2] - B [lxd] - X &= 0 \\ A [(lxd)] - B [d^2] + Y &= 0 \end{aligned}$$

And:

(In secs. of arc)

$$a_1 = \frac{A}{\sin 1''} l_1 - \frac{B}{\sin 1''} d_1$$

etc.

$$a_2 = \frac{A}{\sin 1''} l_2 - \frac{B}{\sin 1''} d_2$$

$$a = \frac{A}{\sin 1''} l - \frac{B}{\sin 1''} d$$

With regard to the feasibility of making adjustments only to the bearings, assuming measurements to be correct, very much may be said. In the case of an ordinary compass chain survey, however, made on the level shore of a large lake or especially if made in winter upon the ice, accurate chaining would be made comparatively easy and this mode of adjustment of traverse would appear to be the most suitable. If distances are measured by stadia or micrometer, however, it is not so apparent that adjustments should be made to bearings only. The conditions and the relative accuracy of the methods of carrying out the survey would have to be considered.

The application of these several methods of adjustment are shown in connection with the following example:

Traverse survey connecting two fixed points A and B, the latitude and departure of B with respect to A is already known to be:—

$$\text{Latitude} = 450.4$$

$$\text{Departure} = 1256.6$$

Sta.	Bearing	Distance	Lat.	Dep.
1-2	40° 00'	400	306.4	257.1
2-3	110° 00'	500	-171.0	469.9
3-4	60° 00'	600	300.0	519.6
			<u>435.4</u>	<u>1246.6</u>

∴ Correction to total departure = + 10

Correction to total latitude = + 15

Problem is to balance this survey.

Case 1.—Bearings to remain unaltered.

(a.) Taking $P = \frac{1}{S}$.

Then distances become:

		Lat.	Dep.
1-2	410.4	314.4	263.8
2-3	494.2	-169.1	464.4
3-4	610.2	305.1	528.4
		<u>450.4</u>	<u>1256.6</u>

(b.) Taking $P = \frac{1}{S^2}$.

		Lat.	Dep.
1-2 becomes	408.8	313.	262.
2-3 becomes	493.8	-169.	464.
3-4 becomes	612.9	306.	531.
		<u>450.</u>	<u>1257.</u>

Case 2.—Chainages to remain unaltered.

Corrected values of bearings are:

		Lat.	Dep.
1-2	40°-43.3'	303.15	260.95
2-3	107°-50.5'	—153.20	475.94
3-4	59°-56.4'	300.52	519.30

Using Rule 3, Johnson—

	Bearings.	Lat.	Dep.
1-2	39°-42'	312.3	259.2
2-3	109°-30'	—167.7	473.6
3-4	59°-43'	305.8	523.8

Using Rule 1, Johnson—

	Lat.	Dep.
1-2	310.4	259.8
2-3	—166.	473.2
3-4	306.	523.6

The above results are intended only to give a general idea of the results to be expected by the several methods and the figures in the decimal places are not to be taken as being absolutely correct.

$$\text{Case 1. (a.) } P = \frac{1}{S}$$

The following gives the forms or methods of reduction of the problem in question.

1st.—By Logarithmic Computation.

Therefore

$$1056.8 A + 296.1 B - 10 = 0$$

$$296.1 A + 443.2 B - 15 = 0$$

Solving:

$$B = + .034 \text{ and } \log B = 8.52967$$

$$A = 0 \text{ very nearly}$$

$$\log B = 8.52967 \quad \log B = 8.52967 \quad \log B = 8.52967$$

$$\log l_1 = 2.48631 \quad \log l_2 = 2.23302 \quad \log l_3 = 2.47712$$

$$\log 10.4 = 1.01598 \quad \log -5.8 = .76269 \quad \log 10.2 = 1.00679$$

$$\log \sin 40^\circ 00' = 9.80807$$

$$\log 6.7 = .82405$$

$$\log \cos 40^\circ 00' = 9.88425$$

$$\log 8.0 = .90023$$

In a similar manner latitudes and departures (corrections) are computed for other courses.

The same reduction by use of traverse tables:

Sta.	Bearing.	Dist.	Lat.	Dep.
1-2	40 00'	400	306.0	257.1
2-3	110 00'	500	-171.0	469.8
3-4	60 00'	600	300.0	519.6
	$\Sigma d \sin \ominus$	$\Sigma d \cos \ominus$	$\Sigma l \cos \ominus$	
	165	197	234	
	442	-161	59	
	450	260	150	
	<hr/>	<hr/>	<hr/>	
	1057	296	443	

It is worthy to note here that it is convenient and sufficiently accurate to use approximate values for co-efficients of A and B, for example 300 in place of 296, etc.

Then:

$$1060 A + 300 B - 10 = 0$$

$$300 A + 440 B - 15 = 0$$

$$\text{and } B = .034$$

$$A = 0$$

$$\Delta S_1 = .034 \times l_1 = 10.4$$

$$\Delta S_2 = .034 \times l_2 = -5.8$$

$$\Delta S_3 = .034 \times l_3 = 10.2$$

Again from traverse tables:

Lat.	and	Dep. Corrections
8.0		6.7
2.0		-5.4
5.1		8.8

When good traverse tables are at hand practically all the reduction may be performed by the use of them.

After the latitude and departure for each course has been looked up, then enter the tables again with the latitude or departure distance as the case may be and the corresponding bearing and obtain the quantities: $d \sin \theta$

$$d \cos \theta$$

and $l \cos \theta$, for each course,

and so on.

Graphical Method or Representation of Values in Formulae

This same problem could be attempted graphically, for it is readily seen from sketch attached that:

$$d_1 \sin \theta_1 = \text{distance from F. to Sta. 2.}$$

$$d_1 \cos \theta_1 = \text{perpendicular distance E F, where E F is a perpendicular dropped on course 1-2 from point of intersection of lines drawn through Stations 1 and 2 parallel to co-ordinate axes.}$$

$$l_1 \cos \theta_1 = \text{distance from F to Sta. 1.}$$

In a similar manner these corresponding quantities could be ascertained or scaled off for each course. Whether or not this method would ever be found convenient to use in practice, it suffices to show the meaning and the relative values of the terms of our formulae.

DISCUSSION

Mr. Le May—I am sure we have all listened with the greatest interest to Mr. Ransom's most instructive paper. It is perhaps rather difficult to see the ins and outs quite as clearly as one would like to in hearing it read, but I have no doubt anybody who really gets an opportunity to go into it properly with the paper before him would see it was of the greatest possible value to any surveyor who was endeavoring to accurately plot a traverse. I have much pleasure in moving that this paper be accepted and printed in the records of the Association.

Mr. James—I have pleasure in seconding the motion.

The President put the motion, which, on a vote having been taken, was declared carried.

The President—I am sure any of the members who have had any trouble in balancing up traverse surveys, when they get that before them, will be able to work them out without any trouble.

INDEX MUNICIPAL SURVEYS

No.	Township	Surveyor.	Survey.	Date of Instructions	Date of Confirmation
52	Adjala, Etc..	John Ryan	Line between Tosoronto, Mona, Etc.	Mar. 20, 1855	Aug. 26, 1855
58	Aldborough.	Sam Smith	Lots D and No. 1 in 11 to 15 con.	Dec. 21, 1855	Oct. 31, 1860
88	Alfred	Wm. McConnell.	Lines bet. 9 and 10, and 10 and 11 con.	Nov. 24, 1857	Feb. 10, 1858
107	Alfred	Robt. Hamilton.	Line bet. 4 and 5 cons., Etc.	Oct. 30, 1858	Aug. 7, 1859
110	Albion and King	Chas. J. Wheelock	Boundary line between.	Jan. 12, 1859	June 4, 1859
162	Albion and Gore of Toronto	Thos. C. Prosser.	Base line between.	Dec. 19, 1861	Feb. 4, 1864
282	Alnwick	John Dainty	Line between 3 and 4 con. from W. limit of Lot No. 12.	Feb. 27, 1869	
315	Aldborough	Arthur Jones	Line in front 9th con., lots 12 to 18.	July 20, 1871	
336	Aldborough & Orford.	Wm. McGeorge	Line between.	July 26, 1872	Mar. 21, 1874
339	Aldborough.	William G. McGeorge	Part of line in front of 9 con.	Nov. 4, 1872	
346	Alfred	Robt. Hamilton	Lots in 1st con.	Mar. 25, 1873	
375	Alfred	Robt. Hamilton	Lots 21-37 in 1st con, 14-20 in 2nd con., 1 to 14 in 3rd con.	July 20, 1874	July 16, 1875

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
398	Aldborough.	Q. Johnstone	... Lots 12, 13, 14, 15, 16, 17, 18 in 9 & 8 con., lots 10, 11, 12, 13, 14 & 15 in 4 con., lots 1, 2, 3, 4, 5, & 6 in 9 and 10 con.	May 28, 1875	Oct. 24, 1877
401	Aldborough..	Q. Johnstone	... Lots 1, 2, 3, 4, 5 and 6 in 12 con.	July 21, 1875	Oct. 24, 1877
410	Aldborough.	Q. Johnstone	... Lots 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, in 3rd con.	Oct. 5, 1875	Oct. 24, 1877
438	Alfred	R. W. Lendrum	. Pt. con. line bet. 8 and 9 con.	Dec. 1, 1876	Oct. 24, 1877
479	Arthur	Lewis Bolton	... Lots 6 and 7 in 2 con.	Oct. 28, 1879	
488	Alfred	R. Hamilton	... West boundary line from Ottawa R. southerly to front 11 con.	June, 1880	
505	Arthur	F. F. Passmore	. Boundary line between lots 17, 18, 19 and 20 on W. side Owen Sound road and lots 15, 16, 17 and 18 in 6 con.	Feb. 24, 1882	
532	Ancaster	R. O'de Kennedy	Town line between Ancaster and Glanford at ends of 1, 2 and 3 con, Glanford, and at end 4, 5 and 6 con., Ancaster.	Sept. 26, 1885	May 14, 1888

542 Assignack..	T. J. Patten	Front angles of lots 16, 17, 20, 21, 28 and 29 cons. 1 and 2.	Nov. 9, 1886
550 Arthur	C. J. Wheelock .	Pt. blind line between 7 and 8 con., Tp. Arthur.	Dec. 23, 1889
543 Artemesia..	J. McAree	Lots 172 to 179 and 2nd range S. W. of Toronto and Sydenham Road and lots 171 to 174 & 179 & 180 in 3 range S. W. of side road, and to plant mon. at front and rear angles limit between lots 172 and 173, 174 and 175 and 177 and 178 and 178 and 179 in said 2nd R. and on the limits between 171 and 172, 172 and 173, 173 and 174, 179 and 180.	Apr. 12, 1887
611 Arthur	C. R. Wheelock .	Road allowance between lots 3 and 4 in 3 and 4 con.	Mar. 7, 1899
613 Arthur	C. R. Wheelock .	Road allowance between 18 and 19 in 11 and 12 con.	Mar. 7, 1899
685 Assignack..	T. J. Patten	Rear boundary line of lots 24 to 33.	July 11, 1912

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
659	Aldborough & Oxford	A. S. Code	Allowance for road between rear of lots on Middle Road and 3 con., extending from town line between Tps. N. W. across lots 1, 2 and 3.	Mar. 23, 1907	Oct. 14, 1907
13	Blenheim	James Black	Line in front 10 con.	June 16, 1852	Dec. 20, 1861
17	Bertie & Wil- loughby	Andrew Hood	Line between.	Aug. 3, 1852	May 25, 1853
25	Binbrooke	Ed. deCew	10th con. line.	Nov. 16, 1852	May 20, 1853
27	Burford	W. G. Wonham	13 and 14 con. line and W. boundary line.	Dec. 6, 1852	Apr. 5, 1856
33	Binbrooke	Wm. Smith	8 and 9 cons.	July 11, 1853	
34	Bertie	Andrew Hood	Garrison line.	Sept. 6, 1853	
43	Bedford	John Booth	Line between 7 and 8 and 8 and 9 con.	Apr. 5, 1854	
50	Brighton	J. S. Peterson	Part of 9 con.	Nov. 10, 1854	Feb. 22, 1855
61	Brighton & Cramache.	J. S. Peterson	Line between.	Mar. 6, 1856	Dec. 10, 1857
68	Bertie	Ed. DeCew	Part 5, 6 and 7 cons.	July 8, 1856	Dec. 15, 1858
72	Bertie	Ed. DeCew	5 con., 8 con., lot 9 nly., and line between 4 and 5 in 13 con.	Nov. 3, 1856	Dec. 15, 1858

80 Bertie	Ed. DeCew	Parts 8 and 7 con. and road allowance from 8 con. W. to 11th, between lots 8 and 9.	June	4, 1857	Dec.	15, 1858
98 Burford	O. Robinson	Part 3 con. line.	July	5, 1858	Jan.	11, 1859
112 Brantford	Lewis Burwell	Front and rear angles of lots 1, 2, 3, 4, 5, in 2nd range E. of Mount Pleasant Road.	Feb.	7, 1859	Sept.	1, 1862
117 Burford	E. Malcolm	14th con. line.	May	4, 1859		
125 Blenheim	Jas. Black, Jr.	Line between 7 and 8 con.	Nov.	14, 1859	Oct.	4, 1862
155 Bertie	Edmund DeCew	Lots 16 and 17 in bro. ft. and 1 and 2 con. on Lake Erie.	Sept.	4, 1861	Nov.	23, 1861
Burford	O. Robinson	See I. B., vol. 9, p. 12, 13 and 14, con. line.	June	30, 1862	Passed, etc. Sept.	25, 1863
184 Brighton	A. C. Webb	See C. R. S., vol. 7, p. 14, verification of the late J. P. Ball's survey under 24 U. C., 66.	Feb.	3, 1863		
199 Blenheim	James Pollock	Lots 2-10 in 6th con. 11th con. line.	Sept.	21, 1863	Dec.	5, 1863
210 Bertie	James W. Fell	Pts. 4, 5 and 6 and 10 con.	Oct.	3, 1864		
213 Bertie	John DeCew	Pts. 4, 5 and 6 and 10 con.	Oct.	31, 1864	Jan.	24, 1865
214 Bertie	John DeCew	Lots on line between 8 and 9 from tp. bdy. to side road bet. lots 8 and 9.	Dec.	28, 1864	Apr.	4, 1865
255 Brighton	E. C. Caddy	Lots 2 to 10 inc. in the 6th con.	June	27, 1867	Nov.	25, 1868

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
256	Blanchard ..	A. Niven	To plant stone monument at several angles of tp.	Oct. 25, 1867	May 8, 1868
257	Blanchard ..	A. Niven	To plant stone monument at front and rear angles 18 to 12 S. Bdy. and 37 to 42 Thames con.	Nov. 4, 1867	May 8, 1868
277	Brighton ...	A. C. Webb	5 to 10 in 3rd con.	Dec. 21, 1868	Sept. 9, 1869
278	Brighton ...	Thos. Nash	Lots 2 to 6 in 7 con.	Jan. 9, 1869	Mar. 25, 1871
280	Bertie	Edmund DeCew .	Lots 22 and 23 in 1 and 2 con., 5, 6, 7, 8, 9 in 12 con.	Feb. 12, 1869	May 15, 1869 Apr. 28, 1869
285	Bertie	Edmund DeCew .	Lots 4 and 5 bet. Gar. Rd. and L. Erie and pt. mon. at ft. and rear.	May 14, 1869	July 14, 1869
305	Bertie	Edmund DeCew .	Lots 33 and 34 in 1 and 2 cons. (L. Erie).	Sept. 7, 1870	Nov. 1, 1870
327	Bosanquet ..	Alfred Wilson ..	Lot 7 lake road, west con.	April 12, 1872	Dec. 30, 1873
333	Bexley	James Dixon ...	Line in rear of lots ft. on N. Bay Balsam Lake.	July 26, 1872	Nov. 18, 1872
335	Blanshard ..	B. Springer	Lots 1 to 12 E. M. R. 1 to 13 in 15 con. and 13 in 4 con.	July 26, 1872	Nov. 18, 1872

369 Bosanquet & Alex. Davidson Plympton..	Line between.	March 20, 1874	May	18, 1876	
386 Brock	C. G. Hanning ..	Lots 16 to 24 in 4 con.	Nov.	18, 1874	
412 Biddulph ...	Wm. McMillan ..	Lot 25 in 1 con. and line bet. lots 25 and 26.	Oct.	5, 1875	
452 Bertie	Ed. DeCew	Lots 29 and 30 in 2 con., Lake Erie.	Sept.	7, 1877	
466 Burford	O. Robinson	Lots 1 to 12 in 14 con.	April	25, 1878	
482 Blenheim ...	W. J. Wonham ..	Line bet. 1 and 2 cons.	Jan.	7, 1880	
498 Barton	John Fair	Lots 4 and 5, con. 3.	July	11, 1881	
513 Bertie	E. Gardiner	Lots Nos. 33 and 34.	July	17, 1883	
516 Burford	T. H. Jones	That pt. 13 con. bet. Oak- land T. line and Middle.	Sept.	12, 1883	
527 Billings	T. J. Patten ...	Lots 18, 19, 20, 21 and 22 in 14 and 15 cons.	July	8, 1885	
558 Barton	F. F. Passmore ..	Lots 14 and 15, con. 4.	April	27, 1889	
583 Binbrook ...	J. W. Tyrrell ...	Bdy. line on S. end of block No. 2, con. 3.	Aug.	4, 1892	
628 Beckwith & J. H. Moore	Boundary line between.	Sept.	14, 1900	Dec. 4, 1912	
635 Beckwith & Andrew Bell	Pt. line bet. said tps. from 4 to 8 cons.	Feb.	25, 1902	Sept. 28, 1905	
661 Blind River Town	Thos. Byrne	Block of land in	Sept.	24, 1907	Mar. 16, 1908
665 Barton	E. G. Barrow ...	Rd. allce. bet. broken ft. and 1 con.	May	2, 1908	Jan. 19, 1910
A Caistor	Andrew Hood ..	Boundary lines.	March	14, 1850	May 14, 1851
B Cramache ...	E. C. Caddy	Line bet. 9 and 10 con.	April	25, 1851	Jan. 2, 1852
2 Camden	A. B. Perry	Gore bet. Ernestown.	May	17, 1851	Jan. 2, 1852

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
3	Clinton	Jas. W. Fell	Bdy. line of pts. 1, 2, 3, 4, con. 5.	June 16, 1851	
6	Clarke	Dar- John Grant	Boundary line between.	July 31, 1851	Feb. 13, 1855
	ington				
7	Gaistor	Andrew Hood	Line bet. 1 and 2 cons.	Aug. 22, 1851	
8	Camden	A. P. Salter	Bet. cons. A and B and cons. A and the 1st.	Jan. 2, 1852	May 19, 1857
11	Crowland	E. DeCew	Line bet. 1 and 2 cons.	July 2, 1852	May 11, 1853
15	Charlotten- burgh	D. McDonald	Line bet. 3 and 4 cons.	July 6, 1852	
22	Crowland	E. DeCew	Line bet. 3 and 4 cons.	Sept. 20, 1852	May 30, 1854
29	Clarke	Pat Ivory	9th con. line.	April 15, 1853	Jan. 14, 1856
46	Cornwall	James West	Pt. line bet. 3 and 4 or 5 and 6 ranges.	Aug. 3, 1854	Oct. 10, 1857
61	Cramache & Brighton	J. S. Peterson	Line between.	March 6, 1856	Dec. 10, 1857
86	Cramache	J. S. Peterson	Pt. line bet. 8 and 9 con.	Oct. 27, 1857	June 2, 1858
94	Clarence	Wm. McConnell	1, 2, 3 and 4 con. line.	May 11, 1858	Oct. 18, 1858
102	Clarke	Wm. Wallbridge	Eastern boundary line.	Sept. 6, 1858	Nov. 15, 1859
104	Clarke	Wm. Hawkins	Line bet. 9 and 10 cons.	Sept. 18, 1858	Jan. 11, 1859
87	Caledonia & S. Planta- genet	Robt. Hamilton	Bdy. line bet. 10 and 11 cons. Caledonia and 18 and 19 cons. S. Planta- genet.	Nov. 19, 1857	Sept. 27, 1858

