PROCEEDINGS

OF THE

ASSOCIATION OF

PROVINCIAL LAND SURVEYORS

OF ONTARIO

AT ITS SIXTH ANNUAL MEETING HELD AT TORONTO,
ON MARCH 10TH, 11TH, AND 12TH.

1891.

The Seventh Annual Meeting will be held in Toronto, on Tuesday, 23rd of February, 1892.

PRINTED FOR THE ASSOCIATION

BY

C. BLACKETT ROBINSON, 5 JORDAN STREET,
TORONTO.

PATRONIZE OUR ADVERTISERS.

NOTICES.

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

Each member is requested to add to his business card the following: "*Member of the Association of Provincial Land Surveyors of Ontario.*"

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

Copies of the Constitution will be sent upon receipt of three cent stamp.

PATRONIZE OUR ADVERTISERS.

PREFACE.

To the Members of the Association of Provincial Land Surveyors of Ontario :

THE Proceedings of the Association at its Sixth Annual Meeting are herewith presented.

The registered attendance at this meeting was in advance of that of last year, and great interest was taken in the subjects under discussion.

Prominent among the matters brought before the meeting were "Affiliation with the Association of Dominion Land Surveyors," and "Incorporation of the Provincial Land Surveyors of Ontario." A very satisfactory arrangement was reached in the Affiliation question, and definite steps were taken on the subject of Incorporation.

A careful perusal of the Papers and discussions will be attended with much interest.

A number of new members have recently joined our ranks, and it is specially requested that all members will endeavour to impress non-members with the importance of the benefits to be derived from connection with the Association.

Respectfully submitted on behalf of the Executive Committee.

A. J. VANNOSTRAND,
Secretary.

CONTENTS.

ASSOCIATION OF
PROVINCIAL LAND SURVEYORS
OF ONTARIO.

ORGANIZED 23RD FEBRUARY, 1886.

Officers for 1891-92.

PRESIDENT.

Villiers Sankey, P.L.S., Toronto.

VICE-PRESIDENT.

Elihu Stewart, P.L.S., Collingwood.

SECRETARY-TREASURER.

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

COUNCILLORS.

M. J. Butler, P.L.S., Napanee.
H. B. Proudfoot, P.L.S., Toronto.
M. Gaviller, P.L.S., Barrie.

BANKERS.

Imperial Bank of Canada.

STANDING COMMITTEES.

LAND SURVEYING.—A. Niven (Chairman), H. J. Browne, Thos. Fawcett, M. Gaviller, P. S. Gibson, C. F. Miles, L. B. Stewart.

DRAINAGE.—J. C. Macnabb (Chairman), Lewis Bolton, A. G. Cavana, J. Robertson, B. J. Saunders, C. F. Miles, M. Gaviller, D. S. Campbell.

ENGINEERING.—G. B. Abrey (Chairman), C. F. Aylsworth, T. O. Bolger, H. D. Ellis, J. Galbraith, T. H. Jones, R. S. Sherman, James Warren, H. J. Bowman, H. K. Wicksteed.

LEGISLATION.—W. R. Aylsworth (Chairman), O. J. Klotz, A. Niven, J. Dickson, G. B. Kirkpatrick, Willis Chipman, C. Unwin, W. Ogilvie, Jos. Cozens.

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

PUBLICATION.—John McAree (Chairman), H. L. Esten, H. J. Browne, F. L. Foster, Willis Chipman.

INSTRUMENTS.—W. Ogilvie (Chairman), W. S. Drewery, Thos. Fawcett, F. L. Blake, W. A. Browne.

PROGRAMME OF THE

ASSOCIATION OF PROVINCIAL LAND SURVEYORS OF ONTARIO

AT ITS SIXTH ANNUAL MEETING HELD IN TORONTO,
MARCH 10TH, 11TH AND 12TH, 1891.

PROGRAMME.

Tuesday, March 10th—Morning, 9.30 o'clock.

Meeting of Executive Committee.
Meeting of Standing Committees.
Reading of Minutes of Previous Meeting.
Reading of Correspondence.
Report of Secretary-Treasurer.
Appointment of Auditors.

Afternoon, 2 o'clock.

President's Address.

Report of Committee on Land Surveying and Question Drawer, Land Surveying and Legislation.

Paper—"Practical Working of the Ditches and Watercourses Act," R. Coad, P.L.S., Glencoe, Ont.

Paper—"Difficulties in the Survey Act," P. S. Gibson, P. L. S., Willowdale, Ont.

Paper—"Reminiscences of a Canadian Land Surveyor," Jos. Kirk, P.L.S., Stratford, Ont.

Announcements by Committee on Entertainment, F. L. Foster, P.L.S., Chairman, Toronto, Ont.

Evening, 7.30 o'clock.

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

Paper—"Compass Lines," John McAree, D.T.S., Toronto, Ont.

Paper—"Bridge Abutments and Foundations," James Warren, P.L.S., Kincardine, Ont.

Paper—"Railway Location," H. K. Wicksteed, P.L.S., Brantford, Ont.

Wednesday, March 11th—Morning, 9.30 o'clock.

Report of Executive Committee on Incorporation.

Paper—"Incorporation," J. P. B. Casgrain, P.L.S., Montreal, Que.

Paper—"Micrometer Measurements," H. B. Proudfoot, P.L.S., Toronto, Ont.

Discussion of "Boundary Commissioners Scheme."

Afternoon, 2 o'clock.

Discussion on Affiliation with Association of Dominion Land Surveyors.

Paper—"Does the Passing of an Act of Parliament always do justice?" A. Niven, P.L.S., Haliburton, Ont.

Paper—"Country Practice," C. Fraser Aylsworth, P. L. S., Madoc, Ont.

Visit to School of Practical Science and Observatory.

Evening.

Annual Dinner at Walker House.

Thursday, March 12th—Morning, 9.30 o'clock.

Paper—"Descriptions," M. Gaviller, P.L.S., Barrie, Ont.

Paper—"The Reclaimed Lands of Kent County," J. C. Macnabb, P.L.S., Chatham, Ont.

Paper—F. L. Blake, P.L.S., Meteorological Office, Toronto, Ont.

Paper—"The Kincardine Water Works," H. J. Bowman, P.L.S., Berlin, Ont.

Question Drawer—"Drainage."

Report of Committee on Drainage, James Robertson, P.L.S., Chairman, Glencoe, Ont.

Afternoon, 2 o'clock.

Report of Committee on Engineering, Willis Chipman, B.A.Sc., Chairman, Toronto, Ont.

Report of Committee on Legislation, W. R. Aylsworth, P.L.S., Chairman, Deseronto, Ont.

Report of Committee on Publication, John McAree, D.T.S., Chairman, Toronto, Ont.

Report of Committee on Instruments, J. W. Tyrrell, P.L.S., Chairman, Hamilton, Ont.

Report of Committee on Entertainment, F. L. Foster, P.L.S., Chairman, Toronto, Ont.

Unfinished Business.

Election of Associate Members, Junior Members, and Honorary Members.

Nomination of Officers.

Appointment of Scrutineers—Ballot of 1891.

New Business.

Adjournment.

Full discussion after each Paper and each Report.

ASSOCIATION OF
PROVINCIAL LAND SURVEYORS
OF ONTARIO.

MINUTES OF THE SIXTH ANNUAL MEETING,

MARCH 10TH, 11TH AND 12TH, 1891.

The Association met at 11 a.m., on March 10th, in the Library of the Canadian Institute, 58 Richmond Street East, Toronto.

The Association was called to order by the President, Villiers Sankey, Esq.

Moved by A. J. VanNostrand, seconded by Willis Chipman: That the minutes of last meeting, as printed in the Proceedings, be confirmed as read. Carried.

The Secretary-Treasurer, Mr. VanNostrand, then presented his Annual Report.

Moved by A. J. VanNostrand, seconded by A. Niven: That the Report of the Secretary-Treasurer be received and adopted, and that the financial statement be received and referred to the Auditors for their report. Carried.

Moved by Mr. Dickson, seconded by Mr. Gaviller: That Messrs. Aylsworth and Fawcett be the Auditors for the current year. Carried.

The meeting then adjourned.

AFTERNOON SESSION, 2 P.M.

The President in the Chair.

The President read the correspondence received with reference to affiliation with the Association of Dominion Land Surveyors and also the proposed scheme of affiliation.

The President then read his annual address.

Moved by Mr. Aylsworth, seconded by Mr. Niven: That the thanks of the Association are due and are hereby tendered to the President for his address. Carried.

The report of the Committee on Land Surveying was then presented by the Chairman of the Committee, Mr. Niven, which, after discussion, on motion of Mr. Niven, seconded by Mr. Dickson, was received and adopted.

Mr. Kirk's paper on "Reminiscences of a Canadian Land Surveyor" was read by the Secretary, owing to the absence through illness of the author.

Moved by Mr. Niven, seconded by Mr. Speight: That Mr. Kirk's paper be received, and the thanks of the Association be tendered to him. Carried.

Mr. Jas. Warren then read his paper on "Bridge Abutments and Foundations," which, after discussion, was received and the thanks of the Association tendered to him.

Mr. Gaviller read his paper on "Descriptions."

Moved by Mr. Niven, seconded by Mr. Abrey, that the paper by Mr. Gaviller be received, and that the thanks of the Association be tendered to him. Carried.

The meeting adjourned at 5 o'clock p.m.

EVENING SESSION, 7.30 P.M.

The President in the Chair.

Mr. Jas. Dickson read his paper on "Crown Surveys."

Moved by Mr. Gaviller, seconded by Mr. Miles: That Mr. Dickson's paper be adopted, and the thanks of the Association be tendered to him. Carried.

Mr. Foster, Chairman of the Entertainment Committee, then announced that the annual dinner would take place at the Walker House, on Wednesday evening, at 7.45.

The meeting adjourned at 9.45 p.m.

WEDNESDAY MORNING SESSION, 9.30 A.M.

The Vice-President, Mr. E. Stewart, in the Chair.

Mr. Coad read his paper on "Practical Working of the Ditches and Watercourses Act."

Moved by Mr. Gaviller, seconded by Mr. W. R. Aylsworth: That the paper of Mr. Coad on "Practical Working of the Ditches and Watercourses Act" be received and adopted, and that a vote of thanks be tendered Mr. Coad. Carried.

Mr. J. P. B. Casgrain then addressed the meeting with reference to Incorporation.

Mr. Butler read Mr. Wicksteed's paper on "Railway Location" in the absence of the writer.

Moved by O. McKay, seconded by Willis Chipman: That the paper of H. K. Wicksteed be accepted and printed in the Proceedings, and that the thanks of the Association be tendered him for his excellent paper. Carried.

The meeting adjourned at 12.45 p.m.

AFTERNOON SESSION, 2 P.M.

The President in the Chair.

Mr. Dennis, President of Association of Dominion Land Surveyors, and other members of the deputation, then addressed the meeting on the subject of Affiliation of the two Associations.

Moved by Willis Chipman, seconded by James Dickson: That the matter of Affiliation be referred to a Special Committee, composed of the President, the Secretary, Messrs. P. S. Gibson, A. Niven, M. J. Butler, F. L. Foster and E. Stewart, to confer with the deputation from the Dominion Association and report to-morrow (Thursday) morning. Carried.

The discussion *re* Incorporation was then continued.