119 Clarence	Wm. McConnell .	5, 6, 7, 8, 9, 10 and 11 cons. lines.	June	21, 1859	Oct.	5, 1859
121 Charlotten- burgh	Jas. McNaughton	Bdy. line bet. 2 and 4 con., etc.	July	18, 1859	July	5, 1861
137 Canborough.	Edmund DeCew .	Side line bet. 6 and 7 in 2nd con.	July	11, 1860	Oct.	12, 1860
147 Canborough.	G. Z. Rykert . . .	Pt. line bet. 2 and 3 con.	April	3, 1861		
171 Colborne Vil- lage	J. H. Reid	To mark the village boundaries.	May	14, 1862	Jan.	22, 1863
171a Crowland . .	J. S. Dennis, I.B., Vol. 9, P. 13 . .	Line bet. 3 and 4 con., v. 25, cap. 42.	July	26, 1862	Jan.	12, 1863
196 Chatham . . .	E. R. Jones	1st con. line of N. Gore.	Aug.	14, 1863	Dec.	15, 1863
211 Clinton	T. C. Brownjohn.	Lots 9, 10, 11 and 14, line bet. 2 and 3 con.	Oct.	20, 1864		
240 Clarke	Geo. A. Stewart.	Lots 1 to 14, con. 3.	Oct.	15, 1866	Mar.	30, 1867
253 Cartwright . .	Wm. E. Yarnold.	Lot 17, con. 5.	June	3, 1867	Sept.	8, 1874
275 Clinton	F. C. Brownjohn.	Lots 8 and 9, con. 4 and 5.	Nov.	17, 1868		
330 Clarke	C. G. Hanning . .	Lots 31, 32, 33, 34 and 35, con. 1.	July	9, 1872	Feb.	19, 1873
342 Clarke	C. G. Hanning . .	Lots 25 to 35 in con. 10.	Dec.	31, 1872	June	2, 1873
345 Cartwright . .	C. G. Hanning . .	Lots 7, 8, 9, 10 and 11 in con. 3.	March	25, 1873	June	19, 1873
368 Carradoc . . .	Samuel Peters . .	N. halves lots 8 and 9, con. 2, south halves lots 8 and 9, con. 3.	March	20, 1874		
372 Cartwright . .	W. E. Yarnold . .	Lots 7 and 8, con. 2, 22, 23 and 24, in con. 10.	May	1, 1874	Oct.	14, 1874
413 Cartwright . .	W. E. Yarnold . .	Lot 22, con. 8.	Oct.	5, 1875	June	26, 1875
463 Cartwright . .	W. E. Yarnold . .	Lots 18 and 19, con. 8.	Feb.	20, 1878		

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
478	Cartwright..	W. E. Yarnold ..	Pt. con. line in front of lots 12 and 13, con. 7.	Oct. 25, 1879	Sept. 16, 1881
541	Clinton	E. Gardiner	Town line bet. Pelham and Clinton.	Sept. 21, 1886	May 16, 1890
549	Carradoc ...	J. M. Moore	Portion of town line bet. Lobo and Carradoc.	March 6, 1888	
597	Chinguacousy	Speight & Van- Nostrand	Rd. allce. bet. 17 and 18.	April 18, 1895	Dec. 2, 1895
630	Cumberland.	J. B. Lewis	Line bet. lots 3 and 4 in 5 and 6 cons., etc.	March 11, 1901	
631	Cumberland & Clarence	C. A. Bigger	Bdy. bet. said townships.	March 11, 1901	
634	Cumberland & Clarence	J. B. Lewis	Bdy. bet. said townships.	Feb. 15, 1902	
669	Cornwall & Osnabruck.	Geo. L. Brown ..	Bdy. line rd. allce. between townships.	Dec. 21, 1908	
6	Darlington & Clarke ...	See Clarke Grant	J. Line between.	July 31, 1851	Feb. 13, 1855
10	Dorchester & Westmin- ster	See Westminster	Boundary line between.	Jan. 2, 1852	Jan. 27, 1853
20	Delaware ...	Wm. McMillan ..	1st con. and base line.	Aug. 31, 1852	Jan. 25, 1854
45	Darlington..	John Grant	8th concession.	July 24, 1854	Feb. 27, 1855
56	Dorchester N	Sam. Peters	1st con. line Sn. Division.	Dec. 13, 1855	Aug. 5, 1859

64 Darlington.. John Shier	Lots 13 to 19, con. 6. See additional instructions I. B., vol. 8, p. 284, to in- clude lots 9 to 12.	May Sept.	23, 1856 17, 1856	Sept.	12, 1857
67 Dorchester N Sam. Peters	Con. B. Southern division. Survey discontinued. See Atty.-General's letters 2 Sept., 1858. See 106.	June	19, 1856		
105 Dorchester N Wm. McMillan ..	2nd con. line S. of Thames.	Oct.	12, 1858	Apr.	14, 1859
106 Dorchester N Sam. Peters	Con. b Southern Division.	Oct.	20, 1858	Aug.	5, 1859
109 Dorchester N W. G. Wonham .	Bdy. line bet. N. Orford, etc.	Dec.	16, 1858	Aug.	2, 1859
135 Dorchester N Wm. McMillan ..	Con. line N. of Thames.	June	25, 1860	Dec.	19, 1860
139 Darlington.. John Shier	7th con. line from lot 11 to 17.	July	27, 1860	Feb.	25, 1861
141 Darlington.. John Shier	Lots 6 to 10 inc. con. 8.	Sept.	22, 1860	June	21, 1861
148 Dorchester N Wm. McMillan ..	2nd con. N. of Thames.	April	8, 1861	Dec.	14, 1861
153 Doura and John Reid	Pt. boundary between.	July	11, 1861	Sept.	4, 1861
154 Darlington. John Shier	Con. line in ft. certain lots 3 and 4.	Aug.	15, 1861	May	5, 1862
154 Darlington . John Shier	And cons. 5 and 7.	Aug.	15, 1861	July	7, 1862
168 Dorchester N Wm. McMillan ..	1st con. N. of Thames.	Mar.	22, 1862	July	19, 1862
170 Darlington.. C. G. Hanning ..	1st 15 lots in con. 3.	April	3, 1862	July	31, 1862
177 Darlington.. C. G. Hanning ..	Lots 24 to 35, con. 3.	Sept.	16, 1862	Nov.	12, 1862
181 Darlington.. C. G. Hanning ..	Lots 14, 15, 16 in con. 4.	Jan.	7, 1863	June	2, 1863
195 Darlington.. C. G. Hanning ..	Lots 4 to 11, con. 5.	Aug.	14, 1863	Oct.	3, 1863
201 Darlington.. C. G. Hanning ..	6-10 and 24-27, con. 7.	Nov.	18, 1863	Jan.	12, 1864
212 Darlington.. C. G. Hanning ..	18 to 24 in con. 2.	Oct.	28, 1864	Jan.	10, 1865

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
212	Darlington..	C. G. Hanning ..	21 to 24, con. 5.	Oct. 28, 1864	Jan. 24, 1865
	Dorchester..	Wm. McMillan ..	Ascertain damages from alteration of line bet. lots 3 and 4, con. B.	Aug. 2, 1864	Sept. 16, 1864
215	Darlington..	C. G. Hanning ..	Lots 30 to 35 in 4th, 20 in 5th con.	Jan. 11, 1865	May 27, 1865
217	Darlington..	C. G. Hanning ..	Lots 19 to 35 in con. 9.	Feb. 28, 1865	Aug. 26, 1865
220	Downie	Jos. Kirk	Zorra line and Oxford Rd.	May 1, 1865	Aug. 26, 1865
221	Downie	Jos. Kirk	Line bet. Tp. and Gore of Downie bet. Downie and S. East Hope.	May 12, 1865	Aug. 26, 1865
228	Darlington..	C. G. Hanning ..	Lots 25 to 35 in 5 con.	Dec. 27, 1865	Mar. 3, 1866
230	Darlington..	C. G. Hanning ..	Lots 1 to 18 in con. 9.	Feb. 2, 1866	July 20, 1866
231	Darlington..	C. G. Hanning ..	Lots 1 to 5 in con. 6.	Feb. 21, 1866	July 26, 1866
239	Darlington..	C. G. Hanning ..	Lots 25 to 35, con. 2.	Aug. 10, 1866	Dec. 10, 1866
244	Darlington..	C. G. Hanning ..	Lots 11, 12 and 13 in con. 8.	Nov. 29, 1866	May 27, 1867
248	Darlington..	C. G. Hanning ..	Lots 15 to 35 in con. 1.	March 8, 1867	Sept. 20, 1867
249	Darlington..	C. G. Hanning ..	Lots 1 to 7, con. 1, and lots 15, 16 and 17, con. 5.	March 15, 1867	June 28, 1867
260	Darlington..	C. G. Hanning ..	Lots 28 to 32 in con. 7.	May 20, 1868	June 22, 1868
261	Darlington..	Wm. Murdoch ..	Lots 1 to 7 in 2 con. and 17 to 18 in con. 4.	July 13, 1868	May 14, 1869
261a	Darlington..	C. G. Hanning ..	Lots 17 and 18 in 4th con.	May 14, 1869	Aug. 10, 1869
276	Darlington..	John Shier	Lots 20, 21, 22 and 23 in 6 con.	Nov. 30, 1868	May 3, 1869

con.

286	Darlington..	C. G. Hanning ..	Lots 15, 16 and 17 in 8 con.	June	21, 1869	Aug.	10, 1869
295	Darlington..	C. G. Hanning ..	Lots 18 to 23 inc. in con. 8.	Dec.	16, 1869		
301	Darlington..	C. G. Hanning ..	Lots 18 to 31, both inc., con. 8.	June	6, 1870	Dec.	13, 1870
302	N Dorchester	Wm. McMillan ..	Lots 12 to 18, inc. con. 5.	May	31, 1870	June	25, 1872
304	Dover East..	John J. Francis .	Line bet. 12 and 13 con.	Aug.	11, 1870	June	12, 1871
310	Darlington..	C. G. Hanning ..	Lots 6 and 7, con. 6.	Sept.	14, 1870		
312	Darlington..	C. G. Hanning ..	Lots 1, 2, 3, 4, 5, con. 8.	Dec.	24, 1870	Oct.	19, 1871
322	Darlington..	John Shier	Lots 1, 2, 3, 4, 5, 6 and 7, con. 4.	Sept.	14, 1871	July	8, 1872
323	Darlington..	W. E. Yarnold ..	Lot 32, con. 8.	Jan.	17, 1872	Dec.	27, 1872
349	Darlington..	C. G. Hanning ..	Lot 8, con. 4.	April	5, 1873	May	12, 1873
355	Darlington..	C. G. Hanning ..	Lots 33 and 34, con. 8.	April	24, 1873	May	10, 1873
374	Darlington..	C. G. Hanning ..	Lot 15, con. 2.	June	1, 1874	June	22, 1874
385	Dawn	A. Davidson	Lots 16 to 34 on line bet. 5 and 6 cons.	Nov.	18, 1875	Mar.	2, 1876
397	Darlington..	C. G. Hanning ..	Lots 1, 2 and 3, con. 5.	May	31, 1875	Sept.	16, 1875
400	Darlington..	C. G. Hanning ..	Lots 9, 10, 11, 12, 13, con. 4.	July	8, 1875	Sept.	16, 1875
408	Darlington..	C. G. Hanning ..	Lots 18 and 19, con. 5.	Oct.	5, 1875	Nov.	11, 1875
421	Darlington..	C. G. Hanning ..	Lots 1, 2, 3, 4 and 5, con. 7.	March	31, 1876	May	14, 1876
427	East Dover..	Wm. G. McGeorge	Lots 1 to 12, con. 5.	May	22, 1876	July	13, 1877
460	Dunn	Hy. Lawe	Sheehan tract.	July	18, 1878	Sept.	4, 1878
489	Dawn	R. Coad	Pt. of 4 and 5 cons.	June	22, 1880	Aug.	25, 1880
506	Delaware ...	R. Coad	4th concession line.	Feb.	27, 1882	July	14, 1883
528	Delaware ...	C. A. Jones	Pt. 2nd con. ft. base line to line bet. 5 and 6.	July	7, 1885	Oct.	11, 1886
573	Dunwich	W. Davis	Rd. allce. bet. 2 and 3 con. opp. lots 13 and 14.	June	19, 1891	Sept.	6, 1891

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
556	Downie	D. S. Campbell	Rd. allee. bet. lots 5 and 6 in 10 con.	Nov. 8, 1888	Jan. 24, 1890
619	Douro	A. J. Cameron	Pt. rd. allee. bet. 3 and 4, cons. N. lot 23, to river.	Oct. 7, 1899	July 3, 1903
635	Drummond & Beckwith .	Andrew Bell	Pt. line bet. tps. from 4 to 8 cons.	Feb. 25, 1902	Sept. 28, 1905
L	Etobicoke & Gore of Toronto	David Gibson & J. S. Dennis	Boundary line between township of Ernestown	April 14, 1851	Apr. 29, 1852
2	Ernestown	A. B. Perry	Line in ft. of 8 con. or gore bet. tps. of Ernestown and Camden.	May 17, 1851	Jan. 2, 1852
63	Etobicoke	F. F. Passmore	4th con. Northern Division.	May 17, 1856	Mar. 31, 1858
76	Etobicoke	F. F. Passmore	3rd con. Northern Division.	Feb. 4, 1857	June 24, 1861
79	Etobicoke	F. F. Passmore	Con. A. and 1 and 2 cons.	May 22, 1857	Nov. 8, 1860
90	Etobicoke	J. S. Dennis	1st and 2nd mer. cross con. lines.	Feb. 4, 1858	July 29, 1858
101	Etobicoke	J. S. Dennis	1 con. line from lots 12 to 21.	Aug. 9, 1858	
115	Essa	H. Creswick	Pts. line bet. 7 and 8 and 8 and 9 cons.	April 14, 1859	Jan. 21, 1860
124	Eldon	W. Deane	10th cons. line.	Nov. 14, 1859	Feb. 13, 1861
53	Elmsley N. . . .	J. M. O. Cromwell	Portions of 10th con. line.	May 12, 1855	
156	Edwardsburg	James West	9th concession line.	Sept. 4, 1861	Nov. 12, 1862

175 Ellice	J. G. Kirk	Easterly boundary.	Aug.	28, 1862	Nov.	28, 1862
221 East Hope S.	Joseph Kirk	Line bet. gore Downie and S. E. Hope.	Aug. May	12, 1865		
241 Eramosa & Nichol ...	Chas. J. Wheelock	Establish bdy. line between.	Sept.	10, 1866	Mar.	4, 1867
247 Essa	Henry Creswick	Lots 12 to N. bdy. 4 con.	Jan.	14, 1867		
259 Escott, front of	Henry Lillie ...	Lots 5 to westerly bdy. in Br. ft. and 1st con.	Feb.	29, 1868		
267 Etobicoke ...	Chas. Unwin ...	6 to 15 in 1 and 2 M. C., 1 to 5 in 1st S. D., and 1 to 5 in B. F.	July	24, 1868	May	25, 1869
279 Eldon	H. D. Lumsden	Line bet. 4 and 5 fr. lot 13 to 25.	Feb.	1, 1869	Aug.	16, 1870
347 Eldon	Michael Deane ..	Line bet. 10 and 11 cons, ftg. on lot 22 in 11.	April	5, 1873	Oct.	30, 1877
359 Etobicoke ...	John Shier	Lot 6 in 1 con. (ftg. on L. Ontario), and lots 6 in 2, 3, 4, 5 cons.	Aug.	16, 1873		
367 Edwardsburg & Augusta	John S. Brown ..	Boundary line between.	Jan.	10, 1874		
367 Edwardsburg & Augusta	C. F. Chapman ..	Boundary line between.	March	9, 1875	Feb.	22, 1876
432 Escott	Henry Lillie ...	Pt. con. line bet. 1 con. and br. ft. rg.	Sept.	7, 1876		
442 Ennismore ..	T. B. Clementi ..	Part 8 concession.	March	3, 1877	Mar.	21, 1877
450 Egremont ..	Hugh Wilson ...	Side rd. bet. lots 20 and 21 in 6 and 7 cons.	Sept.	3, 1877	Dec.	1, 1877
461 Enniskillen..	John H. Jones ..	Pt. blind line bet. 13 and 14 cons.	Jan.	18, 1878	Aug.	26, 1878

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
492	Enniskillen..	John H. Jones ..	Pt. blind line bet. 13 and 14 cons.	Aug. 31, 1880	
499	Enniskillen..	J. J. Francis	Lots 7, 8 and 9 in 12 con.	Sept. 5, 1881	Apr. 21, 1882
502	Enniskillen..	J. H. Jones	Lots 4,5 and 6 in 13 and 14 cons.	Oct. 17, 1881	
507	Esquering ..	J. Warren	Line bet. lots 17 and 18.	May 20, 1882	Nov. 1, 1883
519	Emily	J. Dickson	Lots 18 and 19 in 11 con.	March 29, 1884	Feb. 9, 1885
520	Enniskillen..	A. Davidson	Lots 19, 20 and 21, con. 10.	May 9, 1884	
534	Enniskillen..	A. McDonell	Lots 19, 20 and 21, con. 10.	Jan. 28, 1886	
524	Eramosa	A. Howitt	Lots 22 to 32, con. 1.	Dec. 21, 1884	Dec. 29, 1885
535	Enniskillen..	J. H. Jones	Lots 19, 20 and 21, cons. 13 and 14.	March 23, 1886	
537	Enniskillen..	J. DeGurse	Lots 19, 20 and 21, con. 10.	May 14, 1886	Oct. 16, 1890
568	Etobicoke ...	P. S. Gibson	Pt. of original rd. allee.	Nov. 19, 1889	
581	Egremont ..	I. Traynor	Lots 26 and 27, con. 21 and 22.	Aug. 4, 1892	
593	Enniskillen..	C. A. Jones	Lots 28, 29, 30 and 31, con. 8.	April 20, 1894	Mar. 7, 1899
602	Ekfrid	Jas. Robertson .	Rd. allee. bet. 2 range N. of Longwood's Road and 1st con.	July 20, 1896	May 17, 1898
604	Eramosa & Nassagawya	James Warren .	Survey line between.	July 23, 1897	May 17, 1898

616 Etobicoke ...	P. S. Gibson ...	Rd. allce. bet. lots 16 and 17 in cons. A, B, C. and 1, 2, 3, 4, etc.	April 15, 1899	Sept. 14, 1900
629 Elderslie ...	A. J. Van Nos- trand	Line bet. 3 and 4 cons.	Feb. 5, 1901	Dec. 4, 1901
677 Eastview Vil.	F. E. Patterson..	McArthur Ave. in said vil- lage.	Dec. 8, 1909	Oct. 14, 1910
683 Elmsley N..	W. J. Moore	Rd. allce. bet. 6 and 7, con. lots 22 to 30.	Aug. 24, 1911	Dec. 14, 1911
F Flos & Vespra	Wm. Gibbard ...	Boundary line between.	March 21, 1851	Sept. 13, 1852
44 Finch	James West	Ft. of 3rd cons. lots 1 to 6 incl.	June 23, 1854	
149 Flos	Hy. Creswick ...	4, 5, 6, 9, 10 and 11 cons.	April 9, 1861	Sept. 16, 1862
150 Flos	Hy. Creswick ...	1, 2, 3 and pt. 4, pt. 6, 7, 8 and pt. 9 cons.	June 29, 1861	Sept. 16, 1862
174 Fenelon & Ops	W. H. Deane	Boundary lines between.	July 26, 1862	Feb. 19, 1863
Fenelon & Mariposa ..	Wm. Rath	Thames Rd. line bet. 38 and River Thames.	Jan. 29, 1863	Jan. 7, 1864
183 Fullarton ...	T. A. Blyth	Pt. 7 con. line from lots 8 to 13.	April 15, 1863	Dec. 22, 1863
190 Flamboro E.	James McIntosh	Pt. 2 con. opp. lots 15 to 18 in 1 con.	March 31, 1864	Jan. 25, 1865
202 Flamboro W.	Joseph Kirk	S. E. angle lot 10 in 14 con.	July 14, 1864	Sept. 21, 1864
208 Fullarton ...	David R. Brown.	Pt. line bet. 7 and 8 cons.	Nov. 9, 1865	Dec. 3, 1867
227 Finch	H. O. Wood	Line bet. 11 and 12 cons.	Dec. 24, 1866	Aug. 1, 1870
246 Finch	D. R. Brown ...	Pt. head line bet. 10 and 11 cons.	July 18, 1876	Oct. 27, 1877

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
578	Flos	C. E. Fitton	Rd. allee, bet. N. 1/2 in 15 and 16 in 9 con.	April 8, 1892	Aug. 22, 1893
585	Finch	D. R. Brown	Rd. allee, bet. cons. 11 and 12 fr. W. boundary across 1, 2 and 3 and bet. 3 and 4 in 12 con.	Oct. 28, 1892	June 9, 1893
632	Flamboro W.	Tyrrell & Ford	Rd. allee, bet. lots 12 and 13 in 5 con.	Aug. 12, 1901	Mar. 10, 1902
642	Fitzroy	J. L. Morris	Rd. allee, bet. cons. 9 and 10 bet. S. R. D. 5-6 to S. R. 10-11.	Dec. 9, 1902	Oct. 7, 1903
654	Fort Frances Village	D. J. Gillon	To survey E. and W. Rd. through Hudson Bay reserve.	Jan. 18, 1905	Apr. 28, 1905
698	Fenelon	Geo. Smith	Kd. allee, bet. cons. 8 and 9 across lot 11, etc.	June 2, 1915	Sept. 1, 1915
E Gore of Toronto & Etobicoke		David Gibson and J. S. Dennis	Boundary line between.	April 14, 1851	Apr. 29, 1852
4	Gwillimbury E. & Scott	(See Scott), Shier	J. Boundary line between.	June 20, 1851	
9	Grantham	F. F. Passmore	Pt. 2 and 3, 4 and 5 and 9 and 10 cons.	Jan. 2, 1852	Jan. 12, 1859
18	Grantham	G. Z. Rykert	Pt. 2, 3, 4, 5, 7 and 8 cons.	Aug. 4, 1852	Jan. 12, 1859

40	Grimsby, W. William Smith .. gore of, & Saltfleet ..	Line between.	Oct.	24, 1853	July	3, 1854
75	Gower N. J. M. Cromwell .	Broken front or concession A.	Jan.	17, 1857	Oct.	17, 1857
205	Gwillimbury S. W. Hallen	Pt. 8th con. line fr. lot 16 to N. limit.	May	27, 1864	Nov.	9, 1864
218	Gwillimbury B. W. Gossage ..	South boundary.	March	14, 1865	June	8, 1869
	N.					
291	Gosfield E. O'Flynn	5, 6, 7 and 8 con. lines.	Aug.	16, 1869		
296	Gwillimbury H. Creswick	3 to 12 in 14 and 15 cons.	Dec.	30, 1869	Feb.	4, 1870
	W.					
300	Gwillimbury Alfred Wilson ..	Lots 10 and 11 in 7 con.	May	25, 1870	Aug.	25, 1870
	E.					
364	Gwillimbury P. S. Gibson	Lots in 2 and 8 cons.	Dec.	18, 1873	Nov.	4, 1874
	E.					
394	Glenelg Hugh Wilson	Lots 100 and 101 in 1 con. or range west of T. and Sydenham Rd. E. and N. angles res.	April	24, 1875	July	17, 1875
419	Grimsby V. B. Wadsworth	Con. line bet. 4 and 5, 6 and 7, 5 and 6 cons. and lots H. and I. in East gore.	March	3, 1876	Nov.	10, 1876
443	Georgina W. E. Yarnold ..	Side line bet. lots 16 and 17 in 3 con.	March	15, 1877	Aug.	24, 1878
444	Georgina W. E. Yarnold ..	W. boundary line.	May	10, 1877	Oct.	3, 1877
445	Gwillimbury Hy. Creswick	S. 1/2 5 in 9 con., N. 1/2 in 8 con.	July	4, 1877	Jan.	29, 1879
	W.					

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
456	Gwillimbury E.	W. E. Yarnold ..	Lots 13 and 14 in con. 8.	Oct. 8, 1877	June 19, 1878
459	Gwillimbury W.	Hy. Creswick ...	Lines bet. lots 1, 2, 3, 4 and 5 in S. 1/2 14 con. and N. 1/2 13, in lots 5 and 6 in 13, 14 and 15.	Dec. 17, 1877	July 21, 1885
462	Gwillimbury E.	H. W. Selby	Pt. of Yonge St.	Jan. 18, 1878	
464	Georgina ...	W. E. Yarnold ..	Lots 16 and 17 in 2nd con.	Feb. 23, 1878	Aug. 27, 1878
472	Georgina ...	C. G. Hanning ..	Lots 1, 2, 3 and 4, con. 4.	Feb. 10, 1879	June 5, 1879
473	Gwillimbury N.	W. E. Yarnold ..	S concession.	Feb. 12, 1879	May 21, 1880
476	Grimmsby	T. C. Brownjohn	5, 6 and 7 concessions.	Oct. 17, 1879	June 11, 1880
486	Gwillimbury E.	P. S. Gibson	Front and rear of line bet. lots 27 and 28 in 5 con.	May 1, 1880	Aug. 24, 1880
500	Gwillimbury E.	P. S. Gibson	Line bet. King and E. Gwillimbury.	Sept. 5, 1881	Apr. 18, 1882
514	Gloucester... E.	H. O. Wood	Con. line at rear of 9 con. Ottawa St.	July 24, 1883	
515	Gainsborough & Pelham.	E. Gardiner	Township line between.	Aug. 6, 1883	Oct. 5, 1886
517	Gwillimbury E.	C. Unwin	Portion Yonge St. in tp. N. of lot 115 to N. bdy.	Jan. 23, 1884	Feb. 3, 1885

518	Gwillimbury E.	C. Unwin	Pt. posts at ft. angles of lots on Yonge St. in said tp. N. of lot 115.	March 5, 1884
525	Gwillimbury W.	M. Gaviller	Angles lots 1, 2, 3, 4 and 5 in S. ½ con. 14.	March 17, 1885
532	Glanford	R. O'de Kennedy	Portion town line bet. Ancaster and Glanford at ends 1, 2 and 3 cons. Glanford, and at ends of 4, 5 and 6 cons. Ancaster.	Sept. 26, 1885 May 14, 1888
547	Gwillimbury E.	P. S. Gibson	Side rd. allee. bet. lots 15 and 16, in 6 con.	Feb. 7, 1888 Apr. 26, 1888
574	Grimsby N..	E. Gardiner	Allee. for rd. bet. lots 2 and 3 in con. 3.	July 20, 1891
601	Grimsby N..	M. W. Hopkins	Allee. for rd. bet. lots 14 and 15 in 2 con.	Dec. 3, 1895 May 17, 1898
614	Gloucester & Osgoode ..	C. A. Biggar	Bdy. line between.	March 8, 1899
617	Gwillimbury E.	P. S. Gibson	Side rd. allee. bet. 25 and 26 in 6 and 7 cons.	April 15, 1899 Nov. 18, 1899
621	Gwillimbury W.	M. Gaviller	Side rd. bet. lots 20 and 21 in 13 con.	Dec. 26, 1899 Dec. 13, 1900
623	Gloucester & Osgoode ..	C. A. Biggar	Pt. bdy. bet. said townships.	Feb. 14, 1900
639	Gwillimbury E.	P. S. Gibson	Side rd. allee. 5 and 6 in 5 con.	Aug. 20, 1902 Dec. 23, 1903
640	Gwillimbury E.	P. S. Gibson	Rd. allee. bet. lots 30 and 31 in con. 7.	Oct. 28, 1902 Dec. 23, 1903

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
660	Garafraxa ..	H. J. Bowman ..	Rd. allee. bet. cons. 3 and 4, across lots 11, 12, 13, etc.	June 15, 1907	June 22, 1909
671	Grey & Mc-Killop	Lewis Bolton ...	Boundary between.	March 4, 1909	
362	Gwillimbury ..	A. Wilson	Allee. N. of 21, S. 26 and 31, N. E. 25 and 30, in 11 con.	Nov. 4, 1873	
636	Gwillimbury W.	P. S. Gibson ...	Rd. allee. bet. 1 and 2 cons.	March 12, 1902	
701	Goulburn ...	S. B. Code	6 con. line from lot 25 at side rd. to lot 18.	July 2, 1915	Oct. 22, 1915
704	Grimsby N. . .	J. J. MacKay ...	From E. limited tp. to rd. bet. lots 6 and 7 in 1st con. Broken front con.	Oct. 22, 1915	
5	Haldimand. . .	E. C. Caddy	Line in front of 10 con.	July 2, 1851	Jan. 20, 1852
16	Haldimand. . .	E. C. Caddy	Line on east side of	July 27, 1852	Jan. 31, 1853
42	Hibbert and T u c k e r - smith	Joseph Kirk	Line between.	March 9, 1854	Oct. 12, 1854
51	Humberstone	Jacob Misener ..	Pt. of 2, 4 and 5 cons.	Nov. 27, 1854	
54	Hope (see No. 70	G. A. Stewart ...	9, 10 and pt. 7 cons.	Nov. 27, 1855	
62	Humberstone	Jacob Misener ..	Eastern boundary line.	May 13, 1856	Aug. 30, 1856
69	Howard	J. O'Mara	Line bet. 1 and 2 cons.	Oct. 4, 1856	Aug. 11, 1858
70	Hope	G. A. Stewart ..	9, 10 and pt. of 7 cons.	Oct. 4, 1856	

74 Hawkesbury. D. McDonell	Eastern boundary.	Dec.	18, 1856	Oct.	4, 1857
E.					
96 Hawkesbury. R. Hamilton	Line bet. 1 and 2 cons., also bet. 7 and 8 and 8 and 9 cons., gore.	May	17, 1858		
E.					
108 Harwich	C. L. Davies 1, 2 and 3 con. lines.	Nov.	8, 1858	Feb.	9, 1859
111 Halowell and S o p h i a s - burgh	J. Emmerson Boundary line between.	Jan.	29, 1859	May	30, 1860
132 Haldimand	R. C. F. Brown 4 and 7 con. lines.	May	23, 1860	Apr.	15, 1862 4 con. 7 con.
140 Haldimand	J. S. Peterson 9th con. line.	Sept.	7, 1860	Sept.	4, 1861
169 Hibbert	Wm. Rath Easterly boundary.	April	2, 1862	Oct.	9, 1863
173 Haldimand	J. S. Peterson 8th con. line.	July	25, 1862	Sept.	12, 1863
179 Haldimand	R. C. P. Brown 5th con. line.	Nov.	5, 1862	Aug.	10, 1863
180 Hibbert	Wm. Rath Resurvey township.	Dec.	12, 1862	Oct.	9, 1863
185 Humberstone John DeCew	Pt. 1st con. line from lots 3 to 9.	Feb.	19, 1863	May	4, 1863
189 Hamilton	R. C. P. Brown 9th con. line.	March	23, 1863	July	30, 1863
192 Haldimand	E. C. Caddy 1st con. line.	May	12, 1863	Oct.	5, 1863
193 Haldimand	J. S. Peterson 3rd con. line.	May	12, 1863	Oct.	27, 1863
197 Haldimand	E. C. Caddy 2nd con. line.	Aug.	17, 1863	Mar.	18, 1864
198 Haldimand	R. C. P. Brown 6th con. line.	Aug.	17, 1863	Dec.	31, 1863
256 Howard	Sherman Malcolm Pt. per. mont. at certain angles 2 cons. (never sent)	Aug.	1867		

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
289	Hamilton	E. C. Caddy	Ft. and rear angles of lots in 7th con.	Aug. 11, 1869	Jan. 27, 1870
294	Harwich	W. G. McGeorge	Lots 19, 20, 21, 22, 23 and 24, in con. fr. L. Erie.	Oct. 29, 1869	
321	Harwich and Howard	Arthur Jones	Pt. boundary line between.	Sept. 14, 1871	
340	Harwich and Howard	J. J. Francis	Pt. boundary line between.	Nov. 5, 1872	June 4, 1873
371	Harwich	Wm. McMillan	Lots 14, 15, 16 and 17 in 1 and 3 cons.	April 8, 1874	Oct. 19, 1874
453	Howard	W. G. McGeorge	Lots 7, 8, 9 and 10 in 2 con.	Sept. 8, 1877	June 27, 1879
526	Hay	H. B. Proudfoot	Line bet. 17 con. and Lake Rd., East con.	May 9, 1885	
563	Harwich	A. McDonell	Rd. allee. bet. lots 18 and 19 in 2 con., west of Communication Rd.	Feb. 4, 1889	
594	Hullett	F. W. Farncomb	The line between 4 and 5 cons.	May 12, 1894	
633	Hibbert	John Rogers	Pt. E. bdy. in re 9 and 10 cons. at lot 1.	Feb. 7, 1902	
637	Hinchinbrooke	E. T. Wilkie	Line bet. 4 and 5 cons. from lot 14 to W. 23.	May 10, 1902	Oct. 6, 1902
643	Hinchinbrooke	E. T. Wilkie	Line bet. 2 and 3 cons. across lot 24.	Feb. 27, 1903	June 1, 1904

646 Hinchinbrooke ...	E. T. Wilkie ...	Pt. line bet. 5 and 6 cons. from L. 25 to 11.	Aug.	31, 1903	June	1, 1904
650 Hinchinbrooke ...	E. T. Wilkie ...	Line bet. 6 and 7 across lots 8 to 16.	June	17, 1904	Sept.	28, 1905
657 Hinchinbrooke ...	E. T. Wilkie ...	Line bet. 8 and 9 cons. from lots 20 to 14.	Oct.	16, 1905	Nov.	26, 1908
662 Hinchinbrooke ...	E. T. Wilkie ...	Line bet. 5 and 6 cons.	Oct.	3, 1907	Oct.	21, 1908
668 Houghton ...	W. H. Fairchild.	Rd. allee. bet. lots 7 and 8 E. of N. rd.	Nov.	6, 1908		
673 Hailseybury Town ...	H. T. Routly ...	Survey of pt. of town.	July	14, 1909		
679 Hinchinbrooke ...	E. T. Wilkie ...	Con. line bet. 8 and 9 con., lot 12 to 8.	Dec.	27, 1909	Nov.	18, 1910
680a Hamilton City ...	J. J. MacKay ...	Certain con. and rd. allee. to Barton, now Hamilton.	July	27, 1910	Aug.	6, 1913
316 Hallowell & Sophiasburg ...	John Emerson ...	Line bet. as far as relates to 3 con. and Gore.	July	20, 1871	May	4, 1872
504 Hawkesbury E. & Lochiel ...	Robt. Hamilton	Pt. bdy. line between.	Nov.	14, 1881		
686 Hinchinbrooke ...	E. T. Wilkie ...	Survey line bet. con. 7 and 8.	Sept.	12, 1912		
687 Hinchinbrooke ...	A. S. Campbell	Line bet. cons. 7 and 8 fr. lots 9 to 15.	Feb.	18, 1913	Oct.	22, 1913
690 Hamilton City ...	Barrow, MacKay & MacKay ...	Define limits of Burlington st.	March	20, 1914	Oct.	15, 1914

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
697	Harwich	W. G. McGeorge.	Con. line bet. 2 and 3 fr. lot 3, to waters of Ron-deau.	March 24, 1915	
699	Hamilton . . .	Jas. J. McKay . .	Limits of Mountain Pk. Ave., etc.	May 25, 1915	Dec. 23, 1915
35	King	T. C. Prosser . . .	Base line 1st con.	Sept. 15, 1853	Aug. 30, 1854
57	King	T. C. Prosser . . .	S. bdy. from 2nd con.	May 23, 1856	
97	King	T. C. Prosser . . .	Base line in ft. of 2nd con.	June 1, 1858	Sept. 15, 1858
103	King	T. C. Prosser . . .	7 and pt. 5th con. lines.	Sept. 17, 1858	July 9, 1860
110	King and Al- bion	C. J. Wheelock . .	Bdy. line bet., see Albion.	Jan. 12, 1859	June 4, 1859
129	Kingston . . .	T. W. Nash	5th con. line from 25 to easterly bdy. See letter Tp. Clerk, 31st July, 1862. L. R. S., vol. 6, p. 110.	March 10, 1860	
158	Kingston Village . . .	J. Burchill	Lines of principal ranges in village.	Oct. 10, 1861	May 5, 1862
500	King	P. S. Gibson	Line between King and E. Gwillimbury.	Sept. 5, 1881	Apr. 18, 1882
636	King	P. S. Gibson	Allee. bet. 1 and 2 cons. in fr. W. Gwillimbury, now in Tp. King.	March 12, 1902	

703 Kenyon	F. M. Eagleson	Pt. con. rd. allee. bet. 6 and 7 con., fr. E. side lot 7 to W. side lot 21; also rd. allee. bet. 6 and 7 in 6 con. Line bet. 10 and 11 cons. To plant monts. at N. E. and S. E. angles lot 24, in 13 and 14 cons. and N. W. and S. W. angles lot 25 in 13 and 14, also N. E. and S. E. angles of lot 30, in 13 and 14 cons., and at N. W. and S. W. angles lot 31 in 13 and 14 cons. Con. line bet. 2 and 3 cons. of Gore.	Oct. 15, 1915
23 London	Benj. Springer		Sept. 28, 1852
485 Luther	C. J. Wheelock		July 31, 1855
			April 22, 1880
503 Lochiel	D. R. Brown		Nov. 14, 1881
504 Lochiel	R. Hamilton	Pt. bdy. line bet. Lochiel and E. Hawkesbury.	Nov. 14, 1881
549 Lobo	J. M. Moore	Portion of town line bet. Lobo and Carradoc.	March 6, 1888
566 Lindsay	A. M. Bowman	Certain cons., ranges and blocks.	Oct. 8, 1889
645 Logan & Mc-Killop	J. A. Bell	Town line between.	Aug. 12, 1903
670 Luther	I. Traynor	Lots 28 to 32 in 14 con. cancelled May 5, 1911, and re-issued to D. D. James. 8, 9 and 10 cons. lines. Line between.	Dec. 31, 1908 May 19, 1911
h Montague	Francis Jones		Mar. 14, 1854
24 Medonte and Tay	William Gibbard		April 15, 1850 Nov. 9, 1852 Aug. 16, 1853

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Confirmation	Date of
31	Matilda	J. S. Bruce	Pt. 3rd con. line.	May 28, 1853	Feb. 10, 1854	
37	Medonte and Oro	William Gibbard	Line bet. across 1 and 2 cons.	Oct. 21, 1853	July 1, 1854	
38	Matilda	J. S. Bruce	7 and 8 cons. line.	Oct. 21, 1853	Jan. 14, 1856	
49	Montague	Francis Jones	Pt. 6 cons. line.	Oct. 25, 1854		
52	Mono, Adjala, Mulmur, Tosorontio	See Adjala, John Ryan	Line between.	March 20, 1855	Aug. 26, 1856	
81	Malden	E. R. Jones	Line bet. 1 and 2 cons.	June 15, 1857	Oct. 12, 1857	
85	Marysburgh	J. Emmerson	2nd con. N. of Black River.	Oct. 8, 1857	Mar. 12, 1859	
92	Moore & Sombra	P. S. Donnelly	Boundary line between.	March 28, 1858		
118	March & Nepean	J. A. Snow	Boundary line between.	June 8, 1859	Oct. 19, 1858	
122	Montague	John Morris	Line bet. 5 and 6 cons.	Sept. 28, 1859	Nov. 26, 1860	
136	Marysburgh	John Emerson	Line bet. 2 and 3 cons.	July 9, 1860	Nov. 12, 1860	
174	Mariposa and Fenelon	W. H. Dean	Boundary line between.	July 26, 1862	Feb. 19, 1863	
182	Mariposa	W. H. Dean	W. bdy. line in ft. 5, 6 and 7 cons.	Jan. 7, 1863		
186	Mariposa, including No 182	W. H. Dean	do. and cons. A, B and C, formerly Cartwright.	Feb. 26, 1863	Apr. 4, 1865	
233	N. Monaghan	John Reid	Western governing and bdy. lines of several cons.	March 5, 1866	Dec. 18, 1866	

269 Mara	.....-Peter Burnet ... Reissued to J. Morris	Pt. line bet. cons. A and B.	Aug. April	17, 1868 14, 1874	Apr. Oct.	24, 1869 31, 1877
284 Montague	... John Burchill ...	Pt. line bet. 4 and 5 cons.	March	18, 1869		
307 Moore & Som- bra	..... J. J. Francis ...	Line between.	Sept.	7, 1870		
387 Moore	..... A. Davidson	Lots 7 and 8 in front con.	Dec.	10, 1874	Oct.	21, 1875
417 Moore	..... A. Davidson	Lots 13, 14, 15, 16, 17 and 18 in 11 and 12 cons.	Jan.	18, 1876	June	1, 1876
424 Moore	..... A. Davidson	Lots 25, 26, 27 and 27 in 7 and 8 cons.	May	22, 1876	Dec.	3, 1880
447 Moore	..... A. Davidson	Lots 37 to 48 in front con.	Aug.	1, 1877		
455 Mara	..... Albert Fowlie	Lots in 6 con. and on 5 con. from 6 to 10 incl. line between.	Oct.	8, 1877		
484 Mersea	..... Alex. Baird	Lots 13 to 18, etc., pts. 1 and 2, A and B, broken front.	Mar.	9, 1880	Apr.	24, 1884
490 Mersea	..... Alex. Baird	Line bet. 2 and 3 con. from W. side lot 19 in 2 east- ward to Lake Erie.	July	24, 1880		
497 Mara	..... A. G. Cavana	Eastern boundary line.	Apr.	16, 1881	Jan.	15, 1883
533 Montague	... W. Chipman	Pts. 4 and 5 cons. and 3 and 4, which were not run in original survey.	Nov.	30, 1885		
536 Moore	..... J. DeGurse	Lots 7 to 12, con. 3 and 4.	Mar.	29, 1886	July	20, 1886
545 Maidstone	... A. J. B. Halford.	Line in centre of rd. in rear of lots E. of River Aux Puce.	Aug.	29, 1887	Aug.	29, 1887

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Instructions Date of	Date of Confirmation
577	Montague ...	J. H. Moore	Pt. con. line bet. cons. 4 and 5, which was not run in original.	Feb. 4, 1892	June 8, 1893
579	Monaghan	N. F. W. Wilkins ..	Con. lines and side rd. lines.	May 30, 1892	
596	March & Tor- bolton	J. H. Moore	Ends con. lines bet. 2 and 3 of Tps. March and Tor- bolton.	Jan. 5, 1895	
599	March & Tor- bolton	J. H. Moore	Line bet. crossing 2 con.	Sept. 20, 1895	Feb. 14, 1900
610	Mariposa ...	Geo. Smith	Line bet. cons. C and D across lots 15, 14 and 16.	July 28, 1898	Mar. 7, 1899
612	Markham ...	Speight & Van- Nostrand	Pt. rd. allee. bet. 3 and 4 cons., lots 1-5.	Sept. 14, 1899	Feb. 14, 1900
626	Mariposa ...	W. E. Yarnold ..	Rd. allee. bet. cons. 9 and 10 across lots 8 and 9.	June 6, 1900	Nov. 15, 1900
684	Marlborough.	S. B. Code	Rd. allee. bet. 6 and 7 con. opposite lots 1 to 4.	Feb. 2, 1912	Nov. 12, 1912
628	Montague & Beckwith ..	J. H. Moore	Boundary line between.	Sept. 14, 1900	Dec. 4, 1912
653	Mountain & Osgoode ..	J. H. Moore	Boundary line between.	Oct. 14, 1904	June 19, 1908
620	McNab	J. L. Morris	Con. line bet. B and F con. A and B and C.	Nov. 4, 1899	