Moved by W. R. Aylsworth, seconded by James Dickson: That it is desirable to have the Provincial Land Surveyors of the Province of Ontario incorporated as a body corporate and politic, and that this Association take steps to have an Act therefor prepared and passed with as little delay as practicable. Carried.

Moved by James Dickson, seconded by H. D. Ellis: That the following be a Committee to wait upon the Attorney General and the Commissioner of Crown Lands, and ascertain their views on Incorporation, and that this Committee draft a Bill for Incorporation, a copy of such draft to be sent to each of the members of the Profession now practising: Messrs. Stewart, Gibson, Sankey, VanNostrand, Chipman, Niven, Kirkpatrick, Unwin, Dickson, Butler, Aylsworth, Passmore, Klotz, Webb, Casgrain, T. O. Bolger. Five to form a quorum. Carried.

Moved by Mr. Gaviller, seconded by Mr. Dickson: That a vote of thanks be tendered to Mr. Casgrain for the trouble he has taken in the matter of Incorporation, and for the very clear manner in which he has presented the subject. Carried.

Moved by A. J. VanNostrand, seconded by J. Dickson: That the Committee on Incorporation be empowered to retain a lawyer for the purpose of drafting a Bill of Incorporation and seeing it through the Legislature. Carried.

The meeting adjourned at 4.20 p.m. for the purpose of visiting the School of Science and Observatory.

THURSDAY MORNING SESSION.

The President in the Chair.

Mr. J. C. Macnabb read his paper on "Reclaimed Lands in Kent County."

Moved by Mr. Aylsworth, seconded by Mr. E. Stewart: That the paper by Mr. Macnabb be received and printed in the Proceedings, and the thanks of the Association be tendered to him. Carried.

Mr. P. S. Gibson then read his paper on "Difficulties in the Survey Act."

Moved by Mr. Butler, seconded by Mr. Speight: That Mr. Gibson's paper be accepted, and that the thanks of the Association be tendered him. Carried.

The Auditors' Report was then read by Mr. Aylsworth.

Moved by Mr. Aylsworth, seconded by Mr. Butler: That the report of the Auditors be received and adopted. Carried.

The meeting adjourned at 12.45 p.m.

AFTERNOON SESSION, 2 P.M.

The President in the Chair.

Mr. H. J. Bowman read his paper on "Kincardine Water Works."

Moved by E. Stewart, seconded by M. J. Butler: That the paper read by Mr. H. J. Bowman be received, and that a vote of thanks be tendered him. Carried.

An invitation was received from the Royal Canadian Academy of Arts.

Moved by E. Stewart, seconded by A. J. VanNostrand: That the invitation of the President and Council of the Royal Canadian Academy of Arts be received, and that the thanks of this Association are due for the same. Carried.

The President then read the Rules and Regulations *re* Affiliation with Association of Dominion Land Surveyors as prepared and submitted by the Committee appointed for that purpose.

Moved by Mr. Gibson, seconded by Mr. Dickson: That this scheme of Affiliation be adopted. Carried.

Moved by Mr. Aylsworth, seconded by Mr. Niven: That this Association hereby instruct the Executive Committee to appoint five delegates as per Rules and Regulations for Affiliation as adopted. Carried.

Mr. Dennis, President of Association of Dominion Land Surveyors, addressed the meeting, and returned thanks for himself and deputation for the cordial manner in which they had been received. Mr. Sankey, President of the Provincial Land Surveyors' Association, replied on behalf of this Association.

Moved by Mr. Coad, seconded by Mr. Macnabb: That the report of the Committee on Drainage, also the Question Drawer and answers, be taken as read and printed. Carried.

The Report of the Committee on Engineering was then read by the Chairman, Mr. Chipman.

Moved by Mr. Gibson, seconded by Mr. Butler: That the Report of the Committee on Engineering be adopted. Carried.

The following verbal report by Mr. Aylsworth, of the Committee on Legislation, was received and adopted: The Committee, having no matters yet matured ready for legislation, have no report to make.

The report of the Committee on Publication was read by the Chairman, Mr. McAree.

Moved by Mr. McAree, seconded by Mr. Niven: That the report of the Committee on Publication be adopted. Carried.

Moved by F. L. Foster, seconded by A. J. VanNostrand: That the report of the Committee on Entertainment be taken as read and printed in the Proceedings. Carried.

The question of Registrars' fees being taken up, it was moved by Mr. Stewart, seconded by Mr. Dickson: That the matter of Registrars' fees be referred to the Committee on Legislation. Carried.

Moved by A. Niven, seconded by A. J. VanNostrand: That the paper on "Country Practice" by Mr. C. F. Aylsworth be taken as read and printed in the Proceedings, and that the thanks of the Association be tendered Mr. Aylsworth. Carried.

New business was then taken up, Mr. Gibson speaking as follows: With reference to our School of Practical Science, my impression is that a Provincial Land Surveyor should be allowed to enter the School of Science without taking the matriculation examination.

The following resolution was then carried:—

Moved by P. S. Gibson, seconded by T. B. Speight: Resolved, that, in the opinion of this Association, any person holding a certificate as a Provincial Land Surveyor should be entitled to be admitted to the School of Practical Science without being required to pass a matriculation examination, and that a copy of this resolution be forwarded to the authorities of the University by the Secretary of this Association.

The President then read a letter from Mr. L. B. Stewart, of the School of Practical Science, giving a list of books required to prepare for examination for Provincial Land Surveyor.

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

The following report of the Executive Committee with regard to the compass and chain sent in by Mr. Currie was then read by the President :—

Your Committee beg leave to report as follows : That said compass and chain be purchased by this Association for the sum of ten dollars and to remain the property of this Association. That the Secretary be instructed to inquire if the Toronto School of Science would take charge of same as a curio for exhibition.

Signed, E. STEWART.
M. GAVILLER.

The report was adopted.

An adjournment for five minutes was made at 4 o'clock, after which the nomination and election of officers for the ensuing year took place.

NOMINATION AND ELECTION OF OFFICERS.

Moved by Mr. Aylsworth, seconded by Mr. Gibson : That the President and Vice-President be re-elected by acclamation. Carried.

The President—I may say I did not suppose that you were going to elect me for a second term, although it is true that the two previous Presidents have held the office for two years consecutively. I don't believe monopoly will do the Association any good, and I think it may do it harm. At the same time, personally, I am satisfied to do whatever is going to advance the interests of the Association, otherwise I should have very great reluctance, indeed, in standing in anybody else's way. But I shall defer to the wishes of the Association and accept it again for another year, tendering you my sincere thanks for the honour you have conferred on me for the second time, and also for the very hearty way in which the Association Committees have stood by me, or rather have stood by the Association and by each other. I thank you very sincerely.

Moved by Mr. Gibson, seconded by Mr. Aylsworth : That the Secretary-Treasurer, Mr. VanNostrand, be re-elected for the ensuing year. Carried.

Mr. VanNostrand—I thank you, gentlemen, for this mark of confidence in returning me to the office.

The following were then nominated for Councillors : Messrs. Proudfoot, Gaviller, Jones, Dickson, H. J. Bowman, M. J. Butler, Ellis, Unwin, Gibson, Macnabb, Speight, Aylsworth.

Messrs. Gibson and Speight afterwards withdrew their names.

Mr. Aylsworth nominated Messrs. Speight and Foster as scrutineers. Carried.

VOTES OF THANKS.

Moved by Mr. Aylsworth, seconded by Mr. Niven: That the Secretary be paid the usual fee of $40 for his services, and that the thanks of the Association be tendered to Mr. VanNostrand for the attention he has given to the business of the Association. Carried.

Moved by C. F. Miles, seconded by A. Niven: That the thanks of the Association be tendered to Professor Galbraith for the interest he has taken in the Association, and for his kindness in conducting the members of the Association through the School of Science yesterday; also that the thanks of the Association be given to Prof. Carpmael for his kindness in showing the members through the Observatory. Carried.

Moved by Mr. Macnabb, seconded by Mr. Miles: That the thanks of this Association be given to Mr. Robertson for his services as Chairman of the Committee on Drainage. The report contains the valuable results of much trouble in collection. Carried.

Mr. Dickson—I move that the President do now leave the Chair and that Mr. Gibson take it. Carried.

Moved by Mr. Dickson, seconded by Mr. Niven: That a hearty vote of thanks be tendered the President, Mr. Sankey, for the very able manner in which he has performed the duties of the Presidency for the last year. Carried.

The meeting was then declared closed. 4.30 p.m.

MEMBERS IN ATTENDANCE AT SIXTH ANNUAL MEETING.

Abrey, Geo. B.
Aylsworth, Wm. R.
Butler, M. J.
Bolton, Lewis.
Bowman, H. J.
Browne, H. J.
Browne, W. A.
Casgrain, J. P. B.
Cavana, A. G.
Chipman, Willis.
Coad, R.
Dickson, James.
Drewry, W. S.
Ellis, H. D.
Esten, H. L.
Fawcett, Thos.
Foster, F. L.
Galbraith, John.
Gaviller, M.
Gibson, P. S.
Kirkpatrick, G. B.
Klotz, O. J.
Laird, R.
Lumsden, H. D.
McAree, John.
McCulloch, A. L.
McKay, Owen.
Macnabb, J. C.
Miles, C. F.
Murphy, C. J.
Niven, Alex.
Ogilvie, Wm.
Proudfoot, H. B.
Ross, Geo.
Sankey, Villiers.
Speight, T. B.
Stewart, E.
Stewart, L. B.
Tyrrell, J. W.
Unwin, Chas.
VanNostrand A. J.
Warren, Jas.
Wheelock, C. R.

RESULT OF ELECTIONS.

President .....Villiers Sankey.....(by acclamation).
Vice-President.....Elihu Stewart.....(by acclamation).
Secretary-Treasurer .....A. J. VanNostrand .....(by acclamation).

Councillors.—M. J Butler, H. B. Proudfoot, M. Gaviller.

I declare the above named Councillors elected.

A. J. VANNOSTRAND,
Secretary-Treasurer.

Certified correct.

(Signed) F. L. FOSTER,
T. B. SPEIGHT,
Scrutineers of Ballots.

REPORT OF SECRETARY-TREASURER.

MR. PRESIDENT,—The following report is herewith submitted as the business of the Association from February 25th, 1890, to March 10th, 1891:—

The number of paid-up members on the roll is the same as at the commencement of our last annual meeting, but a number of others are in arrears for only the past year, so that, on the whole, our membership may be considered slightly in advance of that of 1889-90.

We have lost, by death, one active member during the year—Mr. Hugh Wilson, of Mount Forest—one of the oldest land surveyors in the Province and a member of this Association ever since its organization.

A full meeting of the Executive Committee was held in Toronto on April 12th, 1890, in order to strike the Standing Committees and make necessary arrangements respecting the publication of the report of proceedings of the Fifth Annual Meeting.

A meeting of the Executive and Standing Committees was held in Toronto on December 23rd, for the purpose of transacting the business of committees for the current year. It was then arranged that a circular should be issued by the Executive Committee to collect a list of cases of the classes which the proposed Boundary Commissioners' Act would have benefited. As a result of this circular we have the names and particulars of quite a number of cases of that description.

The following circulars have been issued by the direction of the Executive Committee during the past year:—

No. 26—Ballot for Officers for 1890-91.
No. 27—Explanation respecting Ballot.