624 McNab	J. L. Morris	Pt. S. E. town line along con. A, also line bet. cons. A and B and C.	Mar.	27, 1900	Oct.	2, 1900
645 McKillop and Logan	A. Bell	Town line between.	Aug.	12, 1903	Mar.	15, 1904
671 McKillop and Grey	Lewis Bolton	Bdy. rd. allce. between.	Mar.	4, 1909		
39 Nepean	J. McNaughton	Western boundary.	Oct.	21, 1853		
118 Nepean March	J. A. Snow	See March bdy. line bet.	June	8, 1859		
194 Nissouri W.	Wm. McMillan	Southern boundary.	Aug.	4, 1863	Dec.	18, 1863
241 Nichol & Era- mosa	C. J. Wheelock	Boundary line between.	Sept.	10, 1866	Mar.	4, 1867
265 Nassagawega	J. McIntosh	South boundary.	July	24, 1868	Nov.	5, 1868
265 Nelson	J. McIntosh	North' boundary.	July	24, 1868	Nov.	5, 1868
266 Nepean	Robt. Sparks	28 to 32 A and B Rideau ft. Nepean.	Aug.	1, 1868	Feb.	25, 1871
281 Nissouri E.	W. G. Wonham	Place pt. mon. at S. end each con. line on base line.	Feb.	26, 1869	Sept.	9, 1869
297 Norwich S.	B. Springer	10th con. line.	Dec.	30, 1869	July	23, 1870
404 Norwich S.	W. G. Wonham	Pt. line bet. 11 and 12 cons.	July	31, 1875	Dec.	4, 1876
434 Nassagawega	Jas. Warren	Lots 15 and 16, con. 1.	Sept.	21, 1876	Nov.	21, 1876
553 Nepean	J. M. O. Cromwell	Con. line in ft. 2 con. Ot- tawa ft. of Nepean ft., lots 21 to 30 of con. line on N. side con. A in Ri- deau ft.	Sept.	8, 1888	Nov.	28, 1888
567 Niagara	G. Gibson	Western bdy. of Niagara.	Oct.	28, 1899	July	4, 1891

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
569	Nepean	J. Stewart	Pt. con. line bet. 4 and 5 cons.	Nov. 19, 1889	Feb. 14, 1890
570	Nepean	J. M. O. Cromwell	Allee. for rd. N. lot 35, con. 1, Rideau ft. and S. of lots 26 to 30 in con. 2, Ottawa ft.	Nov. 26, 1890	Dec. 16, 1891
584	Nepean	J. Stewart	Pt. 3 and 4 con. line Rideau ft. Tp. Nepean, from base line bet. Ottawa and Rideau fts., S. to lot 22, etc., and from lot 15 S. to town line.	Sept. 7, 1892	Dec. 10, 1892
590	Nepean	E. J. Rainboth	Rd. allec. bet. 1 and 2 cons., Rideau ft. across lots 31 and 35.	Nov. 7, 1893	Oct. 3, 1894
559	Norwich S.	T. H. Jones	Town line bet. Windham June and S. Norwich.	June 25, 1889	Feb. 25, 1891
567	N i a g a r a Town	G. Gibson	W. bdy. line bet. town and township.	Oct. 28, 1889	July 4, 1891
569	Nepean	J. Stewart	Pt. con. line bet. 4 and 5 cons. and 2 and 3 Rideau front.	Nov. 19, 1889	Feb. 14, 1890
570	Nepean	J. M. O. Cromwell	Rd. allec. N. 35 in con. 1, Rideau ft. S. of lots 26 to 30, Ottawa front.	Nov. 26, 1890	Dec. 16, 1891

584 Nepean	John Stewart . . .	Pts. 3 and 4 con. line, Ri- deau ft.	Sept.	7, 1892	Dec.	10, 1892
604 Nassagawega	Jas. Warren	Town line bet. sd. tps.	July	23, 1897		
652 New Liskeard	W. J. Blair	Survey boundary line.	Aug.	19, 1904	Dec.	28, 1904
672 Niagara	A. Niven	Survey lines of streets.	June	12, 1909	May	27, 1910
675 Niagara	A. Niven	Survey S. boundary.	Oct.	5, 1909	May	27, 1910
676 Nepean & N. Gower	J. B. Lewis	Survey T. line bet.	Nov.	15, 1909		
678 Nottawasaga	M. Gaviller	Survey of Rd. bet. lots 9 and 10, con. 12.	Dec.	23, 1909	Sept.	16, 1910
680 Nepean & N. Gower	E. T. Wilkie	Town line between.	Jan.	18, 1910	Dec.	9, 1910
B Oxford W.	Wm. Smiley	4, 5 and 6 con. lines.	Mar.	29, 1851	June	25, 1851
1 Oxford N.	W. G. Wonham . . .	Line in front of 4 con.	May	9, 1851	Jan.	2, 1852
37 Oro and Me-donte	Wm. Gibbard	Line between.	Oct.	31, 1853	July	1, 1854
36 Osnabruck	J. S. Bruce	1 con. and S. E. angle.	Sept.	15, 1853		
55 Oxford N.	Wm. Smiley	Line bet. 1 and 2 cons.	Nov.	30, 1855	May	23, 1857
109 Oxford N.	W. G. Wonham . . .	Bdy. line bet. N. Dorchester	Dec.	16, 1858	Aug.	2, 1859
153 Otonabee and Douro	and John Reid	Pt. bdy. line between.	July	11, 1861	Sept.	4, 1861
161 Oxford N.	W. G. Wonham . . .	Line bet. 20 and 21 in con. 1, formerly N. Dorches- ter.	Dec.	14, 1861	Feb.	28, 1862

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
164	Osgoode . . .	J. Burchill	Line bet. 1 con. and broken front from lot 20 to S. boundary.	Jan. 7, 1862	
174	Ops & Fenelon	W. H. Dean	Boundary line between.	July 26, 1862	Feb. 19, 1863
187	Osgoode	H. O. Wood	Line bet. 1st con. and broken front, from lot 20 to S. boundary.	Mar. 7, 1863	June 30, 1863
237	Oshawa Village	J. Shier	Lots 9 and 10 in 2 con. E. Whitby, now tp. of	Mar. 8, 1867	May 15, 1867
272	Oxford W.	W. G. Wonham	5 and 6 concessions.	Oct. 3, 1868	
309	Osgoode	H. O. Wood	Line bet. 10 and 11 cons.	Sept. 7, 1870	Dec. 14, 1871
353	Orillia S.	F. W. Armstrong	Pt. rd. allee. bet. 4 and 5 con., known as West St. in village of Orillia.	Apr. 15, 1873	May 13, 1874
354	Oxford	W. G. McGeorge	Line bet. 4 con. and range of lots N. on Middle Rd.	April, 1873	July 7, 1875
433	Oxford	W. G. McGeorge	Lots 20 and 21 in 9 con.	Sept. 12, 1876	Aug. 6, 1878
468	Otonabee	John Reid	Base line bet. lots 16 and 17, through several concessions.	Aug. 5, 1878	Feb. 20, 1880
501	Oxford	W. G. McGeorge	Lots 6, 7, 8, 9, 10, 11 on N. side Middle Rd.	Sept. 5, 1871	

516	Oaklands	T. H. Jones	Pt. 13 con. Tp. Burford bet. Oaklands town line and middle town line of Burford.	Sept. 12, 1883	
521	Osprey	J. G. Sing	Bdy. line bet. con. A and adjoining con. in said tp.	June 27, 1884	July 18, 1886
531	Orford	W. G. McGeorge.	Pt. middle road from lot 6 to 11.	Aug. 11, 1885	
539	Otonabee	G. B. Abrey	Lots 10 and 11, con. 17.	Mar. 6, 1888	
586	Oxford	R. Coad	Rd. allee. bet. 1 con. and rear lots N. of Talbot Rd., Tp. Oxford.	July 14, 1893	Aug. 2, 1895
598	Oxford	R. Coad	Allee. for rd. bet. 3 and 4 con. Oxford from town line bet. Orford and Oldborough W. across.	Sept. 4, 1895	Apr. 20, 1900
548	Otonabee	G. B. Abrey	Lots 10 and 11 in 17 con.	Mar. 6, 1888	
606	Osgoode	J. H. Moore	Rd. allee. bet. 10 and 11 con., from lot 12, to N. bdy. of township.	Nov. 2, 1897	Sept. 5, 1901
614	Osgoode and Gloucester.	C. A. Biggar	Pt. bdy. line bet. sd. tps.	Mar. 8, 1899	
623	Osgoode and Gloucester.	C. A. Biggar	Pt. bdy. line between.	Feb. 14, 1900	
653	Osgoode and Mountain .	J. H. Moore	Boundary line between.	Oct. 14, 1904	
655	Ops	Jas. Dickson	Rd. allee. bet. 8 and 9, con. across lots 11 and 12.	May 17, 1905	
658	East Oxford.	F. J. Ure	Rd. allee. bet. 3 and 4 con. from lots 14 to 20.	Apr. 18, 1906	June 19, 1908
				Oct. 14, 1907	

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No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
659	Oxford	A. S. Code	Rd. : l/ce. bet. rear of lots on Middle Rd. and 3rd con. from town line, etc.	Mar. 23, 1907	
666	East Oxford.	W. H. Fairchild.	Rd. : allce. bet. 3 and 4 across lots 16 and 18.	May 2, 1908	Dec. 29, 1911
669	Osnabruck & Cornwall.	G. L. Brown	Boundary line between.	Dec. 21, 1908	
681	Osnabruck & Cornwall.	T. H. Dunn	Boundary between.	Oct. 26, 1910	July 31, 1914
689	Oakville	Mackay & Mackay	Parts of streets.	Mar. 3, 1914	Aug. 4, 1914
336	Orford	W. G. McGeorge.	Line bet. Aldboro and Oxford.	July 26, 1872	Mar. 21, 1874
706	Oakville	Mackay & Mackay	Boundaries A'lan Street in town.	Jan. 13, 1916	
19	Percy	J. S. Peterson	Pt. 2nd concession.	Aug. 23, 1852	June 28, 1854
21	Pickering	John Shier	Bdy. con. and range lines.	Sept. 1, 1852	Mar. 21, 1855
37	Plantagenet and Caltonia	S. R. Hamilton	Bd. line bet. 10 and 11 cons. and 18' and 19 cons. S. Plantagenet.	Nov. 19, 1857	Sept. 27, 1858
114	Pelham	E. DeCew	8th con. line in ft. of lots 14 to 20, inclusive.	Mar. 26, 1859	Nov. 9, 1859
166	Pickering	John Shier	Line in ft. 11 and 12, con. 5.	Jan. 17, 1862	Mar. 7, 1863

167	Portland	A. B. Perry	11, 12, 13, and 14 con. lines. See L. 30th May, 1864, L. R. S., vol. 7, p. 152, Mr. Perry's account recommended for payment, but survey cannot be confirmed. Resurveyed at expense of Government. See special Act.	Jan.	21, 1862
188	Pickering	John Shier	Lots 3 and 4 in 7 con.	Mar.	7, 1863
203	Pickering	John Shier	Lot 5 in 7 concession.	Apr.	5, 1864
219	Pickering	John Shier	Lots 14 and 15 in 4 con., and 18 in 8 concession.	Mar.	22, 1865
222	Pickering	John Shier	Lots 7 and 8 in 7 concession.	June	5, 1865
224	Pickering	John Shier	Lot 21 in 5 concession.	Aug.	17, 1865
225	Pickering	John Shier	Lots 21 and 22, con 1.	Nov.	8, 1865
232	Pickering	John Shier	Lots 7, 8 and 9 in con. 5.	Feb.	23, 1866
234	Pilkington	Wm. Grain	Lots 5 to 9, con. 1.	Mar.	20, 1866
236	Pickering	John Shier	N. westerly angles of 10, N. easterly angle of S. easterly angle 11, in 2 con.	Apr.	16, 1866
238	Pickering	John Shier	N. W. and S. W. angles of 12.	July	2, 1866
			N. E. and S. E. angles of 13, con. 1.		
245	Pickering	John Shier	Lot 26, in 2 con.	Nov.	19, 1866
250	Pickering	John Shier	Lots 32 and 33, in 1st con.	Apr.	10, 1867
251	Pickering	John Shier	Lots 21 and 22, in 3rd range broken front.	Apr.	10, 1867
				Mar.	31, 1868
				Sept.	25, 1866

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
252	Percy	D. Williams	Lots 15 W. to lot 3, in con. 1.	May 10, 1867	June 11, 1868
254	Pickering	John Shier	N. W. and S. W. angles of lot 19 and N. E. and S. E. angles of lot 2, in 5 con.	June 21, 1867	Apr. 1, 1868
258	Pickering	John Shier	Lots 22, 23 and 24 in con.	Mar.	June 5, 1868
263	Pickering	John Shier	Lot 13 in 4th con.	July	Jan. 19, 1869
283	Pickering	John Shier	Lots 7 and 8 in 1st con.	Mar.	July 30, 1869
293	Pickering	John Shier	Lots 19, 20, 21, 22 in 7 con.	Oct.	May 20, 1870
303	Pickering	John Shier	Lots 17 and 18 in 1st con.	July	Feb. 23, 1871
306	Pickering	John Shier	Lots 23 and 24 in 8th con.	Sept.	Jan. 19, 1872
308	Plympton	John H. Jones	Line bet. 3 and 4 con.	Sept.	Mar. 13, 1871
311	Pickering	John Shier	Lots 25, 26, 27 and 28, con. 9.	Nov.	Apr. 9, 1872
317	Pickering	John Shier	Line bet. lots 9 and 10 in con. 1.	July 21, 1871	Mar. 1, 1872
318	Pickering	John Shier	Lots 23, 24 and 25, con. 7.	July 31, 1871	May 28, 1872
328	Percy	C. F. Caddy	Lots 3 to 24, con. 9.	Apr.	Jan. 27, 1873
320	Percy	C. F. Caddy	Lots 3 to 24, in 7 and 8 cons.	July 31, 1871	Jan. 27, 1873
329	Parkhill Village	Chas. Rankin	Village lots.	July 9, 1872	Nov. 4, 1872
341	Pickering	W. H. L. Lepenostiere	Lots 1, 2, 3, 4, 5, 6, 7, 8 and 9 in con. 2, E. G. R.	Nov. 29, 1872	June 4, 1873
344	Pickering	John Shier	Lot 20 in 9th con.	Jan. 25, 1873	Feb. 19, 1873

351 Percy	C. F. Caddy	...	Lots 3 to 24 in 6 con.	Apr.	7, 1873	Sept.	5, 1874
361 Pickering ...	W. E. Yarnold	..	Lot 15, in 2 concession.	Sept.	20, 1873	May	14, 1875
366 Pilkington ..	W. H. L. Lepenotiere	..	Lots 10, 11, 12 and 13, con. 2.	Jan.	10, 1874	May	11, 1874
373 Percy	C. F. Caddy	.....	Lots 15 E. to 24 in 3 con., both inclusive.	May	2, 1874	Sept.	17, 1874
376 Pickering ...	John Shier	.....	Lots 20 and 21 in 3 range broken front.	Aug.	7, 1874	July	27, 1875
377 Pickering ...	John Shier	.....	Lots 17 and 18 in con. 2.	Aug.	6, 1874		
380 Percy	A. C. Webb	.....	Lots 22 to 24 in 3 con.	Sept.	18, 1874	Apr.	6, 1875
381 Percy	A. C. Webb	.....	Lots 16 to 24 in 4 con.	Sept.	18, 1874	Mar.	9, 1875
390 Pickering ...	John Shier	.....	Lots 28 and 29 in con. 1.	Feb.	24, 1875	July	27, 1875
395 Percy	Wm. Burke	.....	Lots 3, 4, 5, 6 in 4 con.	Apr.	26, 1875	Aug.	15, 1876
425 Plympton Village	J. H. Jones	.....	Bdy. line bet. 1 and 2 con. from lot 18 to Warwick town line.	May	21, 1876	Jan.	24, 1877
449 Penetanguishene	Ryley & Hamilton		Robert Street.	Sept.	3, 1877	Mar.	24, 1880
454 Pickering ...	John Shier	.....	Lots 19 and 20 in 3 range broken front.	Oct.	8, 1877	Jan.	30, 1878
457 S Plantagenet	C. E. Wolff	.....	Pt. of western bdy.	Dec.	17, 1877	May	8, 1878
467 Pickering ..	C. G. Hanning	..	Lots 17 and 17, con. 2.	May	3, 1878	July	17, 1878
475 Pickering ...	John Shier	.....	Lot 26, con. 8.	July	21, 1879	Nov.	26, 1879
487 Pickering ...	W. E. Yarnold	..	To pt. mon. at front and rear angles of lots 3 and 4, con. 9.	May	14, 1880		
488 N. Plantagenet	N. R. Hamilton		Eastern bdy. line of N. Plantagenet and N. bdy. line Alfred from Ottawa River S. to 11 con.	June	15, 1880		

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
512	Pelham and Thorold ..	E. Gardiner	Pt. bdy. line bet. Pelham and Thorold from N. W. cor. Thorold to S. W. angle, lot 111.	May 12, 1883	
515	Pelham and Gainsboro	E. Gardiner	Township line between.	Aug. 6, 1883	Oct. 6, 1886
522	Pickering ...	C. G. Hanning	Lots 5 and 6, con. 9.	July 25, 1884	Oct. 18, 1884
523	Pickering ...	C. G. Hanning	Lots 11 and 12, con. 9.	Dec. 20, 1884	
541	Pelham	E. Gardiner	Town line bet. Pelham and Clinton.	Sept. 21, 1886	May 16, 1890
557	Plympton	R. Coad	Rd. allce. in rear of front concession.	Dec. 3, 1888	Oct. 17, 1890
560	Plantagenet	S. J. B. Lewis	Lots 10 to 23 on line bet. 14 and 15 con. and bet. 16 and 17 cons.	June 22, 1889	Dec. 28, 1891
564	Pelham	G. Ross	Rd. allce. bet. lots 11 and 12, con. 2.	Oct. 7, 1889	May 7, 1890
565	Pickering	W. E. Yarnold	Lots 7 and 8, con. 8.	Oct. 7, 1889	Apr. 17, 1891
580	Pakenham	T. H. Moore	Bdy. line bet. Ramsay and Pakenham, across con. 9.	Aug. 4, 1892	Oct. 14, 1894
587	Pittsburg	F. Purvis	Con. rd. bet. 4 and 5 con.	July 14, 1893	May 29, 1894

595 Pelham	Geo. Ross	Rd. allce. bet. lots 6 and 7, Sept. con. 3.	10, 1894
607 Port Carling.	A. G. Cavana . . .	Village lots of Bailey estate.	31, 1898 June
609 Pelham	Geo. Ross	Rd. allce. bet. lots 2 and 3, con. 5.	11, 1898
638 Port Credit..	H. H. Gibson . . .	Queen St., Anne St., etc.	7, 1902 Nov.
647 Pickering . . .	W. E. Yarnold . . .	Rd. allce. bet. lots 16 and 17, in con. 3.	3, 1903 June
648 Peterboro . . .	A. J. Cameron . . .	Rd. allce. along W. bank Mar. Otonabee River.	29, 1904 Feb.
663 Port Arthur.	A. L. Russell . . .	Certain streets in town of Jan.	28, 1908
691 Port Arthur.	E. R. Bingham . . .	Certain streets in Apr.	7, 1914
695 Port Arthur.	E. R. Bingham . . .	Pt. bet. John St. and Mc-Nov. Vicar, etc.	26, 1914
693 Port Credit..	Speight & Van Nostrand	Pt. of said village.	May 20, 1914 Jan.
77 Rawdon	John Emerson . . .	13th concession line.	Feb. 20, 1857 Feb.
127 Richmond & T y e n d i - n a g a	W. R. Rombough . . .	Boundary line between.	Jan. 10, 1860 Oct.
143 Rawdon	J. J. Haslett . . .	Line bet. 1 and 2 cons. from Oct. lots 1 to 6, inclusive.	24, 1860 Feb.
229 Rawdon	H. A. McLeod . . .	Lots 6 and 7, con. 2.	16, 1866
235 Reach	W. E. Yarnold . . .	Lot 17, con. 3	26, 1866 Feb.
242 Reach	W. E. Yarnold . . .	Western boundary.	9, 1861
264 Reach	W. E. Yarnold . . .	16 in 6 concession.	20, 1868 Feb.
270 Reach	W. E. Yarnold . . .	6 in the 9th con. and 13 in the 10th.	21, 1868 Mar.
313 Reach	W. E. Yarnold . . .	Lot 16 in 5 con.	Apr. 19, 1871 Jan.

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
332	Reach	W. E. Yarnold . .	Lots 5 and 6 in 6 con.	July 9, 1872	Dec. 30, 1873
337	Reach	John Shier	Lots 17 and 18 in con. 8.	Oct. 10, 1872	Aug. 14, 1873
352	Raleigh	W. G. McGeorge.	Con. rd. bet. cons. 2 and 3, 3 and 4, 4 and 5, 5 and 6, 6 and 7, Gore A.	Apr. 15, 1873	July 9, 1874
363	Reach	W. E. Yarnold . .	Lots, 1, 2, 3, 4, 5 and 6, con. 7.	Dec. 16, 1873	Aug. 26, 1874
365	Reach	John Shier	Lots 15, 16, 17 and 18 in con. 11.	Dec. 31, 1873	July 8, 1874
407	Rama & Mara	John Shier	Pt. bdy. line between.	Aug. 27, 1875	Nov. 11, 1875
420	Reach	W. E. Yarnold . .	Lot 10, con. 4.	Mar. 7, 1875	June 18, 1877
428	Reach	W. E. Yarnold . .	Lot 18, in 7th con.	May 22, 1876	June 24, 1876
440	Romney	W. G. McGeorge	Pt. of concession 2.	Mar. 22, 1877	Oct. 1, 1878
446	Romney	W. G. McGeorge	Lots 203 and 204 on Talbot Road.	July 6, 1877	Oct. 1, 1878
465	Ross	William Bell . . .	Line bet. 5 and 6 cons.	Mar. 1, 1878	
469	Rochester . .	E. O'Flynn	Line of Malden Road.	Aug. 5, 1878	
471	Ross	William Bell . . .	Pt. of line bet. 5 and 6 con- cessions.	Nov. 15, 1878	Feb. 4, 1879
474	Raleigh	J. S. Laird	Part of con. line 3-4 and 4-5.	Apr. 1, 1879	July 24, 1879
580	Ramsay	T. H. Moore . . .	Bdy. line bet. Ramsay and Pakenham, across 9th concession.	Aug. 4, 1892	Oct. 17, 1894

589 Ross	F. Purvis	Pt. town line bet. Ross and Westmeath, W. of Muskrat L.	Sept.	15, 1893	May	17, 1898
603 Rochester & Tilbury W	J. S. Laird	Pt. town line between.	June	26, 1899		
608 Rochester ...	Wm. Newman ..	Rd. allce. bet. 6 and 7 con. A, across lot 21, pt. 20, etc.	Mar.	1, 1898		
612 Ross	J. L. Morris	Survey front lots 1, 2, 3, in con. 1.	Oct.	10, 1898	June	26, 1899
615 Richmond ...	W. R. Aylsworth	Pt. rd. allce. bet. 7 and 8 con.	Mar.	17, 1899	Apr.	20, 1900
641 Ross	J. L. Morris	Rd. allce. bet. 8 and 9 con. from lots 1-5.	Oct.	28, 1902	Sept.	14, 1903
644 Ross	J. L. Morris	Rd. allce. bet. lots 5 and 6 from con. 3 to 8.	May	2, 1903	Nov.	16, 1904
667 Ross	H. J. Beatty ...	Pt. Rd. allce. bet. 7 and 8 con.	Sept.	21, 1908		
694 Ross	W. J. Moore	Rd. allce. bet. 2 and 3 from proof line bet. lots 10 and 11.	July	24, 1914	Nov.	4, 1914
4 Scott and E. G w i l l i m - bury	John Shier	Boundary line between.	June	20, 1851		
12 Sidney	J. S. Peterson ...	W. pt. line bet. 5 and 6 concessions.	June	15, 1852	June	19, 1854
40 Saltfleet and W. Gore Grimsby .	Wm. Smith ...	Line between.	Oct.	24, 1853	July	3, 1854

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
41	Southwold ..	Chas. Fraser ...	Line bet. lots T. Rd. E. and N.	4, 1854 Mar.	11, 1856 July
73	St. Thomas Village ...	L. Burwell & Dan Harvey ...	Lots 13 and 15 in the village.	4, 1856 Dec.	9, 1858 Apr.
91	Sombra and Moore	P. S. Donnelly ..	Boundary line between.	28, 1858 Mar.	19, 1858 Oct.
111	Sophiasburg and Hallo-well	J. Emerson	Boundary line between.	29, 1859 Jan.	13, 1860 May
123	Sandwich ...	A. Wilkinson ...	Line bet. 2 and 3 cons. of Petite Cote.	14, 1859 Nov.	
133	Saltfleet	J. S. Dennis	5 and 6 con. lines.	June 14, 1860	Jan. 2, 1861
138	Smith	Geo. A. Stewart.	Front of 1, 2 and 3 cons. W. Bdy.	July 17, 1860	Aug. 29, 1860
163	Sombra	P. S. Donnelly ..	Lots along pt. rd. allee. bet. 13 and 14 cons.	Jan. 7, 1862	May 27, 1862
176	Sandwich ...	E. R. Jones	Line bet. 2 and 3 cons., Petite Cote.	Sept. 30, 1862	Dec. 22, 1862
268	Scott	John Shier	Est. line in front 11 con.	Aug. 17, 1868	Mar. 8, 1869
299	Sandwich E.	F. L. Foster	Line bet. 2 and 3 cons. and 3 con. and English survey.	Apr. 4, 1870	Nov. 1, 1870
314	Scott	W. E. Yarnold ..	Lot 26, in 6th con.	Apr. 19, 1871	Oct. 10, 1872
316	Sophiasburg and Hallo-well	John Emerson ..	Boundary line between.	July 20, 1871	May 3, 1872

357	Scott	.....	W. E. Yarnold ..	Lots 32 and 33 in con. 5.	July	16, 1873	Aug.	14, 1873
319	Scott	.....	W. E. Yarnold ..	Lot 26 in 3 concession.	July	31, 1871	Oct.	5, 1872
370	Scott	.....	W. E. Yarnold ..	Lots 33 and 34 in 5 con., 30 and 31 in 6 concession.	Apr.	8, 1874	July Nov.	19, 1875 2, 1875
383	Sombra	.....	J. H. Jones	Lot A or 1 on base line in 5, 6, 7 and 8 con., lots A, B, C, D, 1 to 10 in 9 to 15 con., lots 18 to 30 in 13 con., lots 11 to 16 in 14 con., lots 11 to 30 in 15 con.	Oct.	31, 1874	Feb.	25, 1871
388	Scott	.....	W. E. Yarnold ..	Lots 17, 18, 19 and 20 in con. 6.	Dec.	17, 1874	July	19, 1875
391	Sophiasburg.	.....	T. O. Bolger	Base line bet. 2 con. S. W. Green Pt. and Gore B on one side and portion of 2 con. N. of Green Pt. from lots 23 to 27 on other side.	Mar.	31, 1875	Jan.	14, 1875
393	Sarnia	.....	A. Davidson ...	Line bet. bk. con. A and 9 con.	Apr.	19, 1875	Apr.	15, 1876
402	Sombra	.....	J. H. Jones	Lots not mentioned in No. 383 and excepting lots on rd. allce. bet. 13 and 14 cons., etc.	Aug.	26, 1875		
423	Scott	.....	W. E. Yarnold ..	Lots 29 and 30 in 7 con.	Mar.	31, 1876	May	17, 1876
431	Shuniah	.....	Hugh Wilson ...	Several lines through which C. P. Ry. passes.	Aug.	1, 1876	Jan.	6, 1877
437	Sandwich E..	.....	E. O'Flynn	Lots 143 and 144 in 3 con.	Nov.	20, 1876		

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
439	Southwold & Delaware.	J. A. Bell	Bdy. line bet. from base line in Southwold to R. Thames.	Feb. 9, 1877	Jan. 24, 1878
458	Scugog	W. E. Yarnold	Line bet. lots 7 and 8, con. 10.	Dec. 17, 1877	Feb. 20, 1878
470	Scugog	W. E. Yarnold	Lots 3 and 4 in con. 11.	Nov. 4, 1878	July 15, 1879
477	Scott	W. E. Yarnold	Lots bet. 29 and 30, con. 8.	Oct. 24, 1879	
483	S. S. Marie	Jos. Cozens	Lots, 1, 2, 3, 4, park lots adjoining.	Mar. 2, 1880	
508	Scott	W. E. Yarnold	Lots 13 and 14 in con. 4.	July 6, 1882	Nov. 1, 1883
510	Scugog	J. Dickson	Front and rear angles line bet. lots 9 and 10 in con. 11.	Feb. 27, 1883	Apr. 15, 1884
543	Sydenham Rd	J. McAree	Lots 173, 174, 175, 177, 178 and 179 in range 2, lots 171, 172, 173, 174, 179 and 180 in range 3, lots 172, 173, 174, 175, 178 and 179 in range 2, etc.	Apr. 12, 1887	
559	Norwich S...	T. H. Jones	Town line bet. Windham and S. Norwich.	June 25, 1889	Feb. 25, 1891
592	St. Vincent	J. G. Sing	Ft. Bdy. line bet. 11 and 12 con. in rear of lots 19 to 30 in said township.	Mar. 2, 1894	Nov. 24, 1896

625 S. Sherbrooke	E. T. Wilkie	Pt. con. line bet. 2 and 9 con. of said township, etc.	4, 1900	Apr.	9, 1902
552 St. Vincent . .	J. G. Sing	Bdy. line bet. 5 and 6 cons., etc.	25, 1888	Mar.	17, 1890
696 Wilberforce and Stafford	H. J. Beatty	Pt. bdy. line bet. commencing 20 con., Wilberforce and ending S. L. of Alice.	23, 1915	Mar.	
E Toronto Gore and Etobicoke	D. Gibson and J. S. Dennis	Boundary line between.	14, 1851	Apr.	29, 1852
24 Tay and Mendonte	Wm. Gibbard	Boundary line between.	9, 1852	Aug.	16, 1853
42 Tuckersmith & Hibbert.	Jos. Kirk	Boundary line between.	9, 1854	Oct.	12, 1854
52 Toronto, Adjala & Mono	John Ryan	Boundary line between	20, 1855	Aug.	26, 1856
127 Tyendinaga and Richmond	W. R. Rombough	Boundary line between.	10, 1860	Oct.	26, 1860
134 Thorold	John DeCew	Line bet. 215 and 216.	19, 1860	Aug.	29, 1860
162 Toronto Gore and Albion	T. C. Prosser	Base line between.	19, 1861	Feb.	4, 1864
426 Thorah	W. E. Yarnold	Pt. lot 19, con. 2.	22, 1876	Jan.	24, 1879
491 Tecumseth . . .	H. Creswick, Sr.. . .	Eastern portion of 11 and 12 concessions.	30, 1880	Aug.	
509 Trafalgar . . .	F. F. Passmore	Lots 5 and 6, con. 10.	6, 1882	July	
512 Thorold and Pelham	E. Gardiner	Line bet. Pelham and Thorold from N. W. corner to lot 111.	12, 1883	May	

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
529	Tecumseth..	H. Creswick	That pt. con. line bet. 8 and 9 con.	Aug. 4, 1885	Oct. 4, 1893
530	Tecumseth..	H. Creswick	Pt. posts at ft. and rear angles lots 1 and 2, cons. 8 and 9 and 1 to 7 in 9 and 10 cons. and 1 to 4 in 10 and 11 cons.	Aug. 4, 1885	Oct. 4, 1893
543	Artemesia...	J. McAree	Lots 172, 173, 174, 175, 177, 178, 179, range 2. Lots 172, 173, 174, 179 and 180 in range 3, etc.	Apr. 12, 1887	
551	Townsend ...	T. H. Jones	Pt. rear line 5 con. across lots 1 to 12.	May 4, 1888	Nov. 22, 1888
561	Zone	Coad & Robertson	Base line across 4 con.	July 3, 1889	
562	Zone	Coad & Robertson	Canal Street.	July 3, 1889	Apr. 17, 1891
572	Tiny	M. Gaviller	Line bet. 6 and 7 from 2 con. or base line W. to Georgian Bay.	Apr. 18, 1891	Dec. 1, 1891
575	Tilbury E....	J. M. Tiernan	Con. bet. 1 and 2 cons.	July 21, 1891	Nov. 3, 1893
588	Torbolton ...	F. Purvis	Con. line bet. 1 and 2.	Sept. 15, 1893	
596	Torbolton ...	J. H. Moore	The ends of con. 1 and 2 Tps. March and Torbolton.	Jan. 5, 1895	
599	Torbolton ...	J. H. Moore	Line bet. March and Torbolton, crossing 2 con.	Sept. 20, 1895	

603	Tilbury W. & Rochester.	Jas. Laird	Pt. town line bet.	June	26, 1897
651	Toronto Tp..	P. S. Gibson	Rd. allee. bet. 1 and 2 ranges Credit Indian Reserve.	Aug.	12, 1914
688	Toronto Tp..	W. S. Gibson	Ranges Credit Indian Reserve.	Mar.	19, 1913
705	York (now Toronto)	Speight & van Nostrand	Lots J, K, L pt. lot 19, con. 2, from Bay	Dec.	9, 1915
82	Uxbridge	John Shier	8th concession line.	July	2, 1857
200	Uxbridge	John Shier	Lots 15 and 16, con. 3.	Sept.	24, 1863
204	Uxbridge	John Shier	Lot 17, con 3.	Apr.	5, 1864
216	Uxbridge	John Shier	Lots 31 to 37, con. 3.	Feb.	18, 1865
243	Uxbridge	John Shier	Lots 6 to 17, con. 6.	Oct.	19, 1866
287	Uxbridge	John Shier	Lots 1, 2, 3, 4, 5, 6, con. 3.	June	21, 1869
288	Uxbridge	John Shier	Lots 30 and 31, in the 5th con.	June	21, 1869
324	Uxbridge	W. E. Yarnold	Lots 16, 17, 18, 19 and 20, con. 4.	Jan.	30, 1872
338	Uxbridge	John Shier	Lots 1 and 2, con. 4.	Oct.	26, 1872
350	Uxbridge	John Shier	Lot 32, con. 5.	Apr.	5, 1873
356	Uxbridge	W. E. Yarnold	Lot 34, con. 2.	June	10, 1873
358	Uxbridge	W. E. Yarnold	Lots 26, 27, 28, 29, 30, 31, 32, con. 4.	June	17, 1873
382	Uxbridge	C. G. Hanning	Lot 33, con. 5.	Oct.	31, 1874
392	Uxbridge	C. G. Hanning	Lots 11, 12, 13, 14, 15, con. 2, and lot 7, con. 3.	Apr.	8, 1875
396	Uxbridge	W. E. Yarnold	Lots 11, 12, 13, 14 and 21, in con. 1.	May	5, 1875
399	Uxbridge	C. G. Hanning	Lots 34, 35 and 36, con. 5.	June	24, 1875
				Jan.	9, 1873
				Jan.	24, 1874
				Jan.	24, 1874
				Dec.	7, 1874
				Feb.	23, 1874
				Mar.	10, 1875
				May	7, 1875
				May	28, 1875
				Aug.	23, 1875
				Dec.	1, 1875
				Aug.	4, 1875

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No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
403	Uxbridge . . .	C. G. Hanning . .	Lot 8 in con. 3, and 33 and 34 in 6 con.	July 29, 1875	Jan. 26, 1876
406	Uxbridge . . .	C. G. Hanning . .	Lot 26, con. 1.	Aug. 27, 1875	Oct. 5, 1875
411	Uxbridge . . .	C. G. Hanning . .	Lot 20, con. 8.	Oct. 5, 1875	Oct. 23, 1877
416	Uxbridge . . .	C. G. Hanning . .	Lots 27, 28, 29 and 30, con. 1.	Jan. 6, 1876	May 16, 1876
418	Uxbridge . . .	C. G. Hanning . .	Lots 25 and 26 in con. 2.	Feb. 4, 1876	May 14, 1876
422	Uxbridge . . .	W. E. Yarnold . .	Lot 22, con. 1.	Mar. 31, 1876	Aug. 15, 1876
429	Uxbridge . . .	C. G. Hanning . .	Lot 36, in con. 6.	July 18, 1876	Aug. 1, 1876
441	Uxbridge . . .	C. G. Hanning . .	Lot 9, con. 3.	Feb. 16, 1877	Oct. 3, 1877
480	Uxbridge . . .	C. G. Hanning . .	Lots 35 and 36, con. 4.	Nov. 4, 1876	Nov. 25, 1879
481	Uxbridge . . .	C. G. Hanning . .	Lots 33, 34 and 35, con. 4.	Dec. 26, 1879	Jan. 12, 1880
C	Vaughan . . .	T. C. Prosser . . .	11th concession line.	Dec. 31, 1850	Aug. 29, 1851
F	Vespra and Floss	Wm. Gibbard . . .	Boundary line between.	Mar. 31, 1851	Sept. 13, 1852
128	Vespra	Henry Creswick . .	3rd con. line.	Feb. 19, 1860	July 2, 1860
290	Vaughan and York	Chas. Unwin . . .	Line townships.	Aug. 11, 1869	Dec. 31, 1869
326	Verulam	James Dickson . .	Pt. line bet. 4 and 5 cons.	Feb. 16, 1872	Dec. 16, 1874
331	Vespra	H. Creswick	Pt. line bet. 3 and 4 con. opp. lots 6 to 20.	July 9, 1872	Oct. 18, 1874
379	Verulam	Jas. Dickson . . .	Lots 28, 29, 30, 31 and 32, cons. 4 and 5.	Sept. 16, 1874	June 23, 1875

409 Verulam	Jas. Dickson	Lots from 25 to bdy. line of Summerville on line bet. 5 and 6 cons.	Oct.	5, 1875	Oct.	16, 1877
552 Vincent	J. G. Sing	Blind line bet. 5 and 6 cons.	July	25, 1888	Mar.	17, 1890
592 Vincent	J. G. Sing	Pt. blind line bet. 11 and 12 cons. in rear of lots 19 to 30.	Mar.	21, 1894	Nov.	24, 1896
600 Vespra	E. Stewart	Con. rd. allee. bet. 11 and 12 con. from lot 5 to lot 15, etc.	Oct.	11, 1895	July	14, 1896
656 Vaughan	P. S. Gibson	Con. line bet. 4 and 5 cons. across lots 21 to 25.	Oct.	16, 1905		
G Williamsburg.	John McNaughton, trans. to J. West 11 July, 1846.	Boundary lines.	Jan.	22, 1846	Feb.	10, 1854
10 Westminster and Dorchester	Wm. McClary, trans. to C. Fraser	Boundary line between.	Jan.	2, 1852	Jan.	27, 1853
11 Woodhouse	W. W. Walsh	Line bet. 3 and 4 cons.	Jan.	10, 1852	Feb.	1, 1858
17 Willoughby	A. Hood	Line bet. Bertie and	Aug.	3, 1852	May	25, 1853
26 Winchester	Wm. Tracey	Line bet. 7 and 8 cons.	Nov.	26, 1852		
28 Winchester	Wm. Tracey	Line bet. 6 and 7 cons.	Jan.	20, 1853		
30 Windham	F. W. Walsh	1st con. line.	Apr.	27, 1853	May	23, 1855
32 Westminster.	Chas. Fraser	Pt. 2nd concession.	June	16, 1853	See No. 65	
47 Wainfleet	Jacob Misener	Pts. 2, 3, 4, 5, 6 and 7 concessions.	Sept.	11, 1854		
65 Westminster.	Chas. Fraser	Front 2nd con.	June	17, 1856	Nov.	5, 1858
71 Whitby	John Shier	Lots 25 to 35 in 6th cons.	Oct.	14, 1856	Dec.	12, 1857
78 Whitby	John Shier	Lots 19 to 20 in 2nd cons.	May	15, 1857	Dec.	12, 1857

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
83	Whitby	John Shier	Pts. 7, 8 and 9 con. and line bet. 7 and 8 con. Survey lots 1 to 6 in 9 con., lots 26 to 35 in 7 con., lots 1 to 7 and 14 to 35 in 8th con.	July 15, 1857	Apr. 16, 1859 Apr. 29, 1859 July 27, 1863
84	Whitby	John Shier	Lots 13 to 16 inc., con. 9.	Aug. 8, 1857	Apr. 16, 1859
89	Wolford	J. Burchill	Line bet. 7 and 8 con.	Jan. 5, 1858	Aug. 10, 1858
93	Whitby	J. Shier	Pt. line in ft. 5th con.	Apr. 10, 1858	Jan. 5, 1859
95	Winchester	John S. Brown	Line bet. 3 and 4 con.	May 12, 1858	Nov. 12, 1858
99	Whitby	John Shier	Lot 17 in 9th con, also pt. line in ft. of 5th con.	July 5, 1858	Apr. 16, 1859
99	Whitby	John Shier	Line in ft. 2 con.	Aug. 6, 1858	Jan. 15, 1859
100	Westminster	Wm. McMillan	Lines in ft. of 9, 10 and 11, in 6th con., and in ft. of 9 and 10 con.	Mar. 19, 1859	Feb. 9, 1859 July 28, 1859
113	Whitby E.	John Shier	Line from 20 to 22 inc. ft. 5th con.	Apr. 14, 1859	Mar. 9, 1860
116	Whitby	John Shier	Bdy. line in ft. of lots 11 and 12, con. 7.	June 27, 1859	
120	Whitby E.	John Shier	Line in ft. 18 and 19 in con. 9.	Dec. 19, 1859	Dec. 19, 1860
126	Whitby	John Shier	Lots 26-29, in con. 9.	Apr. 28, 1860	Dec. 19, 1860
130	Whitby	John Shier	Lots 27-35, in con. 4.	May 23, 1860	Jan. 7, 1861
131	Whitby	John Shier	Lots 21, 22, 31-35, in 3 con.	Oct. 3, 1860	Aug. 9, 1861
142	Whitby	John Shier			