No. 28—Respecting Advertisements in 1890 Proceedings.
No. 29—Requesting Papers for Sixth Annual Meeting.
No. 30—To Collect Statistics of Recent Drainage Works.
No. 31—To Collect Information for Boundary Commissioners' Scheme.
No. 32—Requesting Contributions for Question Drawer.
No. 33—Notifying Members of Adjournment of Sixth Annual Meeting.
No. 34—Programme for Sixth Annual Meeting.

Correspondence was entered into with the officers of a number of incorporated professions and copies of their several Acts of Incorporation with suggestions from the originators in order to facilitate the framing of the draft of an Act of Incorporation of this Association.

The railway companies were applied to for reduced rates to members attending this meeting, but it was found that the number of members required in order to obtain a reduction was much in excess of our usual attendance of members travelling by rail.

Accompanying this report is a statement of the financial transactions of the Association from February 25th, 1890, to March 10th, 1891.

All of which is respectfully submitted.

A. J. VANNOSTRAND,
Secretary-Treasurer.

STATEMENT OF RECEIPTS AND EXPENDITURES OF THE ASSOCIATION OF PROVINCIAL LAND SURVEYORS OF ONTARIO FROM FEBRUARY 25TH, 1890, TO MARCH 10TH, 1891.

1890.	RECEIPTS.		
To Balance on hand 20th February, 1890			$25 00
" Fees, 1 Active Member for 1887, at $3		$3 00	
" " 2 Active Members for 1888, at $3		6 00	
" " 10 Active Members for 1889, at $3		30 00	
" " 92 Active Members for 1890, at $3		276 00	
			315 00
" Advertisements for 1890			65 50
" Proceedings sold, 2 copies, at 50 cts			1 00
Total			$406 50

1890.	EXPENDITURES.	
By Postage		$20 35
" Stationery and Printing Circulars, etc		14 10
" Printing Proceedings and Engraving for same		178 15
" Express, Cartage, Packing, etc., in exchanges		20 15
" Duties paid		8 60
" Rental of Rooms for Fifth Annual Meeting		12 00
" Amount granted Stenographer for Fifth Annual Meeting.		35 00
" Amount granted Secretary-Treasurer for 1889-90		40 00
" Balance		78 15
Total		$406 50

1891. RECEIPTS.

To Balance from 1890		$78 15
" Fees, 4 Active Members for 1890, at $3	$12 00	
" " 3 Active Members for 1891, at $3	9 00	
		21 00
" Advertisements for 1890		13 00
Total		$112 15

1891. EXPENDITURES.

By Postage		$4 00
" Printing Circulars Nos. 31, 32 and 33	$7 00	
" Printing Circulars Nos. 29, 30 and 34	11 75	
		18 75
" Balance		89 40
Total		$112 15

A. J. VANNOSTRAND,
Secretary-Treasurer.

March 10th, 1891.

REPORT OF AUDITORS.

We hereby certify that having examined the above accounts of Receipts and Expenditures, together with the vouchers therefor, we find the same to be correct.

W. R. AYLSWORTH,
THOS. FAWCETT,
Auditors.

March 11th, 1891.

REPORT OF COMMITTEE ON LAND SURVEYING.

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

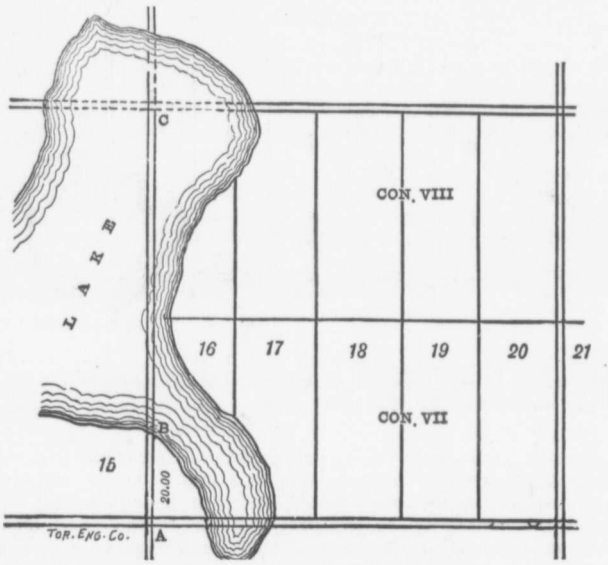
1. Several questions in surveying have been referred to your Committee, which questions and the answers are annexed hereto.

2. Your Committee would suggest that members, in submitting questions as to surveys in townships, should state the name of township, as this would enable your Committee to examine instructions under which such surveys were made and assist them in coming to a proper conclusion.

3. Your Committee would impress upon the Legislative Committee the importance of taking some steps for the amendment of the Surveyors' Act regarding village surveys, and the plans for registration in connection therewith, and also that the matter of the revision of the Ditches and Watercourses Act be attended to.

Respectfully submitted.

A. NIVEN,
Chairman.

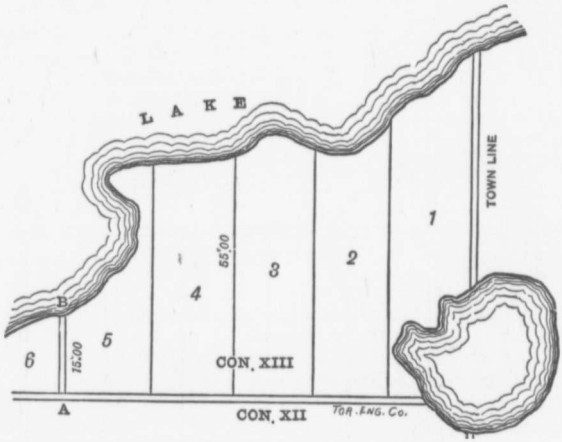


Question 1.—The bearing of A B is found to be N. 20° 10′ W. C is found by measuring along concession line on ice, and the bearing of a straight line A C is found to be N. 21° 15′ W. The bearing of this side-road in original plan is N. 20° 51′ 40″ W.

On what course should line between lots 18 and 19 be run ?

Answer.—See Section 52 Surveyors' Act.

Question 2.—There is an original post at A, and the bearing of A B can be satisfactorily obtained as the blazed line is visible. The distance from A to B is 15°.00. The bearing of A B is found to be N. 20° 20′ W., and the bearing shown on original plan is N. 20° 51′ 40″ W. On what course should line between lots 3 and 4 be run?



Answer.—In this case the base line is the town line, not A B. For bearing see Section 52 Surveyors' Act.

Question 3.—In a township, part of which is an island, the west or governing line was not located, being in a lake; but at the time of the original survey the line between lots 1 and 2 was run and marked through the concession to the proper depth thereof, and measurements made from it for the parts in the other concession. The line between lots 9 and 10 on the east side of the island was run through said concession and properly marked, but neither of these lines was mentioned in the notes of the original survey. The east boundary of the township was run originally and is on dry ground. The east and west sides of the township are intended to be parallel and on the same bearing, as also are the lines between the lots that were run as mentioned above.

In this case must the east boundary be taken as the governing line and the others between lots ignored? This is a single front township.

Answer.—If no governing side roads run and shown in field notes, east boundary must govern.

Question 4.—On the north boundary of a township, bounded by a lake, posts were planted at the time of the original survey to show the limits of the lots. Some of these posts are still in existence, and lines were run from them to the south. Several years after the posts on the lake shore were planted, a new base line was run by the Government 1¼ miles back from the lake and posts planted on it, and lines run from the posts so put down to the lake, but which did not meet the posts at the lake shore, jogs of several rods occurring.

Is this to be treated as a double front concession ?

QUESTION RE WIDTH OF ROADS.

" No Council shall lay out any road or street more than 100 feet nor less than 66 feet in width, except where an existing road or street is widened, nor unless with the permission of the council of the county in which the municipality is situate, but any road, when altered, may be of the same width as formerly, and no highway or street shall be laid out by any owner of land of a less width than 66 feet without the consent of the municipality." (Section 545 of Municipal Act.)

Question 5.—Is there anything in above section to prevent a town council paying money to an owner of land in consideration of his laying out a *forty foot* street through his property and registering a plan thereof with resolution of town council attached consenting thereto. If not, what is the use of the first part of the above section where it requires permission from county council where town council lays out street less than 66 feet in width ?

Answer.—In case of the town being connected with the county, and town council wishing to lay out a street less than 66 feet wide, they must get consent of county council.

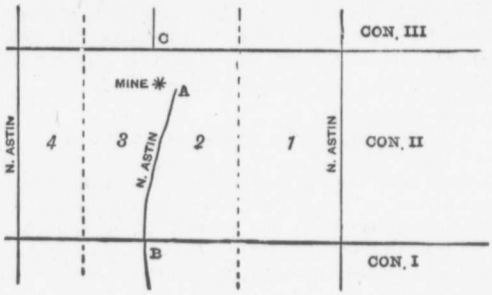
Question 6.—Suppose a proprietor or owner of a property in lands and that he has occasion to be absent perhaps out of the country, having been placed in circumstances that make it impossible for him to return for over ten years, and naturally feeling in his own mind during this time that his title to his own property is all right :

But in the mean time another person takes possession of the whole or a part of the said property, makes a fence around it, and has quiet and peaceable possession and occupation of it for over ten years :

Query.—Does that give him a clear title to the said property that he has thus taken possession of without leave or liberty ?

Question 7.—Line A B surveyed as shown on sketch. Mine located at *. C A B shown on notes as having been run all way through the concession and bearing given as North Asty.

Required.—On which lot is the mine located, the line not having been surveyed on the ground between A and C and only having been surveyed on the ground between A and B?



DISCUSSION.

Question 1.

Mr. Dickson—I think the law is so plain that there is no necessity of taking up time in discussing it.

Question 2.

No discussion.

Question 3.

Mr. Aylsworth—I don't know that your answer gives any more light than the question. I think you read that the line between one and two or thereabouts was actually run on the ground but was not mentioned in the field notes. I am inclined to think that where there are lines run on the ground, although a man was not instructed to do it if he did do it and parked them out and it can be proven that they are lines, that we have no right to ignore them, and I am not so clear as the Committee appears to be that the east boundary in that case should be taken.

Mr. Dickson—Was the surveyor instructed to run those lines?

Mr. Niven—The question does not give us the information.

Mr. Dickson—I don't think any lines should govern in any township unless they are instructed to be run.

Mr. Gaviller—If he had been instructed to run them and did not show them in his field notes would not his field notes have been returned by he Crown Lands Department for correction?

Mr. Kirkpatrick—There is the township of Smith—I don't know whether that is the township to which that refers or not—but it is one the sides of which are broken by lakes and rivers. Now, that was run about 1821 or 1822. I had a case the other day where they were asking for the field notes, and I find that when the surveyor came to the river Otonabee he then struck through the concessions and ran one of the side lines giving the field notes on it, and as soon as he got up there he commenced to run the other concession, but as far as I can find out he was not told to do that in his instructions; he ran them merely for his own convenience. I don't think myself that the bearing of that side-line would prevail by which the others should be run. The Act provides how concessions broken on both ends should be run. I should suppose that line would of course hold for that particular line, but I am not at all sure in my mind that it would act as a governing line, because it says expressly how certain lines shall be run. Then take the township of Scugog; there is a great deal of trouble there very often. It was run out originally, but it has been flooded since and has become an island. The original plan gives the bearings, and the posts are there no doubt, but the trouble is there is about ten feet of water on them. I should be inclined to think that that line would only govern its own line, not the rest of the township. We assume that the instructions are on record, and there was nothing said as to running these proof lines. Of course if he is instructed to run these proof lines then they will be all right; but we must assume, although he does not say so, that the instructions make no mention of these proof lines and they were probably run for his own convenience.