144	Whitby E.	John Shier	Lots 13 and 14, in con. 5.	Nov.	10, 1860	July	30, 1861
145	Whitby	John Shier	Lots 32-35, in con. 2.	Jan.	18, 1861	Feb.	4, 1862
146	Whitby E.	John Shier	Lots 45 and 46 in 6 and 7 cons., and lots 15, 16 and 17 in 6 and 7 cons.	Mar.	28, 1861	Oct.	3, 1861
151	Whitby E.	John Shier	Lots 5 and 6 in con. 1.	June	29, 1861	Jan.	20, 1862
152	Whitby	John Shier	Lot 20, con. 9.	July	11, 1861	Mar.	12, 1862
157	Whitby	John Shier	Lots 30-35, con. 5 .	Sept.	4, 1861	Aug.	30 1862
160	Westminster	Wm. McClary . .	1st con. line from easterly town line to limit bet. lots 9 and 10, in 1 con.	Oct.	16, 1861		
159	Whitby	John Shier	Lots 19, 20 and 21, in con. 7.	Oct.	16, 1861	July,	1862
172	Whitby E.	John Shier	Line in ft. lot 9, con. 1.	July	9, 1862	Nov.	5, 1862
178	Whitby	John Shier	Lots 18-21 and N. 1/2 lots 22-24, con. 6.	Sept.	29, 1862	Apr.	28, 1863
191	Whitby E.	John Shier	Lots 16 and 17, con. 5.	Apr.	23, 1863	May	28, 1863
206	Whitby E.	John Shier	Lot 1 in 2 and 7 and 8 in 9 con.	June	15, 1864	Oct.	18, 1864
207	Whitby	John Shier	Lot 21 in con. 2.	July	6, 1864	Aug.	19, 1864
209	Whitby E.	W. E. Yarnold . .	Lots 3 and 4, con. 7.	Sept.	20, 1864	Jan.	10, 1865
223	Whitby E.	John Shier	Lots 1 and 2, con. 6.	June	8, 1865	Aug.	27, 1866
226	Williamsburg	D. R. Brown . . .	Pt. line bet. 4 and 5 cons.	Nov.	9, 1865		
237	Whitby E.	John Shier	Lots 9 and 10, con. 2.	Nov.	9, 1865	Mar.	15, 1867
262	Whitby	John Shier	Lot 30, con. 9.	July	20, 1868	Aug.	19, 1868
271	Whitby E.	John Shier	14, 15 and 16, con. 2.	Aug.	24, 1868	Dec.	23, 1868
274	Whitby	John Shier	Lots 19 and 20, con. 4.	Nov.	5, 1868	Jan.	20, 1869
292	Whitchurch.	John Shier	Lots 21, 22, 23, 24, 25, con. 2.	Sept.	21, 1869	Dec.	31, 1869

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
298	Willoughby	Chas. Unwin	Base line.	Jan. 26, 1870	
325	Whitchurch.	W. E. Yarnold	Lots 31, 32, 33, 34, 35, con. 6.	Feb. 3, 1872	Sept. 13, 1872
329a	E. Whitby.	John Shier	Lots 2, 3, 4, con. 2.	Apr.	11, 1872 Aug. 23, 1872
334	E. Whitby	John Shier	Lot 12, con. 6.	July	26, 1872 Aug. 28, 1872
343	E. Whitby	John Shier	Lots 5 and 6, con. 3.	Jan.	25, 1873 June 4, 1873
348	E. Whitby	W. E. Yarnold	Lots 5 and 6, con. 2.	Apr.	5, 1873 Oct. 11, 1875
360	E. Whitby	W. E. Yarnold	Lot 12, in broken ft., con.	Sept.	20, 1873 Dec. 5, 1873
362	Whitby	John Shier	Lots 31 and 32, con. 9.	Dec.	16, 1873 Feb. 15, 1875
378	Whitby	John Shier	Lots 32 and 33, in 1 con.	Sept.	8, 1874 Feb. 15, 1875
384	Warwick	J. J. Francis	Lots 27, 28 in 3, 4, 5, 6 cons.	Nov.	18, 1874
389	Whitchurch.	W. E. Yarnold	Lots 31, 32, 33, 34, 35, in 7th con.	Feb.	15, 1875 Sept. 11, 1875
405	Whitby	John Shier	Lots 23, 24, 25, con. 9.	Aug.	27, 1875 Sept. 11, 1875
414	E. Whitby	John Shier	Lot 10, con. 8.	Dec.	1, 1875 Apr. 7, 1876
435	E. Whitby	W. E. Yarnold	Lot 7, con. 8.	Nov.	9, 1876 May 31, 1877
436	Whitby	John Shier	Lots 33, 34, 35, con. 9.	Nov.	16, 1876 Nov. 20, 1877
448	Whitby	John Shier	Lot 19, con. 15.	Aug.	21, 1877 Dec. 15, 1877
495	Whitchurch.	W. E. Yarnold	Lots 15 and 16, con. 7.	Apr.	2, 1881 Dec. 3, 1883
511	Wainfleet	R. O. D. Kennedy	Pt. line bet. 3 and 4 con. and tp. line bet. Humberstone and Wainfleet.	Apr.	20, 1883 Feb. 6, 1890
538	Whitby E.	W. E. Yarnold	Lots 10 and 11, con. 5.	July	19, 1886 Apr. 26, 1888
540	Wawanosh W	H. B. Proudfoot.	Lots 24 and 25, con. 4.	Aug.	24, 1886 Apr. 26, 1888

544	Wawanosh E H. B. Proudfoot.	Lots 28 and 29, cons. 3 and 4.	June	2, 1887	Nov.	15, 1889
559	Windham .. T. H. Jones	Pt. town line bet. Windham and S. Norwich.	June	21, 1889	Feb.	25, 1891
571	Wolfe Island D. Williams	Pt. 4 and 5 cons. line.	Mar.	19, 1891	Feb.	12, 1894
582	Winchester . C. A. Biggar ...	Line bet. 11 and 12 con.	Aug.	4, 1892	June	5, 1893
591	Waterford . T. H. Jones	Pt. Main street in Waterford.	Dec.	21, 1893		
589	Westmeath and Ross . F. Purvis	Town line bet. townships.	Sept.	15, 1893	May	17, 1898
605	Whitchurch P. S. Gibson ...	Side rd. allce. bet. lots 15 and 16, con. 8, etc.	Aug.	30, 1897	May	17, 1898
622	Williamsburg G. F. Brown	Pt. line bet. cons. 4 and 5 from lot 9 to E. bdy.	Jan.	27, 1900	May	27, 1911
627	Westmeath . J. L. Morris	Line bet. con. 1 and 2 W. M. Lake.	July	18, 1900	Apr.	10, 1902
664	Waterloo and Guelph .. C. D. Bowman .	Pt. line bet. townships. .	Feb.	5, 1908	Jan.	25, 1910
674	Winchester . T. H. Dunn	Con. line and rd. bet. 10 and 11 con. of said tp. across pts. 12 to 16 and W. 1/2 17 in 10 con.	Aug.	6, 1909	Feb.	28, 1910
685	Williamsburg F. M. Eaglesom .	Rd. allce. bet. 7 and 8 con. from lot 25 to W. limit.	Nov.	1, 1911		
692	Wolfe Island A. S. Campbell ..	Ad. allce. bet. 3 and 4 con. S. of base across lots 8, 9 and 10.	Apr.	9, 1914		
	Tp.					

INDEX MUNICIPAL SURVEYS (Continued)

No.	Township	Surveyor	Survey	Date of Instructions	Date of Confirmation
696	Wilberforce & Stafford	H. J. Beatty	Pt. bdy. line bet. at 20 con., Wilberforce, ending T. L. Alice.	Mar. 23, 1915	
702	Westmeath	J. L. Morris	Con. line bet. 8 and 9 con. opp. lots 1, 2 and 3.	Aug. 31, 1915	Dec. 20, 1915
91	York	Wm. Hawkins	Line in ft. of lots Nos. 1 and 5 in the 2nd con.	Mar. 24, 1858	Oct. 18, 1858
493	York	P. S. Gibson	Con. line in ft. of lots 1 and 2, in con. 5.	Dec. 22, 1880	Aug. 12, 1881
546	York	C. Unwin	Rd. line along S. limit lot 1 and 2 con., W. of Yonge Street.	Jan. 24, 1888	May 13, 1889
555	York	P. S. Gibson	Alice. for rd. bet. 5 and 6 con., E. Yonge St.	Nov. 2, 1888	
576	Yarmouth	A. W. Campbell	S. bdy. lots 1 and 2 and 3, in 7 con.	Sept. 8, 1891	June 5, 1893
649	York	Silas James	To survey allee. for rd. in rear lots 39 and 40 in broken front con.	May 20, 1904	Nov. 16, 1904
290	York and Vaughan	Chas. Unwin	Line between.	Aug. 11, 1869	Dec. 31, 1869
705	York	Speight & Co.	Lots J, K and L, pt. 19, con. 2 from Bay.	Dec. 9, 1915	
561	Zone	Coad & Robert-son	Base line across 4 con.	July 3, 1889	
700	Zone	Geo. A. McCubbin	Bet. 3 and 4 con. across 5, 6 Longwoods Rd.	June 22, 1915	

LIST OF MEMBERS

1916

The names of those members granted commissions since January 1st, 1916, are marked*.
See Section 44, Ontario Land Surveyor Act.

Name and P.O. Address.	Date of Admission by Board.
Abrey, George Spencer, 606 Indian Rd., Toronto	6th April, 1906
Allan, John Richard, Renfrew	6th Nov., 1894
Allison, Calvin Bruce, South Woodslee	22nd Feb., 1911
Anderson, Frederick John, Niagara Falls	1st May, 1910
Anderson, Herbert McEwan, North Bay	18th April, 1910
Anderson, Ralph Mackenzie, Toronto, 16 St. Vincent St.	2nd May, 1911
Angus, George Page, North Bay	18th April, 1911
Ardagh, Arthur Gowan, Barrie	18th Feb., 1908
Attwood, Charles Hartley, Dom. Water Power Branch, Dept. Interior, Ottawa	22nd Feb., 1911
Aylesworth, John Sydney, R. R. No. 2, Roblin, Ont.	9th Jan., 1871
Aylsworth, Charles Fraser, Madoc	8th Jan., 1886
Baird, Alexander, Leamington	7th July, 1877
Baird, John Ainslie, City Hall, Sarnia	2nd May, 1913
Baird, Wilmot Johnston, Scarborough	22nd Feb., 1912
Baker, Mason Herman, St. Thomas	16th Feb., 1909
Barrow, Ernest George, Hamilton, 26 John Street South	4th Oct., 1877
Bartley, Thomas Holmes, 464 Gladstone Ave., Toronto	11th Feb., 1915
Bazett, Edward, Huntsville	8th July, 1881
Beatty, David, Parry Sound	12th July, 1869

Grad. S.P.S.

D.L.S., Grad. S.P.S.

Grad. S.P.S.

Grad. S.P.S.

D.L.S.

D.L.S.

C.E.

D.L.S.

D.L.S., Mem. Can. Soc. C.E., City Engineer.

D.L.S.

D.L.S.

D.L.S.

Name and P.O. Address.	Date of Admission by Board.
Beatty, William Benjamin, R. R. No. 1, Sarnia	11th Feb., 1915 D.L.S.
Beatty, Herbert John, Pembroke	8th Nov., 1893 Grad. S.P.S.
Bell, Frederick Archibald, Court House, St. Thomas	22nd May, 1914
Bell, James Anthony, St. Thomas	11th Oct., 1875 D.L.S., Co. Engineer, Elgin; City Engineer, St. Thomas.
Benner, Frederick James King, Port Arthur . . .	13th Feb., 1913
Biggar, Charles Albert, 145 Gloucester Street, Ottawa,	6th Jan., 1882 D.L.S., A.M. Can. Soc. C.E., B.C.S., Astronomer, Dept. Interior
Bingham, Edwin Ralph, Fort William	17th Feb., 1906 D.L.S.
Blair, William John,	13th Feb., 1904 Grad. S.P.S.
Blandy, Oliver Roland, Provident & Loan Chambers, Hamilton	22nd Feb., 1912
Bolton, Ellsworth Doan, Listowel	7th Nov., 1899 B.A.Sc. (McGill).
Boswell, Elias John, C.P.R., Montreal	7th Nov., 1896 Grad. S.P.S., D.L.S.
Bowman, Clemens Dersteine, West Montrose . .	10th July, 1879
Bowman, Edgar Peterson, West Montrose . . .	17th April, 1907 D.L.S.
Bray, Harry Freeman, not known	10th July, 1882 D.L.S.
Bray, Lennox Thompson, Amherstburg	17th Feb., 1902 D.L.S.
Bray, Samuel, Ottawa, Dept. of Indian Affairs. .	6th Jan., 1877 D.L.S., C.E.
Brain, Michael Edward, Windsor City Hall . . .	17th Feb., 1906 B.A.Sc.
Brown, George Laing, Morrisburg	19th Feb., 1898 Grad. S.P.S.
Browne, Harry John, Toronto, 203 Albany Ave.,	6th July, 1872 C.E.
Browne, Wm. Herbert, Toronto, 18 Toronto St.	18th April, 1910
Burd, James Henry, Sudbury, Ont.	2nd Oct., 1905 D.L.S., Grad. S.P.S.

Name and P.O. Address.	Date of Admission by Board.
Burwash, Nathaniel Alfred, Toronto, 26 Alvin Ave.	6th May, 1905 D.L.S., Grad. S.P.S.
Bush, Clayton Elgin, Edmonton, Alta.	15th May, 1908 Grad. S.P.S., B.A.Sc. D.L.S.
Byrne, Thos. Henry, Ottawa, 71½ Sparks St.	24th Feb., 1910
Caddy, John St. Vincent, 327 Laurier Ave., Ottawa	6th Oct., 1866 D.L.S.
Campbell, Alexander Stuart, cor. King & Brock Street, Kingston	24th Feb., 1910
Campbell, Archibald William, Ottawa, Deputy Minister of Railways and Canals. .	10th April, 1885 C.E.
Carre, Henry, 276 Albert St., Belleville, Box 203	8th Nov., 1861 M.O. & Georgian Bay Canal, B.A. and C.E. (Trin. Coll. Dublin). D.L.S.
Cavell, Edwin, 182 Sunnyside Ave., Toronto . . .	13 Feb., 1913
Casgrain, Joseph Phillippe Baby, 180 St. James St., Montreal	5th Jan., 1887 D.L.S., P.L.S. (Que.), C.E., Assoc. Mem. Can. Soc. C.E., Chief Eng. M. & P. J. Ry., Senator.
Cassels, W. Lyttleton, Canada Life Bldg., Ottawa	11th Feb., 1915
Cavana, Allan George, Orillia	8th July., 1887 D.L.S.
Chase, Albert Victor, Orillia, Box 762	21st April, 1909 A.M.C.Sc., Grad. S.P.S., D.L.S.
Chipman, Willis, Toronto, Mail Bldg.	4th Oct., 1881 D.L.S., B.A.Sc. (McGill), Mem. Am. Soc. C.E., Mem. Can. Soc. C.E.
Christie, Uriah Wesley, Orangeville	1st March, 1905
Clarke, Fred Fieldhouse, 75 Sheldrake Bldg., Toronto, Ont.	31st March, 1905 Grad. S.P.S.
Code, Abraham Silas, Alvinston	14th April, 1896
Code, Samuel Barber, Smith's Falls	1st May, 1905 S. P. S.
Code, Thomas George, Box 330, Cobalt	17th April, 1907
Code, Robert Wilmot, 28 Pitt St., Windsor	April, 1911
Code, Richard Stanley, 130 Westminster Ave., Toronto	17th April, 1907
Coltham, George William, Aurora	1st May, 1912 D.L.S.
Coltham, Jas. T., Aurora, Ont.	18th April, 1911
Cook, William Albert McMichael, 37 High Park Ave., Toronto	19th April, 1910

Name and P.O. Address.	Date of Admission by Board.
Cotton, Arthur Frederick, New Westminster, B.C.	11th July, 1874 D.L.S.
Crerar, Samuel Rutherford, Toronto, School of Science	1st March, 1906 D.L.S., B.A.Sc., Toronto.
Crouch, Milton Edwin, 12 Banning St., Port Arthur	11th Feb., 1914 D.L.S.
Dalton, John Joseph, Weston, Ont.	11th Jan., 1878 D.L.S., D.T.S.
DeMorest, Richard Watson, Sudbury, Ont. ...	9th April, 1889 M.E.
Dickson, James, Fenelon Falls	6th April, 1867 D.L.S.
Dobie, James Samuel, Thessalon	21st Feb., 1898 B.A.Sc., (Tor. Univ.), D.L.S.
Dunn, Thomas Hamilton, Dept. of Interior, Ottawa	14th May, 1906 Grad. S.P.S.
Dynes, Richard Fforde, Box 136, Camrose, Alta.	27th May, 1913
Eadie, Louis Francis, 262 Western Ave., Toronto	2nd May, 1913
Eagleson, Francis Merwin, Winchester, Ont. ..	11th May, 1909 Grad. S.P.S., D.L.S.
Earle, Wallace Sinclair, Vancouver, 525 Vancouver Blk.	22nd Feb., 1912
Ellis, Douglas Stewart, 209 Albert St., Kingston	12th Feb., 1913 D.L.S.
Esten, Henry Lionel, Toronto, 157 Bay St.	7th Jan., 1887
Evans, John Dunlop, Trenton	8th July, 1864 D.L.S., Mem. Can. Soc. C.E., Chief Eng. Cent. Ont. Ry.
Fair, John, Brantford, 165 Colborne St.	13th April, 1875
Fairbairn, Richard Purdon, Toronto 452 Markham St.	7th Oct., 1876 Deputy Minister Dept. of Pub. Works, Ontario.
Fairchild, Charles Court, Edmonton	9th April, 1894 Grad. S.P.S., D.L.S.

Name and P.O. Address.	Date of Admission by Board.
Fairchild, William Howard, Brantford	17th Feb., 1900
Farley, Sidney Edward, Canada Life Bldg., Ottawa, Road Engineer, Co. Carleton	21st April, 1909
	P.L.S., Que.
Farncomb, Alfred Ernest, Edmonton, Alberta	9th April, 1895
	D.L.S.
Farncomb, Frederick William, London, 213 Dundas St.	6th Nov., 1889
Fawcett, Thomas, 8 Driveway West, Ottawa	6th Jan., 1881
	D.L.S., Dom. Topographical Surveyor.
Fitton, Charles Edward, Orillia, Box 142	10th April, 1879
	D.L.S.
Fitzgerald, James William, 435 George St., Peterboro	13th Feb., 1904
*Fitzgerald, Edward, 467 Rubidge St., Peterborough	11th May, 1915
Flater, Frederick William, Chatham	9th April, 1888
Fletcher, Wm. Jessamine, 22 Wyandotte St. W., Windsor	21st May, 1915
Flook, Samuel Evert, Port Arthur	13th Feb., 1913
Francis, John James, Sarnia P.O., Box 304	16th Oct., 1861
	D.L.S.
Fuce, Edward Oliver, 83 MacDonell Ave., Toronto	17th Feb., 1906
Fullerton, Charles Herbert, Supt., Colonization Roads, Toronto	7th May, 1906
	D.L.S., Grad. S.P.S.
Galbraith, William, Bracebridge	4th April, 1883
	D.L.S.
Gallagher, Charles Vincent, South Porcupine	11th Feb., 1915
Gardiner, Edward, St. Catharines	6th Jan., 1866
	D.L.S.
Gaviller, Maurice, Collingwood, Box 501	6th Jan., 1866
	C.E. (McGill), D.L.S.
Gibson, Colin William George, Hamilton	13th Feb., 1913
Gibson, Morton Milne, 1835 Yonge St., Toronto	22nd Feb., 1912
Gibson Peter Silas, Willowdale	19th July, 1858
	C.E.M.S. (Mich. Univ.), D.L.S., Mem. Can. Soc. C.E.
Gibson, Wilbert Silas, 1835 Yonge St., Toronto	21st Feb., 1898
Gill, James Richard, Sudbury	13th Feb., 1913
	B.A.Sc (Toronto Univ.)
Gillon, Douglas John, Fort Frances	9th Nov., 1895
	Grad. R.I.E. Coll.
Gourlay, Robert Murray, 35 Keele St., Toronto	22nd Feb., 1912
Grant, Russell Reeve, 961½ Gerrard St. E., Toronto	23rd March, 1911
	Grad. S.P.S.