Mr. Niven—This is the view that the Committee took, that they were ordered to be run and if run were not returned, consequently we cannot accept them as governing.

Question 4.

Mr. Dickson—The township of Somerville, in the county of Victoria, was surveyed a good many years ago, and by the original survey the lots were bounded on the river shore. I think the original survey was made in 1835 or thereabouts, and somewhere about 1856 or 1857 there was a re-survey of the township made by Mr. Reid, of Peterboro', and in his report he said that he found a number of the posts on the river shore had been washed away. I have, and I know that all the surveyors have, treated that as double fronted concession.

Mr. Aylsworth—I don't think that it makes it a double fronted concession; I think it is simply a matter of possession by these posts along the lake. But there is hardly enough information given for the Committee or for us to find upon, because we don't know under what authority the posts were planted along the lake.

Mr. Niven—How far would you run down from post to post to get the centre of the double fronted concession in a case of the kind Mr.

Dickson mentioned. The dividing lines between the upper and lower halves of the concession would not be straight lines.

Mr. Dickson—Divide the centre between post and post.

The President—That would depend somewhat on the way the lots were patented, I presume.

Mr. Ross—I think it would be likely that the lots were patented and sold from the lake at first. I know in the case of Wainfleet the posts were planted along the Welland river.

Mr. Kirkpatrick—In that case in Somerville I think it was Mr. Keating ran out the front concession along the river and planted posts eleven chains eleven links, I think, every post. Then Mr. Reid in surveying the township afterwards, I don't think he did it under instructions, but he reported that he could not find all the posts planted along the lake shore on account of them being washed away, and he found that it would be much handier if he planted them on the rear line at the same distance, and he did plant them apparently in his field notes the same distance exactly as they were planted on the other. His idea was that he was planting them to take the position of the original posts, but I hardly think these posts should govern, because I remember thinking at the time that there were no instructions given to him to plant these posts; the original posts were there and they were the posts by which the lots were settled and sold. I don't think the Government by the mere act of the Department giving instructions to plant those posts could override what the parties had originally bought. I don't think those posts would hold as against the original ones.

Mr. Dickson—That is the posts in the rear?

Mr. Kirkpatrick—Yes; because Mr. Reid gave it as his candid opinion that he thought they were less likely to be washed away, and his whole idea was that he was merely supplementing, making it easy to find the original posts. I don't know, however, of any case decided in the courts about it.

Mr. Dickson—The great difficulty to settle was, the first settlers of the township settled along the river shore, and went by these posts. Then afterwards a number came in and took possession of the rear half of the lots and they went by the rear posts, and they thoroughly believed that those posts should govern. I remember reading Mr. Reid's report, and the interpretation put upon it by Mr. Kirkpatrick is exactly the same as I put upon it.

Mr. Aylsworth—It appears to me from the information that that would be a case where special legislation would be required to establish those lines. I doubt very much, even if that rear line were run and posted under instructions from the Crown Lands Department, whether it would supersede or override the posts and marks along the front that were planted before the patents were issued. In the Township of Hungerford, in the County of Hastings, a difficulty arose. I

think it was the front of the first four concessions were run out, and a single row of posts planted on the blazed line. Then the work ceased. After a while another surveyor was sent on, and he began between the 5th and 6th and ran a line and planted both sides of it. The question came up, was the 5th a double fronted concession? After many suits it was finally held that that was a double fronted concession, the line between 5th and 6th having been run under due authority and posts planted; that we had to respect those posts and draw the lines half way through the concession.

Question 5.

Mr. Ellis—How is it that if it is a town it has not got a town council? What would the county council have to do with a town supposing it was properly incorporated?

Mr. Niven—That is the case all over Ontario. The town of Lindsay sends representatives to the county council, and on the other hand St. Mary's is a separate institution.

Mr. Aylsworth—A town, if it chooses, may after it becomes a town separate from the county for municipal purposes.

The President—A similar case to the one mentioned occurred here in the town of Parkdale. The question arose as to whether the municipal council of Parkdale could open a street of their own wish less than sixty-six feet wide without permission from the county council, and it was finally decided that they had to get that permission. The only point as far as I know at present undecided is this, should the by-law of the council of the minor municipality be ratified by the by-law of the county council. Undoubtedly a private individual goes to the nearest municipality—that is the minor municipality—and asks their permission to open a road of less width than sixty-six feet. Under the new Registry Act he cannot register his plan without having that permission endorsed on the plan. There are a great many cases in point where, if a township wishes to close road allowances and dispose of them, and the proper formalities having been gone through, you will find, as a rule, that lawyers will advise the matter to be brought before the county council and a ratifying by-law passed. Clearly the minor municipality has the right to grant the privilege to a private individual, but I think they cannot exercise that power themselves without getting the permission of the senior municipality.

Mr. Aylsworth—There is nothing in the Municipal Act requiring this sanction to the individual of the minor municipality to be brought before the county council.

Question 6.

Mr. Aylsworth—There are a good many exceptions, as you are aware, in respect to getting a title by possession in the period of ten years, and I am very strongly of the opinion that it is necessary for the

owner to know, before the time of the possession begins to run against him, that they are in possession. I don't believe that without that knowledge, or a reasonable chance for him to get it, the possession holds against him.

Mr. Esten—Unless he had it for forty years. I find a case on that very point: if the owner did not know that he was in possession unless he had it for forty years ten years would not go for anything at all.

The President—How would it be in the case of land being owned by a minor?

Mr. Aylsworth—Then it does not commence to run until he can assert his rights. But I don't think it is a proper question to discuss here; it ought to have gone to Ogoode Hall.

The President—Mr. Esten, will you give us just sufficient data of that case to state in our proceedings? It might be a good precedent.

Mr. Esten—I shall be most happy to; I have the case. A petitioner, claiming by length of possession against the patentee of the crown, failed to show that the patentee or his heir had any knowledge of such possession. It was held that he must show possession for forty years, or such knowledge.—*Re* Linet, 3 Chy. Cham. 230—Taylor, Referee.

Question 7.

No discussion.

REPORT OF DRAINAGE COMMITTEE.

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

We have not been together since our last annual meeting, although a meeting of all standing committees was called by the Executive at the Crown Lands Department, Toronto, for Tuesday, the 23rd day of December, 1890. There was only one member of our committee present.

Although not together, we have had some correspondence among ourselves, but not much has been done except attempting to carry out a suggestion put forth by the Drainage Committee of last year—"To try and gather some statistics as to the amount of drainage work being done in Ontario"—and in this attempt, we regret to say, we have been only partially successful; however, the results which we give further on may not be uninteresting to those who are engaged in this branch of the profession.

As this was only an experiment, we did not attempt to cover the whole Province but such parts as in our opinion would be doing

drainage work, chiefly the counties in Western Ontario and occasional townships in the more easterly parts. We prepared a circular letter, asking twelve questions. We hereto annex a copy of letter:—

ASSOCIATION OF PROVINCIAL LAND SURVEYORS.

Office of Secretary-Treasurer,

TORONTO,

To , Clerk of the Township of .

DEAR SIR,—The Association of Provincial Land Surveyors of Ontario at their last annual meeting deeming it advisable to collect some statistics as to the amount of drainage being done annually throughout the Province, passed a resolution that the Committee on Drainage prepare a circular asking for certain information in drainage matters, and send the same to the clerks of the various municipalities where drainage work is being or has been performed.

The Association would therefore esteem it a favour if you would kindly answer the following questions and return to the undersigned as early as possible, and not later than the 1st of February, 1891:—

1. How many new drains were laid out in your township during the year 1890, under the Municipal Drainage Act?
2. What was the aggregate length of such drains? Rods.
3. What was the estimated cost of such drains?
4. What number of acres of land was assessed for the cost of construction of the same?
5. How many drains were enlarged, cleaned or extended?
6. What was the aggregate length of such?
7. What was the estimated cost of such enlarging, cleaning and extending?
8. What number of acres of land were assessed for same?
9. How many drains were laid out under the Ditches and Watercourses Act?
10. What was aggregate length of same?
11. What was approximate number of acres drained by same?
12. Do the farmers in your township do much tile draining, and give approximate estimate of the amount done during 1890?

Send your replies to JAMES ROBERTSON, P.L.S., Glencoe, Ont.

A copy of this letter we sent to the clerk of the various townships, and out of about one hundred and thirty-five or one hundred and forty distributed we received replies to only thirty-five, or about twenty-five per cent.; and we are of opinion that many of those not heard from are municipalities that do the largest amount of work, and the clerk found that to answer the questions at all approximately entailed considerable work, and so did not reply. We here give statement of results:—

STATEMENT SHOWING DRAINAGE IN PARTS OF ONTARIO DURING 1890.

NOTE.—The numbers at the heads of the columns correspond with the questions on circular letter.

No. of Townships	County.	1	Rods. 2	$ 3	No. of Acres. 4	No. 5	Rods. 6	$ 7	No. of Acres 8	No. 9	Rods 10	No. of Acres. 11	12
1	Wentworth	..	.....	.....	.....	..	.....	.....	.....	..	.....	... ..	
2	Oxford	..	.....	.....	.....	..	.....	.....	.....	1	58	50	Quite a number.
2	Leeds and Grenville	..	.....	.....	.....	..	.....	.....	.....	1	210	75	Large quantities.
4	Welland	3	1290	1294	475	3	1043	2176	2400	9	2470	1500	None of any consequence.
2	Perth	..	.....	.....	.....	1	43	53	1040	10	2832	329	A good deal of lumber—tile on increase.
7	Middlesex	4	2276	3998	3157	5	3509	6178	9362	27	6608	4767	A good deal of tile.
7	Huron	..	.....	.....	.....	..	.....	.....	.....	17	2210	1090	Lumber—tile on increase.
3	Lambton	10	5025	9410	9135	5	4580	8461	15025	11	2000	2120	Good deal in parts.
4	Kent	17	9061	11021	18200	19	15562	20336	46253	19	7636	3845	A great deal in parts.
3	Essex	5	6080	8862	13150	5	2536	2979	6408	2	480	600	Very little.
		39	23732	34585	44117	38	27273	40183	80488	97	24504	14376	
			74.1 miles				85.2 miles				76.6 miles		
			Average 1.9 miles				Average 2.2 miles				Average .79 mile		

Or in all 174 drains, making a length of 236 miles, and costing (allowing $1.00 per rod as average cost of award drains) = $99,272.00.

With this guide, there was, in our opinion, about $400,000 spent in drainage under the Municipal Drainage Act, and Ditches and Watercourses Act, during the year 1890, in Ontario.

We might say that in our opinion the results as here given may represent about one-third or one-fourth of that actually done. In addition to these smaller schemes there are some more extensive ones, begun probably in 1889 and completed in 1890, and some originating in 1890 and still under consideration.

Although the attempt to collect statistics in this matter has not been altogether encouraging, we would recommend that it be tried again, and that the township surveyors be also asked to furnish statement of work done by them for the several municipalities under their charge, and that letters of inquiry be sent to every township in the Province.

Last spring, being an unusually wet one, there was probably more than an ordinary amount of drainage work done, chiefly in the direction of enlarging old drains under the Municipal Drainage Act, and of making new ones under the Ditches and Watercourses Act.

We would bring before your notice the great amount of dissatisfaction which exists with regard to the costly operations of appeals under the Municipal Drainage Act, especially when corporations are brought in conflict. The expense of arbitration as at present frequently runs up to and over one hundred dollars per day, and the arbitration continues for a week or more.

It has been suggested that a Board of Arbitrators be formed of two surveyors acting with the County Judge, to make a decision that would be final, or perhaps it might be arranged that such matters be referred to the proposed Boundary Commissioner for settlement. No doubt any such proposed amendment of the Act would meet with the opposition of the lawyers in the Legislature, and it is doubtful if it ever could be carried through. However this might be, it is high time that some less costly method should be adopted by which these matters might be settled.

Again, we would point out the necessity for the Drainage Act being simplified so it would say what it means, and not leave so much room for diversity of opinion by engineers, lawyers and others that have anything to do with it. It is very complicated, and as one of our prominent drainage lawyers recently remarked of it: "The more you read it the more you find there is in it."

It should undergo a thorough boiling d wn process.

The following are the drainage cases reported during the year 1890: —(*See schedule.*)

We here give amendments of 1890 to the Municipal Drainage Act, and the Ditches and Watercourses Act. (*See schedule.*)

All of which is respectfully submitted.

JAMES ROBERTSON,
Chairman.

Glencoe, 26th February, 1891.

Decided Cases, 1890.

Municipal Drainage Act.

NAME OF CASE.	WHERE REPORTED.	REMARKS.
In *re* Sweetman *vs* Township of Gosfield.....	26 Can. Law J'rn'l, p. 380.	Drainage By-law. Motion to quash.
Re McCormick and Corporation of Howard..	18 Ont. Reports, p. 260.	Drainage By-law. Motion to quash. Notice of intention to move must be given by actual applicant.
Re Townships of Harwick and Raleigh....	20 Ont. Reports, p. 154.	Arbitration and award.

Ditches and Watercourses Act.

Re Curtain, appellant, and Taylor, respondent.....	26 Can. Law J'rn'l, p. 600.	Scale of costs, maps and survey, etc.
Healy, appellant, and McDonald, respondent.....	26 Can. Law J'rn'l, p. 600.	Maintaining ditches, benefit to lands, etc.
Hepburn *vs.* Township of Orford.....	26 C. Law J'rn'l, p. 409. 19 Ont. Reports, p. 585.	Work not in accordance with award. Remedy and costs.
Beer *vs.* Stroud	19 Ont. Reports, p. 10.	Definition of Watercourse.

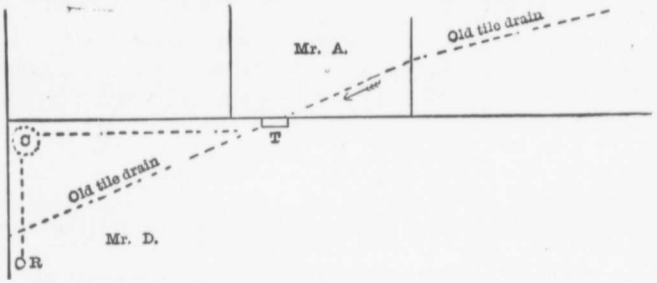
Amendments of 1890 to Municipal Drainage Act.

AMENDED BY	AMENDED.
53 Vic. p. 114, Cap. 50, Sec. 33	Sec. 569 of said Act is amended by adding Sub-Sec. 11 *a*. Relating to adjustment of assessment.
" " " " " 34	Sub-Sec. 15 of Sec. 569 amended. Relating to varying assessment on appeal.
" " 115, " " 35	Sec. 569 amended by adding Sub-Sec. 22. Relating to effect of withdrawal of petitions after signing.
" " " " " 36	Sec. 585 amended and Sub.-Sec. 2 added. Relating to covering drains.
" " " " " 37	Sec. 590 of the said Act amended.

Ditches and Watercourses Act.

" " 152, Cap. 67	An Act respecting the expense of County Court Judges under the Ditches and Watercourses Act.
" " 153, " 68	Sec. 11 of Ditches and Watercourses Act amended by adding Sub-Sec. 2 *a*. Relating to inspection of premises by Engineer.
" " " " 69	An Act to amend the Ditches and Watercourses Act as applied to Railways.

Question 1.—Mr. A makes requisition under the Ditches and Watercourses Act to have a ditch or drain constructed across Mr. D's property to take the water off his own lot. I examine the premises and the parties, and find that the old tile drain—shown on plan—was constructed twenty or more years ago by a former owner; that when it was working successfully it carried away all surface water and left Mr. A's ground dry. For ten years past—more or less continuously—water has been running over Mr. A's lot on the surface,

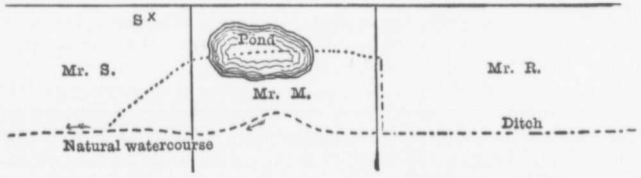


and supplying water for a trough at which Mr. D's stock came to drink. About six years ago Mr. D laid a level overflow pipe from the water trough to a cistern (c) from which he works a hydraulic ram for supplying his house and grounds with water. If I award that the old tile drain shall be opened up across Mr. D's land I would take the water away from Mr. D and render useless his expensive plant; and by leaving the water on the surface Mr. A's lot, which is valuable market garden property, is of no practical use.

How should I make my award?

Answer 1.—Make award to relieve Mr. A's property irrespective of the difficulty spoken of.

Question 2.—Mr. R makes requisition to have ditch extended across the lands of Mr. M and Mr. S under the provision of the Ditches and Watercourses Act. I attended at the locality, examined the premises



and took considerable evidence. I found by taking levels and from the evidence that the natural watercourse was in the position represented by the dashed line. I found a low swampy wet hole several

chains to the north of said natural watercourse, and that the water causing said swampy place trickled down from a running spring on a hill side. Mr. M wanted the watercourse diverted—as represented by the dotted line—so as to drain the wet place on his land, and Mr. S objected to having a second watercourse opened up across his place, especially as it would have to pass through comparatively high ground. I awarded that the natural watercourse should be slightly deepened through Mr. M and Mr. S's lands, but in an appeal from Mr. M the Judge altered my award, directing that watercourse be diverted as shown by the dotted line.

Which under the provisions of the Act is the proper way?

Answer 2.—Would be a matter to be decided by the features met with such as comparative cost of the two routes. To avoid a second cut on Mr. S, run drain along line of Mr. S and charge to Mr. M.

REPORT OF COMMITTEE ON ENGINEERING.

MR. PRESIDENT,—Your Committee begs to report that we have secured for presentation at this meeting four papers on Engineering subjects, which will be found of interest and of value in future, for reference.

We would suggest that all members of this Association avail themselves of the advantages of enrolling themselves as associate members of the Canadian Society of Civil Engineers.

WILLIS CHIPMAN.
Chairman.

REPORT OF PUBLICATION COMMITTEE.

Of the Report for A.D. 1890, 800 copies were printed; of which there were devoted to exchanges with kindred societies the following: To the Michigan Society, 135 copies; Illinois, 100 copies; Iowa, 110 copies; Arkansas, 105 copies; Indiana, 70 copies; Ohio, 110 copies; School of Practical Science Engineering Society, 100 copies.

From each of the above societies we received in exchange from 100 to 110 copies. The printing of our Annual Report of Proceedings has hitherto been done by one firm, viz., C. Blackett Robinson, Jordan Street, Toronto, their prices being as low as those of any other firm who could do the work. The obtaining orders for our advertising columns has been a matter of considerable anxiety to the successive Publication Committees, and it occurs to the present Committee that effective assistance in this department could be rendered by our

members generally, by informing the secretary of parties who would be likely to advertise with us. We venture to suggest that each member make a note of this, and be on the lookout to help the funds of the Association in this way. Nearly every branch of engineering and surveying is practised by some member or other of our Association, and collectively there must be a large number of persons in trade who would find it advantageous to their business to advertise in our publication.

Respectfully submitted on behalf of the Committee,

JOHN MCAREE,
Chairman.

Toronto, March 12, 1891.

REPORT OF COMMITTEE ON ENTERTAINMENT.

MR. PRESIDENT,—The Entertainment Committee for 1890-91 have to report as follows:—

The accommodation and locality of the place of meeting of the Association for the last two years having given general satisfaction, the same arrangement with the Canadian Institute as before was carried out this season, and the meetings were held in the comfortable and well-fitted library of that institution.

In consequence of the Dominion elections being held on the 5th of March, 1891, the yearly meeting of the Association called for the 24th of February was postponed till the 10th, 11th and 12th of March.

On the evening of the 11th the fifth annual dinner of the Association was held at the Walker House, and was generally pronounced a success both in manner and matter of entertainment. The former was thought to be in a great measure due to your able Chairmanship, and that of the Vice-Chairman, Mr. E. Stewart.

The festivities were graced by the presence of the following invited guests of the Association: Mr. Aubrey White, Assistant Commissioner of Crown Lands; Mr. Kivas Tully, C.E.; Mr. Wm. Armstrong, C.E.; Prof. C. Carpmael, Astronomer; Messrs. W. S. Drewry, D.T.S., and J. S. Dennis, D.T.S., of Ottawa; Mr. E. B. Ryckman, Barrister, and Mr. W. A. Sherwood, Artist. The private guests were Mr. Blezard, M.P.; Mr. J. Loughrin, M.P.; Messrs. Canniff and W. I. Mackenzie. Those seated numbered forty-six.

Some excellent speeches were delivered by the following gentlemen in reply to the toasts set opposite their names, after that of "The Queen" being duly honoured: "The Ontario Legislature," Messrs. Blezard and Loughrin; "The Association of D. L. Surveyors," Messrs. Dennis, Ogilvie and Klotz; "The Canadian Institute," Prof. Carpmael; "The Osgoode Legal and Literary Society," Mr. E. B.

Ryckman; "Association of Architects," Mr. Kivas Tully; "The Quebec P. L. S. Association," Mr. J. P. B. Casgrain; "The School of Practical Science Engineering Society," Mr. T. R. Deacon; "The Canadian Society of Civil Engineers," Prof. Galbraith and H. D. Lumsden; "The Crown Lands Department," Messrs. A. White and G. B. Kirkpatrick; "The Press," Messrs. Fawcett, Smith, Curran, Snetsinger and Radford. The speeches were interspersed with songs by Messrs. Armstrong, Radford, Niven, Klotz and Foster; and stories by Mr. Ogilvie and others. The singing of "Auld Lang Syne" by the company in the good old-fashioned style concluded an enjoyable evening.

After the adjournment of the meeting on the afternoon of this day (11th), an invitation from Profs. Galbraith and Carpmael was accepted by a number of our members, and a visit to the School of Practical Science and the Toronto Observatory was made. Much that was new and interesting and instructive was pointed out and explained by Profs. Galbraith and Carpmael in their respective departments.

After adjournment on the afternoon of the 12th a visit was paid to the Gallery of the Ontario Society of Artists in response to the invitation of the President and officers of the Royal Canadian Academy of Arts, and a pleasant hour spent in viewing the paintings and statuary on exhibition by members of that Association.

We have again to thank the Toronto surveyors for their assistance in making our entertainments successful.