Name and P.O. Address.	Date of Admission by Board.
Green, Thomas Daniel, Rocky Mountain House, Alta.	7th Jan., 1885
D.L.S.	
Greenless, Alexander Hunter, Box 1160, North Bay	21st April, 1909
Griffin, Albert Dyke, B.A., Elk Lake	11th Nov., 1890
Halford, Abraham Joseph Bartholomew, Engineer Public Works, Ontario, Parliament Bldgs., 11 Lowther Ave., Toronto	10th April, 1885
Hanes, George Samuel, North Vancouver, B.C. ...	6th May, 1905
City Engineer, Grad. S.P.S.	
Hart, Milner, Toronto, 51 Yonge St.	11th July, 1863
D.L.S.	
Heaman, J. A., G. T. P. Ry., Winnipeg .. .	16th Nov., 1896
Hogarth, George, Chief Engineer Dept. of Highways, Parliament Bldgs., 126 Wells St., Toronto	22nd Feb., 1912
Holcroft, Herbert Spencer, 182 Bloor St. W., Toronto	17th Feb., 1902
D.L.S., B.A.Sc. (Toronto Univ.)	
Hopkins, Marshall Willard, Edmonton, Alta. . .	13th Nov., 1893
D.L.S., B.A.Sc. (McGill), Asso. Mem. Can. Soc. C.E.	
Huffman, Karl, 409 Indian Road, Toronto . . .	11th Feb., 1914
P.L.S.	
Hutcheon, James, Parliament Bldgs., Toronto	10th Nov., 1891
Inspector of Surveys, Grad. S.P.S.	
*Ireson, Edward Taylor, 144 Walmer Rd., Toronto	21st May, 1915
Jackson, Alan Mair, Temple Bldg., Brantford	15th April, 1912
Jackson, John Edwin, Prov. & Loan Chambers, Hamilton	22nd Feb., 1911
Grad. S.P.S.	
Jackson, John Herbert, Queen Victoria Park Com., Niagara Falls	16th Feb., 1901
Jackson, Percival Anthony, 45 Central Ave., Toronto	11th Feb., 1914
James, Darrell Denman, Toronto, 23 Scott St.	3rd Nov., 1891
D.L.S., B.A., B.A.Sc. (Toronto Univ.)	
Johnston, Herbert, Berlin	21st Feb., 1905
Grad. S.P.S.	
Johnson Sydney Munnings, 39 Caledonia St., Stratford	9th Nov., 1895
Johnston, Wm. James, 73 Exchange Bldg., Vancouver, B.C.	10th May, 1910
D.L.S.	

Name and P.O. Address.	Date of Admission by Board.
Jones, Charles Albert, Petrolea D.L.S.	8th April, 1881
Jones, John Henry, Sarnia, Box 194 D.L.S.	10th Oct., 1886
Jones, Thomas Henry, Brantford B.A.Sc. (McGill), D.L.S., City Engineer.	10th Oct., 1878
Jupp, Albert Ernest, 47 Sparkhall Ave., Toronto Grad. S.P.S.	22nd Feb., 1911
Kenny, Carmen Rice, 26 Balfour Ave.	21st May, 1915
Kinnear, Louis Arthur, Port Colborne	2nd May, 1913
Kirkpatrick, George Brownly, Toronto, Dept. of Lands, Forests and Mines D.L.S., Director of Surveys.	13th April, 1863
Kirkup, Roy Stanley, Fort William	30th April, 1914
Laird, James Stewart, Essex D.L.S.	6th April, 1867
Laird, Robert, Haileybury Grad. S.P.S.	11th Nov., 1887
Lane, Frederick Carleton, Sudbury	22nd Feb., 1912
Lang, John Leiper, Sault Ste. Marie B.A.Sc., (Tor. Univ.), D.L.S.	2nd May, 1908
Lee, Roger Melville, Temple Bldg., Brantford D.L.S., S.L.S.	19th April, 1910
Leitch, John Strickland, Public Works, Parliament Bldgs., Toronto D.L.S.	11 Feb., 1915
Le May, Tracy Deavin, Toronto, City Hall City Surveyor.	1st May, 1909
Lewis, John Bower, 15 Sparks Chambers, Ottawa D.L.S., P.L.S. (Quebec), C.E.	4th Oct. 1883
Lloyd, Norval Clarence, 18 Toronto St., Toronto	22nd Feb., 1912
Lougheed, Aaron, Port Arthur D.L.S.	12th Nov., 1888
Low, Edward Hamilton, Sturgeon Falls Grad. R.M.C. (Kingston).	17th Feb., 1902
*Lumb, William Ewart, Bancroft	17th Feb., 1916
Lumsden, Hugh David, Orillia C.E., D.L.S., M.I.C.E., Mem. Can. Soc. C.E.	4th Jan., 1866
MacKay, James John, Bank of Hamilton Chambers, Hamilton	24th Feb., 1899
MacKay, Ernest George, Bank of Hamilton Chambers, Hamilton D.L.S.	13th Feb., 1913

Name and P.O. Address.	Date of Admission by Board.
MacKenzie, William, Sarnia	11th April, 1896
Grad. R.M.C. (Kingston).	
MacKenzie, William Lyon, Can. Nor. Ry., Winnipeg, Engineer's Office	7th April, 1887
C.E.	
MacRostie, Norman Barry, 251 Sussex St., Ottawa	11th Feb., 1914
D.L.S.	
McAuslan, Herbert James, North Bay	19th Feb., 1906
B.L.S., B.A.Sc. Toronto. D.L.S.	
McCull, Charles Ross, 10 Thompson Block, Windsor	4th May, 1909
Grad. S.P.S.	
McCubbin, George Albert, Chatham, Box 389	9th Nov., 1895
Assistant City Engineer.	
McDougall, Samuel Gladstone, 47 Vittoria St., Ottawa	11th Feb., 1914
D.L.S.	
McDowall, Robert, Owen Sound	11th Nov., 1890
Grad. S.P.S., Town Engineer.	
McFarlen, George Walter, Toronto, City Hall, City Engineer's Office	11th Nov., 1889
Grad. S.P.S.	
McGeorge, William Graham, Chatham, 135 King St.	22nd Feb., 1911
Grad. S.P.S., D.L.S.	
McGregor, James Martin, Chatham	22nd Feb., 1912
McKay, Owen, Walkerville, Ont., Box 324	7th Jan., 1887
M.C.S.C.E., Grad. S.P.S.	
McLean, William Arthur, Toronto, Parliament Bldgs.	21st Feb., 1898
AM. Can. Soc. C.E., Highways Commission.	
McLennan, Murdoch John, Williamstown	13th Nov., 1893
B.A.Sc., (McGill), D.L.S.	
McMeekin, Albert, Kenora	22nd Feb., 1911
B.A.Sc., (McGill), D.L.S.	
McNaughton, Alexander Lorne, Cornwall	May, 1905
D.L.S.	
Malcolm, William Lindsay, School of Mining, Kingston	22nd Feb., 1912
Malcolmson, Walter S., 163 Havelock St., Toronto	2nd May, 1913

Name and P.O. Address.	Date of Admission by Board.
Manigault, William Mazyck, Strathroy, P.O. Box 300	8th July, 1876
Marck, Joseph Albert, Bank of Hamilton Chambers, Hamilton	11th Feb., 1915
*Matheson, Hugh, Box 405, Kincardine	17th Feb., 1916
<small>D.L.S.</small>	
Miller, Frederick Frazer, Napanee	8th Jan., 1885
<small>D.L.S.</small>	
*Moore, Edgar Lawrence, 724 Ossington Ave., Toronto	1st May, 1916
Moore, John MacKenzie, London, Albion Bldg.	9th Oct., 1879
Moore, John Harrison, Smith's Falls	11th Nov., 1889
<small>Grad. S.P.S.</small>	
Moore, William James, Pembroke	18th Feb., 1908
Morris, James Lewis, Pembroke	7th July, 1886
<small>D.L.S., C.E. (Toronto Univ.)</small>	
Morris, Alfred Edmund, Perth, Ont.	10th April, 1879
Muckleston, Francis Herbert, City Surveyor's Office, City Hall, Toronto	11th March, 1914
Murdoch, William, Bowmanville	10th Jan., 1860
<small>D.L.S., C.E.</small>	
MURPHY, CHARLES JOSEPH, Toronto, 157 Bay St.,	6th Oct., 1886
President O. L. S. Association	
Nash, Abram Stanley Leland, Y. M. C. A., Brantford	1st May, 1915
Neelands, Ernest Wesley, New Liskeard, Ont.,	16th Feb., 1909
<small>Grad. S.P.S.</small>	
Newman, John James, 57 Sandwich St. W., Windsor	12th Nov., 1892
<small>Grad. S.P.S.</small>	
Newman, William, 410 Ashdown Block, Winnipeg	
Niven, David Alexander, McLean Bldg., Guelph	13th Feb., 1913
Norrish, Wilbert Henry, 17 Nepeau St., Ottawa	11th Feb., 1915
<small>D.L.S.</small>	
O'Hara, Walter Francis, 236 Waverly St., Ottawa	14th April, 1892
<small>D.L.S.</small>	
Patten, Thaddeus James, Little Current	5th Jan., 1883
<small>D.L.S.</small>	

Name and P.O. Address.	Date of Admission by Board.
Patterson, Frank Elliott, Ottawa, Ont. 71 ⁷ / ₂ Sparks St.	21st April, 1909
Peckover, Horace Joseph, City Engineer's Office, Toronto	24th Feb., 1910
Grad. S.P.S. D.L.S., B.A.Sc., Toronto.	
Pequegnat, Marcel, Berlin, Ont.	24th Feb., 1910
B.A.Sc., Toronto D.L.S.	
Phillips, Edwin Percy Argall, Port Arthur ...	24th Feb., 1910
Pierce, Benjamin Clifford, 58 Victoria St., Kingston	11th Feb., 1915
Pierce, John Wesley, Box 98, Pembroke	20th Feb., 1909
D.L.S.	
Pinhey, Charles Herbert, Ottawa, 110 Wellington St.	12th Nov., 1888
D.L.S., Grad. S.P.S., Assoc. Mem. Can. Soc. C.E.	
Proudfoot, Hume Blake, Gravelbourg, Sask. ...	6th Jan., 1882
D.L.S., B.A.Sc. (Toronto Univ.)	
Rainboth, George Louis, 1 Regent St., Ottawa ..	2nd May, 1913
D.L.S.	
Rainboth, Edward Joseph, Ottawa, 488 Mac- Laren St.	11th Nov., 1887
D.L.S.	
Ramsey, Guy Lawrence, Sault Ste. Marie ...	13th Feb., 1913
Ransom, John Thomas, 286 Roncesvalles Ave., Toronto	22nd Feb., 1911
D.L.S., B.A.Sc.	
*Riddell, John Morrison, 55 Huntley St., Toronto	9th Feb., 1916
Robertson, James, 1170 Yonge St., Toronto ...	11th July, 1885
Grad. S.P.S.	
Roger, Alec, 48 Emmett St., Ottawa	22nd Feb., 1911
Roger, John, Mitchell, Ont.	10th Nov., 1888
Grad. S.P.S.	
Rolfson, Orville, Walkerville	11th Feb., 1915
D.L.S.	
Rorke, Louis Valentine, Toronto, Department of Lands, Forests and Mines	14th April, 1890
D.L.S.	
Ross, George, Welland	10th July, 1879
Engineer County Welland, B.A.Sc., (McGill), D.L.S.	
Ross, Kenneth George, Sault Ste. Marie ...	15th May, 1909
Grad. S.P.S.	
Routly, Herbert Thomas, Huntingdon, P.Q., ...	1st May, 1907
Grad. S.P.S., D.L.S., A.M.C.E.	

Name and P.O. Address.	Date of Admission by Board.
Rubidge, Walter Frederick Brendon, Dom. Bridge Co., Montreal, P.Q.	15th April, 1912
Russell, Alexander Lord, Port Arthur D.L.S., P.L.S. (Que.)	16th April, 1873
Rutherford, Frank N., St. Catharines, Ont., 24 Queen St.,	18th May, 1906
Seager, Edmund, Kenora	8th July, 1861
Sewell, Henry De Quincy, Toronto, 34 Yonge St.	9th July, 1885
D.L.S. D.L.S., A.M.I.C.E.	
Sewell, Henry Charles DeQuincy, 79 Adelaide St. E., Toronto	2nd May, 1913
Seymour, Horace Llewellyn, Box 151, Ottawa ..	2nd May, 1908
A. M. Can. Soc. C. E.	
Shaw, John Henry, North Bay	17th Feb., 1900
Grad. S.P.S.	
Sibbett, William Algernon, C.P.R., North Bay	6th May, 1912
Silvester, George Ernest, Copper Cliff	12th Nov., 1892
Asst. to President, Canadian Copper Co., Grad. S.P.S.	
Sing, Josiah Gershom, Toronto, Confederation Life Building	9th Jan., 1879
D.L.S., C.E., Public Works Dept.	
Slater, Nicholas James, Ottawa, 10 Sparks Chambers	22nd Feb., 1911
Smith, Charles Campbell, 518 Hastings St. W., Vancouver, B.C.	16th Feb., 1907
D.L.S.	
Smith, James Herbert, Edmonton, Alta.	27th Dec., 1904
Smith, Walter, Lindsay	16th Feb., 1907
*Smith, Oliver, Lindsay	15th Feb., 1916
Snow, Ernest Arthur, 14 Piper Block, Berlin,	18th April, 1910
Speight, Thomas Bailey, Toronto, 703 Temple Building	6th Jan., 1882
D.L.S.	
Stewart, Lionel Douglas Noble, Fort Frances	24th Feb., 1910
Stewart, Walter Edgar, Aylmer	12th April, 1892
Street, James Cunard, Box 1167, Thorold ...	11th May 1912
Stull, William Walter, Sudbury	17th Feb., 1900
B.A.Sc. (Toronto Univ.)	

Name and P.O. Address.	Date of Admission by Board.
Summers, Gordon Foster, Haileybury	11th May, 1908
<small>Grad. S.P.S.</small>	
Sutcliffe, Homer Wilson, New Liskeard, Ont.	11th May, 1908
<small>Grad. S.P.S.</small>	
Tate, Harry William, Toronto, Prov. Board of Health, Parliament Bldgs.	30th April, 1911
<small>Grad. S.P.S.</small>	
Tench, William Eastwood, 210 John R. St., Detroit, Mich	11th Jan., 1878
Townsend, David Thomas, C.P.R. Land Dept., Calgary	17th Feb., 1906
<small>D.L.S., B.A.Sc., Toronto.</small>	
Traynor, Isaac, Dundalk	16th April, 1873
<small>D.L.S.</small>	
Tyrrell, James Williams, Hamilton, Ont. Prov. & Loan Chambers, 7 Hughson St. S.	8th April, 1885
<small>C.E. (Toronto Univ.) D.L.S., Co. Eng. for Wentworth.</small>	
Unwin, Charles, Toronto, 126 Seaton St.	12th April, 1852
<small>D.L.S.</small>	
Ure, Frederick John, Woodstock	7th April, 1887
<small>D.L.S.</small>	
van Nostrand, Arthur J., Toronto 703 Temple Bldg.	30th Oct., 1882
<small>D.L.S.</small>	
van Nostrand, John, Toronto 703 Temple Bldg.	1st May, 1910
<small>D.L.S.</small>	
Waddell, William Henry, 896 23rd St., Edmonton	6th May, 1905
<small>D.L.S.</small>	
Wadsworth, Vernon Bayley, Toronto, 51 Yonge St.	9th April, 1864
<small>D.L.S.</small>	
Walker, Alfred Paverley, Toronto, Room 208 Union Station, C.P.Ry. Div. Surveyor	6th Jan., 1882
<small>D.L.S., Mem. Can. Soc. C.E.</small>	
Ward, Archeson Thomas, Toronto, 703 Temple Bldg.	10th April, 1897
Warren, James, Walkerton, P.O. Box 190	7th Oct., 1864
<small>D.L.S.</small>	
Watson, John McCormack, Orillia, P.O. Box 224	13th April, 1892
Webster, William Gourlay, 68 Bank of Toronto, London	22nd Feb., 1912
Wetherald, Thomas, 210 Delatre St., Woodstock	12th Jan., 1856
<small>D.L.S., C.E.</small>	
Weekes, Melville Bell, Regina	17th Feb., 1900
<small>B.A.Sc. (Toronto Univ.), D.L.S.</small>	
West, Robert Francis, Grand Valley	7th April, 1881

Name and P.O. Address.	Date of Admission by Board.
Wheelock, Charles Richard, Orangeville <small>Treasurer County of Dufferin.</small>	. . . . 7th Jan., 1886
White, Walter Russell, Dept. Indian Affairs, Ottawa . . . . .	. . . . 13th April, 1913
<small>D.L.S.</small>	
Whitson, James Francis, Toronto, Parliament Bldg. . . . .	. . . . 9th Jan., 1886
<small>Commissioner Northern Development.</small>	
Wiggins Thomas Henry, Napanee, . . . . .	. . . . 10th Nov., 1891
Wilde, John Absalom, Sault Ste. Marie . . . . .	. . . . 9th April, 1889
*Wilkins, Claude Hughes, Hastings, Ont. . . . .	. . . . 17th Feb., 1916
Wilkie, Edward Thomson, 56 Marmaduke St., Toronto . . . . .	. . . . 11th April, 1891
<small>D.L.S.</small>	
Wilkins, Frederick William, Norwood, Ont. . . . .	. . . . 6th Jan., 1877
<small>D.T.S.</small>	
Wilson, Norman Douglas, 50 Bay St., Toronto . . . . .	. . . . 24th Feb., 1910
<small>B.A.Sc., D.L.S., A.M. Can. Coc. C.E.</small>	
Winter, Henry, Wallaceburg . . . . .	. . . . 11th July, 1853
<small>D.L.S., C.E.</small>	
Wood, James Russell, Box 995, Peterborough . . . . .	. . . . 22nd May, 1914
Yarnold, William Edward, Port Perry, P.O. Box 44 . . . . .	. . . . 7th April, 1854
<small>D.L.S.</small>	
Young, Alex. Campbell, Swastika . . . . .	. . . . 15th April, 1912

REGISTERED AND WITHDRAWN FROM PRACTICE.

Name and P.O. Address.	Date of Admission by Board
Anderson, John Drummond, Trail, B.C.....	13th April, 1892
Anderson, William Beaumont, Halifax, N.S... Grad. R.M.C., B.A.Sc. (McGill), M. Can. Soc. C.E., D.L.S., R.C.E.	14th Feb., 1903
Apsey, John Fletcher (not known)..... Grad. S.P.S.	6th Jan., 1886
Blake, Frank Lever, Meteorological Observatory, Toronto	13th April, 1875
Booth, Charles Edward Stewart, 21 Staunton St., Westmount, P. Q.	6th April, 1882
Bowman, Arthur Meyer, Mahan, Beaver Co., Pa..... Grad. S.P.S., Staff of U. S. Engineers.	11th Nov., 1887
Bowman, Franklin Meyer, Bellevue, 1234 North Highland Ave., Pittsburg, Pa..... Grad. S.P.S., Engineer Structural Iron Works.	11th April, 1892
Brady, James, Golden, B.C. M.E.	15th July, 1862
Brown, David Benjamin, Kenvil, N.J.	23rd Feb., 1904
Brown, John Smith (not known)..... D.L.S.	8th July, 1852
Brown, John Alexander, 233 S. Brock St., Sarnia	22nd Feb., 1911
Burgess, Edward LeRoy, Ottawa, 21 First Ave D.L.S.	6th May, 1905
Burnet, Hugh, Victoria, B.C..... D.L.S., P.L.S. (B.C.).	5th April, 1887
Burt, Frederick Percy, President "The American Architect," Times Bldg., New York	
Burwell, Herbert M., Vancouver	8th Oct., 1876
Butler, Matthew Joseph, Armstrong-Whitworth Co., Montreal	11th Jan., 1878
C.E., LL.B., C.M.G., M.I.C.E., Mem. Can. Soc. C.E. Mem. Am. Soc. C.E.	
Cambie, Henry John, Vancouver, B.C.....	8th July, 1861
D.L.S., P.L.S. (B.C.).	
Carbert, J. Alfred, Medicine Hat.....	7th April, 1876
D.L.S.; Dist. Eng. and Surveyor.	
Carpenter, Henry Stanley, Regina, Parliament Bldgs.....	25th Feb., 1899
D.L.S., B.A.Sc., Toronto.	

Name and P.O. Address.	Date of Admission by Board
Carroll, Cyrus, Parliament Bldgs., Regina . . .	10th Jan., 1860
<small>Mem. Can. Soc. C.E., D.L.S., District Surveyor and Engineer.</small>	
Clarke, Lenord Oswald, 43 Aberdeen Chambers, Toronto	14th Feb., 1903
Chalmers, John, Edmonton, Alta.	11th April, 1896
<small>Structural Engineer, Dept. Pub. Works.</small>	
Charlesworth, Lionel Clare, Edmonton, Alta. . .	14th April, 1896
<small>Grad. S.P.S., Director of Surveys, Alberta, D.L.S.</small>	
Coleman, Richard Herbert, 1170 Yonge St., Toronto	6th Oct., 1877
Davis, Allan Ross, 146 Cottingham St., Toronto,	8th Jan., 1886
Davis, William Mahlon, Vancouver, B.C.	11th April, 1885
<small>Grad. R.M. Coll. (Kingston), City Engineer.</small>	
Deacon, Thomas Russ, Winnipeg	12th Nov., 1892
<small>Grad. S.P.S.</small>	
Deans, William James, Brandon, Man.	11th July, 1884
<small>D.L.S.</small>	
Dempster, Hubert Orville, Nelson, B.C., Hydrographic Survey	24th Feb., 1910
Dixon, Howard, C. N. Ry., Jasper, Alta.	14th Feb., 1903
Drewry, William Stewart, Ottawa, Dept. of the Interior	5th April, 1883
<small>D.L.S.</small>	
Ducker, William A., Winnipeg, Man.	6th April, 1882
<small>D.L.S., P.L.S. (Man.), Swamp Lands Comm'r.</small>	
Edwards, George, Thurso, P.Q.	6th Jan., 1866
<small>D.L.S.</small>	
Ellis, Henry Disney, 30 Blackheath Park, London, Eng.	7th April, 1877
<small>D.L.S.</small>	
Empey, J. M., Drawer 2081, Calgary	16th Feb., 1907
<small>B.A.Sc., D.L.S.</small>	
Ford, Wm. Butterton, Wabana, Nfld.	21st Feb., 1898
Gibbons, James, Ottawa, Dept. of the Int.	15th April, 1890
<small>Grad. S.P.S., Dominion Topographical Surveyor.</small>	
Gibson, George, St. Catharines	10th April, 1860
<small>D.L.S.</small>	
Gibson, H. H., New Orleans, U.S.A.	8th Sept., 1891
Harris, John Walter, Winnipeg, Man.	6th Oct., 1866
<small>P.L.S. (Man.) D.L.S., Assessment Com.</small>	
Harvey, Thomas Alexander, 239 Vernon Ave., Long Island, New York City	13th Nov., 1893

Name and P.O. Address.	Date of Admission by Board
Hellferth, Jno. Benedictus, 86 Park Place, Newark, N.S.	13th Feb., 1913
Henderson, Eder Eli, Henderson P.O., Maine....	7th April, 1887
Grad. S.P.S.	
Hermon, Ernest Bolton, Vancouver, B.C.....	7th Oct., 1885
P.L.S. (B.C.), D.L.S.	
Henry, Frederick J., London	7th April, 1887
Hobson, Joseph, Hamilton, 343 Bay St. S.....	3rd Oct., 1855
D.L.S.	
Innes, William Livingstone, Simcoe.....	14th April, 1892
C.E. (Toronto Univ.)	
Jephson, Richard Jermy, Brandon, Man.	7th April, 1877
P.L.S. (B.C.), D.L.S.	
Johnston, Robert Thornton, 15 Union Hall St., Jamaica, New York City.....	9th April, 1889
Jones, George Samuel, 215 5th Ave., Ottawa ..	21st April, 1909
Grad. S.P.S.	
Kennedy, James Henry, Keremeos, B.C.....	7th April, 1887
C.E. (Toronto Univ.) Chief Engineer V. V. & E. R. & N. Co.	
Kippax, Hargreaves, Huron, South Dakota....	6th July, 1877
C.E. (Toronto Univ.), Assistant to Surveyor-General.	
Kirk, John Albert, Summerland, B.C.	6th July, 1877
D.L.S., P.L.S. (B.C.)	
Klotz, Otto, 437 Albert St., Ottawa.....	6th Jan., 1867
Dom. Top. Surveyor, C.E. (Mich. Univ.), LL.D.	
Lendrum, Robert Watt, Strathcona, Alta.....	8th Jan., 1874
D.L.S.	
Livingstone, Thomas Chisholm (not known) ...	10th Jan., 1859
D.L.S.	
MacLeod, Henry Augustus F., Ottawa, 340 Cooper St.....	11th Oct., 1856
D.L.S., C.E.	
MacPherson, Duncan, Montreal.....	9th Jan., 1884
Grad. R.M.C., M.I.C.E., Mem. Can. Soc. C.E., Div. Eng., East Div. C.P.R., D.L.S.	
McCaw, Robert Daniel, Dept. of Lands, Victoria, B.C.	16th Feb., 1907
McCulloch, Andrew, Lake Nelson, B.C.	
Grad. S.P.S., Assoc. Mem. Can. Soc. C.E., City Engineer.	
McFadden, Moses, Brandon, Man.	13th April, 1858
D.L.S., P.L.S., (Man.)	
McGrandle, Hugh, Wetaskawin, Alta.....	5th Jan., 1883
D.L.S.	
McNab, John Duncan (not known).....	9th Oct., 1879
Grad. S.P.S.	
McNaughton, Findlay Donald, Strathmore, Alta.....	25th Feb., 1899
McMullen, William Ernest, Dept. Lands & Forests, Frederickton, N. B.	11th Nov., 1892

Name and P.O. Address.	Date of Admission by Board
McPherson, Charles Wilfred, Dawson, N.W.T. Director of Surveys, Yukon, D.L.S.	21st Feb., 1899
Magrath, Charles Alexander, International Water- ways Commission, Ottawa B.A.Sc. (McGill), D.L.S., P.L.S. (B.C.)	1st Nov., 1907
Marshall, James Blyth D.L.S.	6th Oct., 1866
Meadows, William Walter c/o Director of Surveys, Regina D.L.S., Grad. S.P.S.	21st Feb., 1898
Miles, Charles Falconer, 25 Marmaduke St., Toronto D.L.S.	13th Jan., 1862
Montgomery, Royal Harp, Prince Albert, Sask. D.L.S.	6th May, 1905
Mountain, George Alphonse, Ottawa Mem. Can. Soc. C.E., D.L.S., P.L.S. (Que.), Engineer for Railway Commission.	9th Jan. 1884
Munro, John Vicar, New York, N.Y., 359 West 31st St.	9th April, 1895
Ord, Lewis Redman Littlecot, St. Foy Road, Quebec	8th Jan., 1885
Paterson, James Allison, 53 Erie Ave., Hamilton C.E., Mem. Can. Soc. C.E.	5th April, 1878
Pearce, William, Calgary, Alta. D.L.S., P.L.S. (B.C.) Asst. B.C. Land Com. for C.P.R.	12th Oct., 1872
Parsons, Johnston Lindsey Rowlett, Regina, Sask., Box 1004 D.L.S., Grad. S.P.S.	6th May, 1905
Paulin, Frederick William, Bank of Hamilton Chambers, Hamilton	11th May, 1908
Reiffenstein, James Henry, Ottawa, Dept. of the Interior D.L.S.	16th April, 1873
Reilly, William Robinson, 512 Westman Chambers, Regina D.L.S., P.L.S. (Man.)	7th April, 1881
Reinhardt, Carl, Box 303, Cobalt	25th Feb., 1899
Reynolds, Samuel Henry (not known)	17th July, 1880
Ritchie, Nelson Thomas, Kipiegan, Man. P.L.S. (Man.)	9th Nov., 1888
Roberts, Vaughan Maurice, Dept. Dom. Pub. Works, Confederation Life Bldg., Toronto D.L.S.	5th April, 1887
Robinson, Franklin Joseph, Regina Grad. S.P.S., D.L.S., Dep. Min. Pub. Works.	21st Feb., 1898
Rogers, Richard Birdsall, Peterborough, B.A.Sc. (McGill), D.L.S.	9th Jan., 1879

Name and P.O. Address.	Date of Admission by Board
Ross, Joseph Edmund, Kamloops, B.C.	11th Nov., 1890
<small>D.L.S., P.L.S. (B.C.).</small>	
Sanderson, Daniel Leavens, Coral, Mich.	4th Oct., 1892
Saunders, Bryce Johnston, Edmonton, Alta.	7th Jan., 1885
<small>B.A.Sc. (McGill), D.L.S.</small>	
Seibert, Fredrick Victor, 10741 126th St., Edmonton	22nd Feb., 1912
Shaw, Charles Aeneas, Greenwood, B.C.	6th Oct., 1877
<small>P.L.S. (B.C.).</small>	
Sherman, Ruyter Stinson, 3642 Powell St., Vancouver, B.C.	12th April, 1890
Smith, Angus, City Engineer, Prince Albert	14th April, 1896
<small>Grad. S.P.S., City Engineer.</small>	
Smith, Henry, cor Oxford and Bellevue Sts., Toronto	8th Nov., 1861
<small>D.L.S., Mem. Can. Soc. C.E.</small>	
Steele, Ira John, 18 Rideau Terrace, Ottawa.	18th April, 1910
Stewart, Elihu, Toronto, 84 King St. E.	8th April, 1872
<small>Canada Timber and Lands, D.L.S.</small>	
Stewart, George Alexander, 374 Sunset Ave., Shoal Bay, Victoria, B.C.	8th July, 1852
<small>D.L.S.</small>	
Stewart, Louis Beaufort, Toronto, Faculty of Applied Science, Toronto University	6th April, 1882
<small>Dom. Top. Surveyor, Professor of Surveying.</small>	
Stewart, John, Calgary	11th Nov., 1878
<small>D.L.S.</small>	
Taylor, William Verner, Gananoque	7th Nov., 1896
Taylor, William Emerson, 438 Clinton St., Toronto	22 Feb., 1911
Tracey, Thomas Henry, 411 Howe St., Vancouver, B.C.	8th April, 1870
<small>C.E., P.L.S. (B.C.), D.L.S.</small>	
Turnbull, Thomas, C. N. Ry., Winnipeg	6th July, 1878
Vickers, John Richard Odlum, Kamloops, B.C.	5th Jan., 1887
<small>P.L.S. (B.C.), D.L.S.</small>	
Wallace, James Nevil, Calgary, Alta.	21st Feb., 1898
<small>D.L.S., B.A., B.E. (Trin. Coll., Dublin).</small>	
Weekes, Abel Seneca, Glencoe	12th April, 1890
<small>D.L.S.</small>	
Wheeler, Arthur Oliver, Calgary, Alta.	8th July, 1881
<small>P.L.S. (B.C.), D.L.S., Topographer, Dept. of Interior.</small>	
Wicksteed, Henry King, Can. Nor. Railway, Toronto	7th Jan., 1886
<small>D.L.S., C.E.</small>	
Wells, Frederick Arthur, Confederation Life Bldg., Toronto	17th Feb., 1906

DECEASED MEMBERS

NAME	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION.	DIED.
Abrey, George Brockitt..	Toronto Junction...	10th January, 1860..	1892	25th June, 1906
Aylsworth, Charles Fraser	Madoc	2 April, 1861	1892	27th June, 1911
Aylsworth, William R....	Belleville	8th Nov., 1861	1882	22nd April, 1909
Barrett, Russell H.....	Pembroke	19th July, 1858	1903, 14th February	30th January, 1905
Bell, Andrew.....	Delta	14th Oct., 1866	1892	5th January, 1911
Bigger, Samuel Howell..	Almonte	1815	1904, 30th January	12th October, 1912
Booth, John.....	Ottawa	10th October, 1863.	1892	7th July, 1906
Bolger, Francis.....	Lindsay	6th July, 1865	1892	15th May, 1860
Bolger, Thomas Oliver...	Kingston	6th April, 1867	1892	3rd November, 1895
Bolton, Jesse Nunn.....	Toronto	9th July, 1864	1892	17th September, 1900
Bolton, Lewis.....	Listowel	7th January, 1887	1892	18th July, 1910
Bowman, Herbert Joseph.	Berlin	14th April, 1892	1892	19th June, 1916
Bowman, Leander Meyer.	Toronto	6th October, 1866	1892	20th September, 1895
Bray, Edgar.....	Oakville	10th October, 1850	1892	20th August, 1908
Brown, David Rose.....	Cornwall	10th April, 1876	1892	14th May, 1900
Browne, William Albert..	Toronto	12th April, 1852	1892	30th July, 1912
Burchill, John.....	Ingersoll	5th April, 1878	1892	4th June, 1896
Burke, William Robert..	Enderby, B.C.	16th October, 1861	1892	10th June, 1897
Burnett, Peter.....	Sault Ste. Marie	15th July, 1862	1892	29th September, 1910
Byrne, Thomas.....	Campbellford	10th July, 1860	1892	11th August, 1904
Caddy, Cyprian F.....	Cobourg	18th December, 1846	1892	August, 1905
Caddy, Edward C.....	Peterborough	9th April, 1889	1892	26th September, 1897
Cameron, Alfred John...	Mitchell	11th July, 1856	1892	12th January, 1912
Coad, Richard.....	Glencoe	8th October, 1879	1892	17th May, 1905
Cozens, Joseph.....	Sault Ste. Marie	7th July, 1875	1892	17th May, 1897
Creswicke, Henry, Sr. ...	Barrie	10th April, 1854	1892	29th November, 1913
Creswicke, Henry, Jr. ...	Barrie	8th July, 1864	1892	20th January, 1883
Cromwell, Joseph M. O....	Perth	1st October, 1846	1892	22nd January, 1898
Chadwick, Fredk. Jasper.				19th October, 1897
				20th June, 1891

DECEASED MEMBERS — Continued

NAME.	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION	DIED.
Davidson, Walter Stanley.	Sarnia	9th April, 1884	1882	20th January, 1901
Davidson, Alexander	Arkona	11th October, 1858		16th September, 1899
Davis, John	Alton	5th April, 1878	1892	8th November, 1907
Deane, Michael	Windsor	26th May, 1848	1852	3rd April, 1897
DeGurse, Joseph	Windsor	5th April, 1883	1892	22nd March, 1898
Dobbie, Thos. Wm.	Tillsonburg	11th July, 1856	1892	1908
Doupe, Joseph	Winnipeg	13th January, 1863	1892	1910
Esten, James H.	Toronto	16th October, 1857		30th January, 1892
Filmore, Stanley H.	St. Thomas		1902, 17th February	13th June, 1892
Fitzgerald, James William	Peterborough	13th July, 1857	1892	16th June, 1904
Fleming, Sir Sanford	Ottawa			1901
Forneri, C. C.	Toronto			22nd July, 1915
Foster, Frederick Lucas	Toronto	9th April, 1863	1892	15th August, 1880
Fowle, Albert	Orillia	13th January, 1863	1892	27th July, 1899
Furlonge, William Holland	S. Africa	6th April, 1877	1892	April, 1898
Fraser, Charles	Wallaceburg	5th August, 1847	1892	1891
Garden, James Ford	Vancouver	6th June, 1877		1897
Galbraith, John	Toronto	13th April, 1875		10th June, 1914
Gibbs, Thomas Fraser	Adolphustown	31st May, 1841	1892	December, 1914
Gamble, Killaly	Toronto	6th April, 1888		22nd July, 1914
Gibson, David	Toronto	27th December, 1825		17th April, 1893
Gibson, James Alex.	Oshawa	7th April, 1855	1892	25th January, 1864
Gilliland, Thomas Brown	Eugenia	11th July, 1868	1892	1908
Gilmour, Robert	Toronto	11th April, 1856	1892	14th December, 1898
Graydon, Aquila Ormsby	London	8th July, 1880	1892	29th December, 1903
Hanning, Clement George	Preston	19th July, 1858	1892	28th February, 1913
Haskins, William	Hamilton	5th July, 1855	1892	7th May, 1905
Hermson, Royal Wilkinson	Rednersville	13th July, 1857	1892	5th July, 1896
Hewson, Thomas Ringwood	Hamilton	6th July, 1877	1892	9th February, 1907
Holland, Wm. Hugh	Toronto		1907, 1st May	21st October, 1898
				1908

DECEASED MEMBERS — Continued

NAME	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION.	DIED.
Howitt, Alfred.....	Gourock	12th January, 1856	1892	6th May, 1896
Irwin, James Moore.....	Kenora	13th January, 1863	1892	1908
James, Silas	Toronto	19th July, 1858	1892	11th October, 1915
Jones, Francis .....	.....	7th July, 1840 .....	.....	26th March, 1894
Kains, Tom.....	Victoria	11th July, 1873 .....	.....	1901
Keefe, Thomas Coltrin..	Ottawa	14th August, 1840	1892	7th January, 1915
Kingsford, William .....	.....	5th October, 1855 .....	.....	28th September, 1898
Kirk, Joseph Green.....	Stratford	16th February, 1843 .....	.....	22nd January, 1900
Lane, Andrew	Sparrow Point	4th April, 1895 .....	.....	.....
Lawe, Henry	Ottawa	6th October, 1860 .....	.....	10th December, 1912
Lendrum, Robert Watt ..	Edmonton	8th January, 1874 .....	.....	1912
Livingstone, Thomas ..	.....	.....	.....	.....
Chisholm	Milton	10th January, 1859 .....	.....	1914
Low, Nathaniel Edward..	Sarnia	11th July, 1856 .....	.....	.....
Lynch-Staunton, Francis.	Hamilton	11th October, 1856	1892	11th June, 1899
MacDougall, Allan Hay ..	Port Arthur	4th April, 1859	1892	February, 1906
MacMillan, James Alex..	Calgary	6th January, 1877	1894, 4th December	1898
MacNab, John Chisholm..	Hamilton	8th January, 1880	1894	16th October, 1897
McAree, John	Toronto	6th April, 1867	1894	12th December, 1903
McCallum, James.....	Fort Francis	30th March, 1849	1894	July, 1900
McDonel, Augustine.....	Chatham	11th July, 1863	1892	23rd October, 1907
McEvoy, Henry Robinson.	St. Mary's	10th July, 1875	1892	3rd October, 1915
McGeorge, Wm. Graham ..	Chatham	8th January, 1866	1892	1st July, 1906
McKenna, John Joseph..	Dublin	9th July, 1860	1892	22nd September, 1910
McLatchie, John.....	Nelson, B.C.	9th January, 1864	1892	3rd February, 1908
McLean, James Keachie ..	Ottawa	8th April, 1876	1892	25th May, 1913
McLennan, Roderick.....	Toronto	20th June, 1846	1892	1st February, 1911
McPhillips, George.....	Winnipeg	9th July, 1885	1892	25th November, 1913
Malcolm, Sherman Morgan	Blenheim	18th October, 1858	1894	13th January, 1899
Magrath, Bolton .....	.....	January, 1866 .....	.....	October, 1895

DECEASED MEMBERS — Continued

NAME.	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION.	DIED.
Moore, Thomas Alexander	Toronto	12th November, 1892	1892	12th December, 1899
Molesworth, Thomas Nepean	S. Africa	7th July, 1886		1878
Mowat-Biggs, James M.	Kingston	3rd April, 1854		24th March, 1915
Nash, Thos. W.	Toronto	3rd July, 1859	1892	7th May, 1911
Niven, Alexander	Kenora	11th April, 1876	1894, 24th April	21st September, 1898
Ogilvie, John Henry	Paris, Texas	12th July, 1869		13th November, 1912
Ogilvie, William	Doon	10th November, 1891	1892, 23rd December	17th January, 1897
Pedder, James Robert	Montreal	16th July, 1863		21st November, 1913
Peterson, Peter Alexander	Edmonton, Alta.	9th April, 1888		20th January, 1915
Ponton, Archibald William	Ireland	13th April, 1875		1905
Pope, Robert Tyndal	Arizona	7th April, 1875		
Purvis, Frank	Saskatoon, Sask.	6th May, 1905		31st March, 1906
Proudfoot, Hart William	Prince Albert	8th April, 1870		18th June, 1911
Reid, John Lestock	Bowmanville	6th October, 1866	1892	22nd December, 1899
Reid, James Hales	London	1st December, 1841	1892	13th September, 1859
Roche, J. K.	Napanee	—May, 1846		11th October, 1894
Robinson, William	Cornwall	14th November, 1848		19th September, 1912
Rombough, William A.		9th February, 1849	1892	June, 1904
Rubidge, Tom S.	Toronto	12th April, 1852		1869
Rykert, George Z.	Ridgetown	11th January, 1878	1892	10th July, 1905
Sankev, Villiers	Guelph	2nd September, 1844		5th September, 1874
Salter, Albert Pellew	Brampton	7th January, 1865	1892	
Scane, Thomas	Toronto	28th September, 1843	1892	19th February, 1908
Schofield, Milton C.	Toronto	13th April, 1858		25th October, 1878
Scott, Andrew B.	Winnipeg	8th January, 1876	1892	23rd August, 1910
Selby, Henry Walter	Toronto	16th November, 1896	1856	1911
Schwitzer, John Edward	Toronto	7th October, 1864	1892	8th January, 1905
Simpson, George Albert	Toronto	19th July, 1858	1892	1906
Spry, W.				

DECEASED MEMBERS — Continued

DECEASED MEMBERS

NAME	LATE RESIDENCE	DATE OF P.L.S. CERTIFICATE	DATE OF O.L.S. REGISTRATION	DIED.
Squire, Richard Herbert..	Brantford	14th April, 1896	1896 .....	....., 1908
Snow, John Allan	Ottawa	11th September, 1847 .....	.....	13th April, 1888
Snow, John Frederick ..	Ottawa	10th January, 1874 .....	.....	11th April, 1890
Stacey, Albert George ..	.....	.....	1908, 30th March .....	....., 1910
Steele, David Layton	Meaford .....	.....	1905, 29th May	12th January, 1912
Steele, Edward Chas.	Sault Ste. Marie	9th April, 1889	1892 .....	....., 1908
Strange, Henry	Rockwood	30th November, 1838	1892 .....	..... March, 1908
Strathern, John	B. C.	5th October, 1876	1892 .....	....., 1897
Tiernan, Joseph Martin ..	Tilbury Centre	7th January, 1886	1892 .....	..... December, 1900
Thomson, Augustus C.	Chicago	14th January, 1861	1892 .....	..... December, 1896
Van Buskirk, Wm. Fraser ..	Stratford	7th April, 1883	1892	30th January, 1905
Wagner, William	Ossowo	13th April, 1858	1892	29th March, 1912
Wallace, Charles Hugh	Castlederg, Co. Ty- rone, Ireland	9th November, 1889 .....	.....	14th March, 1895
Walsh, Thomas William ..	Simcoe	25th April, 1842	1892	4th July, 1897
Wheelock, Charles John ..	Orangeville .....	....., 1856	1892	20th May, 1906
Willson, Alfred	Toronto	6th October, 1866	1892	8th June, 1908
Williams, David	Kingston	9th April, 1864	1892	January, 1916
Wood, Henry O.	Billings Bridge	10th October, 1855	1892	17th June, 1908

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