All of which is respectfully submitted.

On behalf of the Committee,

FRED. L. FOSTER,
Chairman.

AFFILIATION.

Mr. Dennis, President of the D. L. S. Association, addressed the meeting as follows in relation to the matter of Affiliation with the Association of Dominion Land Surveyors:—

MR. PRESIDENT AND GENTLEMEN,—On behalf of the deputation from the Dominion Land Surveyors' Association I have to thank you very much for the kind way in which you have received us. As you know, we have come here for the purpose of laying before you this scheme for the affiliation of the two Associations. The question of affiliation was suggested to your Association somewhat over a year ago; and at that time, or shortly previous to that time, I had submitted to our Association a memo. having in view the affiliation of all associations of land surveyors in Canada. My object was to further the interests of the profession and to strengthen our hands individually and collectively. At that time the memo. was submitted

to your Association and received some consideration at the hands of your executive, and we appointed a committee to meet your Association at its last meeting. However, the committee, from unavoidable causes, were unable to be present, and nothing further was done; and the matter remained in that state, when I prepared rules to govern the affiliation of the Associations, a copy of which was forwarded to your Association. Our object in coming before you now is to have this scheme discussed and concurred in as far as you may see fit. As the correspondence and this scheme of affiliation has already been read to you, you will have gathered an idea of what our intention is.

As you all know, there are to-day in Canada five associations of land surveyors, that is with the one lately formed in British Columbia. My object in initiating this idea was in as far as possible to arrange that there should be held a convention at which the members of all these associations should be present; that, instead of doing as we do now, holding individual meetings at the headquarters of the different associations, we should hold, annually or biennially or triennially, as may be agreed upon, a convention of the whole. I don't suppose it will be necessary to advance any facts in support of the statement that a convention of all the land surveyors, or a convention of the affiliated associations of land surveyors in Canada would be a more representative and influential body than any of our individual meetings are. The interests of surveyors throughout the country are identical in many ways, each province having its own peculiarities which affect particularly its own association, but there is a general interest which affects us all as surveyors, and if we met in convention there is no doubt that the discussion of these questions which affect us all would be much better dealt with there than they could be as individual associations. I think that in a vast number of ways we would all be benefited. Our associations are most of them on a good footing, and splendid work has been done in the last few years; work which has had the effect of raising the standard of our profession and of our acquirements and enabling us to defend our rights; giving us a recognized standing as a profession instead of a trade, as we were called not very many years ago The Associations in Quebec and Manitoba felt some diffidence about going into this scheme in consequence of their being incorporated societies, and they say it would be necessary to obtain very extensive amendments to their Acts of Incorporation to enable them to adopt the scheme; however, the question is still open, and in Quebec they are ready to adopt it if possible at all. But if we can accomplish affiliation between the Dominion Land Surveyors' Association and your Association, Mr. President, a great step will have been made in the direction of consolidating the whole. We have a strong association now of Dominion Land Surveyors, and I think we are doing a good work. The affiliation of these two will, in my opinion, benefit us both, and, therefore, we hope that if possithat end may be accomplished. My idea in regard to this was that, if acceptable to you, this scheme which we have drawn up, and which I should say was submitted to our Executive Committee before our last annual meeting and as amended by them was submitted to our

annual meeting lately held and was approved by the members then present, and this deputation was appointed for the purpose of coming here, submitting the scheme to you, and in as far as possible having it carried into effect. This deputation is authorized to meet your views as far as possible with regard to the necessary amendments to this scheme. Of course we, having drawn up this scheme, may have put our side of the question rather forcibly, and it may be necessary to consider some amendments, and if, as amended, it meets the views of both Associations the end would be accomplished.

DISCUSSION.

Mr. Klotz—I have thought over this matter a good deal, and it is not very clear in my mind that it is feasible; that it is desirable I admit, but as to its feasibility I am not very clear how it is going to be effected.

Mr. Drewry—In this scheme it is not intended that one Association shall interfere in the department of the other; the Dominion Association would not interfere in purely provincial affairs, but when any question comes up concerning surveyors as a whole then we can act together.

Mr. Gibson—In bringing pressure on the Government, for instance, then we act as a body?

Mr. Dennis—I think there is no question that advantages will accrue in this way; there are questions which arise all over the Dominion in all the provinces where surveying is being done which affect surveyors as a whole. We, as Dominion Land Surveyors, succeeded in fighting the battle of our fellow surveyors in British Columbia where the Government was employing men to make surveys who were not surveyors at all. We also succeeded in three or four other instances where surveyors as a whole were very intimately concerned. Last winter when a Bill was brought in to create a Geological Survey separate department, there was a clause put in that Bill which gave the members of the Geological Survey staff all the rights which we possessed; it gave them the right to make surveys anywhere and everywhere,—practically legislated them into our profession. We fought that question and we had the Bill amended, that clause being changed so that they would not be given powers that would interfere with the rights of surveyors throughout the Dominion. That affected the Provincial Land Surveyors as well as us, because it authorized them to go into Ontario or any other province and make surveys; it did not authorize them to run side lines and lines between lots, but it gave them rights which we have acquired under the law as surveyors. Now, questions of this kind are sure to arise in the future, and if we are a combined body of surveyors in Canada we will fight these battles much better than we do now fighting them individually. We don't ask any of the individual associations to give up anything of their autonomy or any of their particular rights. And I feel that the

voice of a convention of the affiliated associations of land surveyors of Canada would be listened to with very much more respect than it now is when it comes from the individual associations.

The President—I think it will be a move in the right direction, provided there are no very great difficulties in the way of carrying out the scheme. Take matters in the rowing world, for instance; the Amateur Association of Canada has affiliated a great number of clubs, and in that way the amateur rowing of Canada has come up to a very high standing. In football it is the same. I don't see that we would be put to any greater expense than we are now; the only difference, I presume, would be the awkwardness that might occur to some of the members of our Association in Ontario in going to Ottawa the year the Convention was held there, and similarly the Dominion Land Surveyors might find it inconvenient to come to Toronto, but these are only difficulties in detail. Unquestionably we would reap benefits by having papers on the broad question of surveying generally prepared and read at these joint conventions. Personally I feel that I would like to do all I can to have the thing carried out.

Mr. Ogilvie—I think, if the scheme of affiliation could be consummated the interchange of ideas between the members of the different associations would be worth a great deal. The greatest objection I have heard is the cost of travelling east to Ottawa and west to Toronto, but as the cost is not very great I don't think that is a very important objection. It would lend an increased importance to the profession, whereas now we are hardly known. Last winter when we were fighting the Geological Survey a great many people laughed at us and asked, Who are the surveyors? I think we could act much more forcibly in the way of law making and amendments than we do now.

Mr. Gibson—I think what we want is to have each province have its own association, and that the Dominion Association should be formed of representatives from each province. I believe if we attempt to make one association of all the provinces it will be a failure. The ideas are different, the law is different, and the practice is different to a greater or less extent. If a central association could be formed of representatives sent from each local association, and the expenses of these representatives paid I think it would be a very good scheme. But I am pretty well satisfied that if we attempt to have our meetings at Ottawa, Toronto, Halifax, Winnipeg, and Victoria and these places, the affair would end in a break-up, which I would be very sorry indeed to have occur.

Mr. Stewart—What Mr. Gibson has said is just what I have been thinking of as the proper way of carrying this out.

With regard to what has been said about the geological branch of surveys, and especially traverses of lakes it seems to me that they were trespassing on our ground.

Mr. Ogilvie—They wanted to create themselves into a topographical survey, and the misunderstanding was as to the word "topographical." They intended it in a very limited sense, but we said, If you do not intend it in an extended sense your heirs and successors may use it in that way; and the result was that they agreed to expunge the word "topographical." But as far as making surveys for their own purposes is concerned, we must concede that in view of their services to the public they must make some kind of a survey. It is not a public survey, it is not to be accepted in any sense in that way; but we were afraid that they might, having this word in their Act.

Mr. Stewart—Whatever is done the fact is that in these traverses of lakes the Geological Survey have within the last few years done some work which more properly belongs to surveying than it does to geology. I think they have devoted more time to the traverses of lakes than to the geological features of the country, and in that case I think we might insist on having a surveyor appointed on their staff.

Mr. Drewry—In that clause of the Geological Survey Act proposed they had power to make topographical and geological surveys coupled with the power to plant marks to perpetuate these surveys, and we fought that, so that now if they do traverse a lake they have no right to tie them in.

The matter was then referred to a committee.

The Association of Dominion Land Surveyors and the Association of Provincial Land Surveyors for Ontario having agreed to become affiliated, the following Rules and Regulations are adopted to govern the relations, meetings and all transactions of the affiliated Societies:—

RULES AND REGULATIONS.

1. The affiliation of the two Associations shall not interfere with the individuality or autonomy of either Association.

2. Each Association shall continue the issue of its annual report; the proceedings of the Convention of the affiliated Associations being published in manner hereinafter provided.

3. Each Association shall appoint a delegation of five members to represent it at the annual meeting of whichever Association is acting as the Convention meeting as hereinafter provided, the Committee formed of these delegations to be known as the Convention Committee. All matters of mutual interest between the two Associations to be decided by a majority of the votes of the said delegations. The chairman of the delegation of the Association at whose headquarters the Convention meets to be chairman of the above Convention Committee.

The proceedings of the Convention Committee shall be governed by the rules of parliamentary procedure, and a copy of the same furnished each Association, who may incorporate such portions of the proceedings as they may see fit in their annual reports. Each delegation to have five votes, either in person or by proxy. In case any member of the delegation finds it impossible to attend, his vote shall be exercised by the chairman of his delegation.

4. The Convention meetings shall commence in the year 1892, and shall be held each year thereafter. This meeting shall be called "The Convention of Canadian Land Surveyors." The first of these meetings shall be held in Ottawa, and the subsequent meetings shall be held in Toronto and Ottawa alternately.

5. The Convention Committee shall arrange the programme for the Convention, and all papers, reports, etc., which are sent to the two Associations, and which will be read at the annual meetings of Associations or appear in the reports of the Associations for the year in which the Convention is held, shall be submitted to the Convention Committee, and they shall select therefrom such papers, reports, etc., as they may consider proper to be read or presented to the Convention. All papers, reports, etc., shall, however, remain the property of the Association to whom they were originally submitted.

6. Nothing shall be presented to the Convention which properly pertains only to one Association, and all papers read and discussions by the Convention shall be such as interest or affect the profession of land surveying as a whole.

7. Each Association agrees to amend its constitution and by-laws where necessary, so as to bring these rules and regulations into effect.

8. Each Association agrees to say on the first page of their annual reports "Affiliated with the Association of Dominion Land Surveyors," or "Association of Provincial Land Surveyors for Ontario," as the case may be.

9. Each Association binds itself to admit any other Association of Land Surveyors in Canada to affiliation upon the acceptance by such Association of these rules and regulations.

10. Any proposed amendments to these rules and regulations after their acceptance by both Associations must be sent to the Secretary of each Association at least one month before the date of meeting of Convention, and such proposed amendments shall be set forth on the notices of Convention meeting.

11. All voting by the Convention Committee shall be an open or standing vote; a majority of the votes cast to decide questions.

12. Each Association agrees, and hereby binds itself to do everything necessary to strengthen the hands of the Convention Committee by supporting them in all matters which affect the profession of Land Surveying as a whole.

DISCUSSION WITH REGARD TO REGISTRARS' FEES.

The President—With regard to the fees charged in the Registry Offices for the inspection of a registered plan, as far as I can learn there is no actual legislation governing this point. The matter was brought to my attention last year, and, together with some members of the profession in Toronto, I waited upon Mr. Johnston, the Inspector of Registry Offices, and drew his attention to this point. In some offices I was credibly informed that the practice has been to charge twenty-five cents for each plan ; in others they claimed the right to furnish copies and charge certain fees. We contended that a surveyor should be permitted to examine and take what notes he pleased of a plan for ten cents if he did the work himself. He promised that the matter should receive attention at the meeting of this coming Legislature. I think it would be advisable in case such legislation be brought before the House this session that somebody on behalf of the surveyors should watch what they propose to do, and, if necessary, try and control it. It is hard to know what the registrars may do ; like the rest of the world I suppose they want to get as large fees as they can, and I think it would be in our own interest to watch any proposed legislation.

Mr. Miles—I never was charged anything at all in a registry office.

The President—But it is not a very pleasant thing to go into a registry office and be allowed these privileges as a matter of courtesy. It is a business transaction, and I think it ought to be settled on a business basis. We want to go in there and be able to say, We have a right to see this plan for so much.

Mr. Aylsworth—I think he has no right to allow any search to be made without the regular fees. I have usually paid twenty-five cents for seeing a plan and making a copy if I desired to do so.

Mr. Gibson—Ten cents is the legal limit.

Mr. Aylsworth—Is there any authority for that ? Our President says there appears to be no fixed rate.

The President—Mr. Johnston told me that. The objection he raised was this, and I think it may have been fairly raised by some registrar, he did not believe it was in the interests of the public to hand a plan to anybody who came in and asked for it. Supposing he begins and makes a copy of it ; he pins tracing paper over it and so on, and might perhaps keep it an hour or two, and somebody else might come and want to see it. That was the objection I had to meet.

Mr. Gibson—Surveyors must have the plans ; they can't do their business if they don't have exact copies of them.

The President—I think it would be well to appoint some one to watch any legislation of this kind that may be going on at this session of Parliament.

Mr. Bowman—With regard to the appointment of registrars, the custom has been to appoint some politician who probably knows nothing at all about the business. Now, I think there should be some movement made to have those who know something about registry offices appointed as registrars. It should be a regular salaried position to which a man could have a chance of rising. If a surveyor wanted or chose office work, there should be some probability of his getting up to the top of the ladder through time. The fees are altogether out of proportion to the work that is done, and I think surveyors should have the preference.

Mr. Aylsworth—Perhaps when we are incorporated we will have more influence with the Government. It is a matter under the consideration of the Legislature to fix a salary for registrars and sheriffs and have all the fees of the office funded. My impression is that that would be better than the present system.

PRESIDENT'S ADDRESS, 1891.

GENTLEMEN OF THE ASSOCIATION OF PROVINCIAL LAND SURVEYORS OF ONTARIO:—

We are once more permitted to meet together in health, strength and the enjoyment of those faculties which have been bestowed on us, for which may we all truly thank God.

I have much pleasure in welcoming you to this our Sixth Annual Meeting, and hope that, like those meetings which have gone before, this one may prove instructive and useful and be another firm step in our upward course. I have to record the loss the profession and our Association has sustained in the death of the late Mr. Hugh Wilson, who died Nov. 7th, 1890, in his 61st year. Born at Lachute, Que., in his younger days he had to earn his living. After fourteen he was articled by Capt. Quinn, of Lachute, as apprentice to R. F. Andrews, of Montreal, to learn the trade of mathematical instrument-making at $4 per month and board. After five years, ill health made him give up business and he went to the lumber shanties for the winter. Then he became a student at Rockwood Academy and finally at Toronto University College. He took his P.L.S. in 1858, and became a member of the Board of Examiners about 1867, and, in 1874, a Fellow of the Geological Society of London, Eng. Mr. Wilson spent eighteen seasons on Mining and Government Surveys on the north shores of Lakes Huron and Superior, and enjoyed the reputation of being among the best posted men in the country as regards the resources of that region.

On considering what form my address should take, I have thought it would not be out of place, now that we are six years old, firstly, to

invite you to take a retrospect of what our Association has done in the past; secondly, to enquire what there is still for it to do.

On looking over our Proceedings of the last five years, one cannot but feel considerable satisfaction at the very creditable showing these five Reports make, and certainly, to every surveyor in the Province, they must afford a very interesting and useful volume; but it is deeply to be regretted that it is not to be found on every book-shelf. While on the subject of our Report, would it not be well for us to consider the adoption of a uniform binding for our Reports, say in volumes of five years each? No doubt, a considerable saving might be made by having a large number done in the same style and at the same time. I want, however, to look a little closer and see what these Reports contain and what subjects are dealt with. I find some forty papers have been presented on various subjects, including Land Surveying, Bridging, Road-making, Drainage, Instruments, etc., etc. Our Standing and other Committees have also made valuable reports on the same and similar subjects. All of which have been the outcome of considerable personal labour on the part of those who prepared the papers and of concerted effort on the part of the Committees from whom the reports have come.

During the first years of our existence the Survey Act was revised and the standard of examination was raised, which, with the kindly assistance of the Hon. The Commissioner of Crown Lands and the Board of Examiners, became law. The laws on drainage were also under careful consideration, and certain amendments were obtained. In the matter of Registered Plans, this Association has laid down certain conditions as to their preparation and to the amount of survey necessary, which are greatly to the point, but which might reasonably be even further extended.

The Boundary Commission has also been taken up, and it is to be hoped that a matter of so much importance will not be dropped by this Association until it be fully demonstrated that no good is to be looked for from it. For my own part, I would say that I look for the very greatest good and much satisfaction to the public at large from a scheme such as Mr. Ogilvie has outlined, not only in matters of survey, whether public or private, but also in matters of drainage and of local improvements where disputes arise. Many other matters of technical importance have come before us. Instruments, ancient and modern, have been exhibited, from an old compass and quadrant of last century to the modern solar transit, the Lugeal micrometer, and the rolling planimeter, with steel tapes and bands in considerable variety.

We must not overlook our exchanges. They now amount to —, being with the Associations of Ohio, Illinois, Michigan, Indiana, Arkansas, etc., etc. They form in themselves a most valuable addition to any surveyor's library, and at a cost of not more than the ordinary subscription to our own Association.

Nor has the past been entirely forgotten; in several of our President's addresses, and in other papers, much of the past history of our profession, and consequently of this country, has been brought again to the light of day—a history of which we may justly feel proud—a

history of the lives and doings of our predecessors which we may well imitate. But beyond all this, gentlemen, our Association has done something which, to my mind, is worth all the rest put together; it has brought us together, man to man, and face to face; it has brought us to know each other, to know the sound of each other's voices, and has created a bond of Fellowship which must raise us in our own and in the estimation of everyone else

Now, let us inquire what is still to be done. There are still a few more surveyors in the Province to be brought into our Association. I think we can show them just and good reasons for joining, and surely no one having once joined will seriously think of leaving. Some, no doubt, cannot always manage to attend our meetings. Do not, therefore, let those of us who do attend, look down upon, or think less of those who are not so fortunate, but let us try and make our Reports all the more attractive.

We have several important matters still incomplete. The Boundary Commission is to come up at this meeting. The proposed affiliation of the various Associations of the Dominion is to be discussed. It comes to us this year in the form of a deputation of the Dominion Land Surveyors' Association, from Ottawa, in which, I am glad to see, are some of our own members. I would bespeak for them a hearty welcome and a fraternal and courteous consideration of what they come to propose.

Though much has been done in the Survey and Drainage Acts, they cannot, I think, be considered yet as quite perfect and are quite important enough to be made subjects to be referred to Special Committees to report upon. The papers on these subjects by Messrs. Gibson and Coad, to be read at this meeting, will, no doubt, prove valuable additions to the information we already have.

The most important subject, however, which is to come before us, is that of Incorporation. It is one, the consideration of which is the natural result of association. In other Provinces, it has already been inaugurated; in some of these where incorporation came first, association naturally followed and I cannot but think that whichever one comes first the other is sure to follow, be it sooner or later. A paper on this subject will be presented by our eloquent *confrère*, Mr. J. P. B. Casgrain, who, being a member of the Incorporated Society of Quebec and of the Association of Ontario, will be able to put the matter in a practical and clear manner before us. This is, I have said before, a most important subject, and its adoption or rejection should not be hastily or carelessly gone into, as it will inevitably be a turning-point in our career.

In conclusion, I wish to thank the officers and committee-men with whom I have been associated this year, particularly the Secretary, Mr. A. J. VanNostrand, who has worthily filled the place of our first Secretary, Mr. Willis Chipman.

Finally, gentlemen, I would invite your attention to the various matters to be brought before you, trusting that your deliberations may successfully lead to the building up and establishment of our profession on a sure and permanent foundation.

PAPERS.

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

PRACTICAL WORKING OF THE DITCHES AND WATERCOURSES ACT.

By RICHARD COAD, P.L.S.,
Glencoe, Ont.

Last year the Committee on Drainage made some suggestions as to certain sections of the Ditches and Watercourses Act that were not good, or might be improved by amendment, and I have heard opinions expressed by lawyers, as well as members of our own profession, that this Act from one end to the other is bad, and unworkable in some cases. Be this as it may, the object of the Act is a good one, and as it is one of the ways or methods provided by means of which individuals may the better drain, improve and cultivate their lands, we must accept it as it is till we get something better, and in this paper I will endeavour to set forth a small part of my experience in working under it, commencing from the time the engineer receives the notice (Form C), mentioned in Sec. 8 of the Act, from the municipal clerk.

On receipt of the notice or requisition for the drain, I mark on it the date, and appoint the day for attending at the locality, within the time limited by Sec. 6, and endorse the same upon the notice, and send to the clerk the requisite notice of such appointment, and at the same time (although not required so to do) I always send a similar notice to the individual calling the engineer out, as many of the persons who make use of this Act do not have a daily mail, and many of the township clerks are similarly situated, and by the time the clerk receives the notice from the engineer, and the applicant from the clerk, it is often too late to give the proper notice to the individuals interested, and it has frequently happened that I have arrived at the place and been unable to proceed with the examination and survey from this cause.

On arriving at the ground, I always ascertain if the *formalities* as to preliminary meeting, notices, etc., have been carried out to the letter, and, if everything is regular up to that time, I proceed to make a preliminary examination of the locality and ascertain how many owners' lands the ditch will require to be extended through, and thus

see if the requisition is sufficiently signed for the carrying out of the scheme. According to the reading of the Act, Sec. 6 and Sub-Sections, the clerk should not file the requisition unless sufficiently signed; but as the application is generally written out by the applicant himself, who is usually not very well posted on the Act, and probably guided by an old copy of it, without amendments, it is often very difficult for the township clerk to know whether the requisition is a proper one or not, and he invariably sends the copy on to the engineer, and the engineer can only determine by an examination of the locality. The engineer cannot be too particular in seeing that all the steps taken by the applicant have been in accordance with the course laid down, and that every step laid down has been followed, as there is usually one, if not more, persons on every drain of this kind who is ready to cause trouble, if the slightest inducement is offered. The judgments on decided cases mentioned in the report of the Drainage Committee of last year also show the importance of this. If the proceedings so far have not been regular, I point this out and direct the parties where they have erred, and the preliminaries in part or in the whole must be gone through in the regular way before the survey is proceeded with. If everything has been regular, I next hear what the parties have to say, in accordance with Sec. 8, and generally find that to get through this part of the programme in a satisfactory manner is more difficult and often takes longer than making the survey. Usually the smaller the job the greater is the amount of quarrelling and jangling to be done over it on the part of the neighbours interested; and in many cases it does not take long to ascertain that the cause of the engineer being called out is not for the purpose of procuring the better drainage of land on the part of the applicant, but that he is at variance with his neighbour from some cause far remote from drainage, and this means is taken up in hopes that he can in some way get the start of him as it were.

I have found, however, that in many cases there are some points rather difficult to decide as to what is best to be done, and as many of the parties are not at all acquainted with the Drainage Act and the engineer's duties under it, and they will tell him that if he does *so* and *so*, they intend to appeal against the award. I always make it a point to take a copy of the Ditches and Watercourses Act with me, and when points arise, as to where the people have a wrong impression of the Act, engineers' duties, etc., I read to them the sections relating thereto. I always try to have the people understand what the engineer's duties are in the matter, and then let them see by what I do that I intend to follow out the course as laid down as nearly as I can, and intimate to them that if they wish to appeal to the county judge when the award is made out, that they have that privilege and are quite at liberty to do so, so far as I am concerned. Where I have done this, I have had few or no appeals, as people are not generally slow to see that the engineer understands what his duties are in the matter and that he intends to carry them out.

I always listen to what each interested individual has to say in the matter, however unimportant it may seem to me at the time, as the

person who has anything to tell in the matter usually thinks it of the utmost importance, and is very necessary to a proper solution of the case. Be this as it may, it relieves him to express what he knows or does not know in the matter and does the engineer no harm. Where there is more than usual jangling and difference of expressed opinion it may be well for the engineer to examine the parties on oath, and reduce the evidence to writing as he is authorized to do. I have never done so, however, as it is usually inconvenient to do this and would in many cases be a waste of time, but in some cases I have no doubt it would have a salutary effect, and be the shortest way to dispose of the preliminary talk if it serves no other purpose, and allows of the work of survey to be proceeded with. I might here say that I always rely upon my own examination and levels of the locality rather than upon any evidence given on any point that may have a bearing on the case.

When the drain in question is to be a long one there is generally only the one course which can be followed, and *drainage* is generally the object sought; but with short drains it frequently happens that one of two outlets may be chosen, probably one on the applicant's own land by a little deeper digging, than by another course through his neighbour's land. I always take the view that where a man can get an outlet on his own place with a reasonable amount of labour he has no right to bother his neighbour about it, when his neighbour is opposed to it. I have sometimes, where there was a dispute over two routes, made a survey of both, and after considering the advantages and disadvantages of each, after figuring the same up, have decided in the office which one to adopt, and made the award in accordance therewith.

Methods of making the survey have been fully described in previous papers by members of this Association, I will therefore not enlarge upon this part of the subject.

When the drain is located I make my examination of the lands for the purpose of ascertaining the amount of benefit to be derived by each parcel that will be effected by the proposed work; and in doing this I am assisted very much by the fifty-rod limit of benefit set forth in Sub-Sec. 2 of Sec. 8 of the Act, and while many farmers and lawyers and even engineers doubt the justness of this limit, yet it defines the engineer's duties in this respect very closely and much simplifies the apportioning of the work. Again, I always maintain that the intention of this Act is not for the purpose of carrying out large drainage schemes as some would attempt under it, and the introduction of the fifty-rod limit in 1887 clearly points this way.

I generally find that where water is brought down from a considerable distance above the land of the person applying for the drain, as is often the case, that the applicant and parties below are of the opinion that those parties up the drain can be made parties to the award. This, of course, is a mistake, and if the engineer does not want to leave in the minds of the parties impressions that he has peculiar ideas of apportioning a ditch, he should be careful to point out how he is limited in this respect to fifty rods. I might here say

that the case just referred to is one which causes a great deal of trouble, and I have failed as yet to apply the Act to the case in a satisfactory manner, as the parties owning higher lands will throw their water down upon the lower and frequently more level lands and will not sign a requisition or assist in any way to carry it off. There is often sufficient fall from the upper to the lower man's land to drain it by flooding the lower, but he cannot come at the upper parties further than the fifty rods for benefit, and in fact on account of the large fall on the upper land a drain on the lower land might benefit only a few rods within the meaning of the Act, while several hundred acres of land may send their waters down as is the case in many instances, and the lower man is powerless to do anything in the matter but dig a ditch through his own land sufficient to carry all this water, which in most cases is unjust, otherwise he must sustain damage, and then he may come upon the parties above for causing such damage by the proper course of law.

It sometimes happens that an individual having considerable low, flat land applies for an outlet, but wishes the survey to come only up to his line, saying that he will ditch on his own place himself, and while the construction of the ditch only to the line would perhaps, regarding strictly the fifty-rod limit, benefit those lands through which the ditch run more than the land of the applicant, yet by the applicant continuing the ditch across or partly across his land to drain some low swamp would receive much more benefit by the construction of the outlet part than the other parties, and he would have less to do. In such cases I consider the drain as continued up over or partly over the land of the applicant to the part to be drained, and then assess him for benefit so received within the fifty rods of this drain.

Again it sometimes happens that the engineer is called out where there is clearly no necessity for it as before intimated. When I find that such is the case, instead of setting the matter aside and awarding costs against the applicant as might seem right at first, I generally, if there be any excuse for a drain at all, make a survey and an award by which the applicant party pays expenses and does the bulk of the work; but I always make it a point to award a part, however small it may be, to the second party, as if all is awarded to be done by the applicant he will find that he has made nothing by his case, and the chances are that he will not do his ditch. And the object in giving a portion to the second party is to make him an *interested party* within Sec. 15 of the Act, and thus enable him to enforce the carrying out of the award if he so desires.

Another particular case where we were called upon to make an award may be interesting, and I mention it here as we were somewhat in doubt about it ourselves at first as to our power to act in the matter, but the case was appealed to the Judge who sustained the award, and the point may be of use to others under similar circumstances.

It was in a locality where the land is even on the surface with a uniform fall in a south-westerly direction, but the fall in a westerly direction was at the rate of about four feet per mile while that southerly was about one foot per mile. The main outlets for the locality

were large drains running in a westerly direction, constructed under the Municipal Drainage Act, one along the road in front of the lots and another through the lots, parallel with and about 140 rods back from the front.

The owner of the higher of two adjoining fifty acre farms called the engineer on to lay out a ditch along the line running north and south to the main outlets. He made a survey for three separate drains all along the line, one starting sixty rods back and running north to the outlet in front, another starting fifty-six rods north of the main outlet through the lots and running southward to it, another starting sixty-four rods south of and running northward to the main outlet. We awarded that each of these several drains should be dug by the parties on the upper and lower side, as we thought right. The man on the lower side appealed against the award, stating as one of his grounds of Appeal that the Act did not contemplate line ditches. The Judge visited the locality with the engineer, and as before stated sustained the award in its entirety and making appellant pay all costs.

Sub-Sec. 3 of Sec. 8 says that the engineer may by his award direct that any portion of such ditch or drain may be constructed as a covered drain, etc.; and while I am of the opinion with regard to the meaning of this section expressed in the report of the last Drainage Committee, that the Act does not contemplate the enforcing of the putting in of tile or of covering a drain, I find in many cases that it is advisable to do so in parts of a drain, but I also find that it is best to have them put in by one man and not by the different persons at different times. It is frequently found when an upper-land man wants an outlet through the lower farm of his neighbour that the neighbour protests strongly against the cutting of an open drain through his well-kept fields, and insists that if an outlet must be obtained it must be under ground. In quite a number of such cases we have ordered that the parties above procure and distribute along the course of the drain on the land of the lower man a certain number of tile, and that he—the lower owner—put them in and maintain them. Of course the number of tile to be supplied by the upper parties will be greater than if they had to put them in and maintain them. However, in doing this as well as in awarding an open drain, the engineer must be careful to give all parties whose lands will in any way be effected by the keeping open of any such drain a portion of it to maintain, as it will be observed by Sub.-Sec. 4 of Sec. 4 that only an owner whose duty it is to keep any portion of such ditch or drain in repair can enforce the putting of any other part in repair.

It may be departing somewhat from the subject of this paper, but I have been asked how I examined or ascertained whether tile were put in in accordance with the award. To do this exactly would be a somewhat difficult task when not on the ground to see it put in, but our practice has been to dig down in a few places at irregular intervals to examine with what care they have been laid as to jointing, etc., and to use a steel rod marked off in feet and tenths which can be readily shoved down through the loose soil to the recently covered tile, measure the distance to the surface from the top of the tile,

and to this add the outside diameter of the tile, and add this sum to the reading of the rod held on the surface where the measurement was taken. This done at irregular intervals and compared with the grade line will enable a very good opinion to be formed as to whether they are properly put in or not.

As before stated, in my opinion the Ditches and Watercourses Act is not intended for large drainage schemes, as all such should be carried out under the Municipal Drainage Act, so that all parties may be dealt with justly, which cannot be the case in drains of any considerable length, or for the drainage of any considerable area, under the Ditches and Watercourses Act. Notwithstanding this some municipalities appear to have a great aversion to the Municipal Drainage Act, as they consider the extra expense in connection with carrying out any work under it as money thrown away, and they encourage and allow of the carrying out of all schemes, no matter how large, under the Ditches and Watercourses Act; and by so doing, and carrying on this system from year to year, we are necessarily getting some of the drains somewhat complicated, as may well be imagined. As at first a drain is asked for and an award made out, assessing as laid down by the Act, the next year, or perhaps the same year, other parties wish to make use of the drain and apply to the council, if they cannot get enough to sign the requisition, and a new award is made out. These last parties should of course enlarge the former drain—if insufficient—on account of the additional water brought to it, and the whole award must be changed. Again, another drain may be asked for with the first or second drain as an outlet. The awards again are effected, and so it goes. Each case of this kind must be determined on its own merits. If the first drain is to be enlarged by the entrance of the second drain, such enlargement should generally be made by the second parties, and the first parties should maintain as in the original award, or as may be set forth in the second award under the altered circumstances. When the drain as at first constructed is of sufficient size to carry the additional water of the second drain we sometimes award that the parties on the second pay so much money to the parties who constructed the first drain for the use of the same.

Another case that comes under our attention frequently is where the main outlets are constructed under the Municipal Drainage Act, and were sufficient for carrying the water brought down to them at first, but on account of altered circumstances, and getting somewhat out of repair, the drain gradually gets too small for the work required of it, and while in this condition some one applies for a drain under the Ditches and Watercouses Act for the drainage of a considerable area, the outlet to be into the main drain just described. The question that presents itself here is, Shall I lay out a drain that will cause the lands along the main drain to be further injured by the additional water? or shall I not make out an award at all, even although the parties applying for it may be parties assessed on the main drain? Of course I do not consider it advisable to continue the award drain over the municipal drain to enlarge it. Each of such cases must be

determined by itself, and in some instances where the additional water would be considerable and the parties along the main drain are opposed to its entrance I have not made out an award, but have recommended the parties to apply for an enlarging of the main drain first, or to get up a petition and carry out their scheme for drainage to a different outlet, where this is practicable, under the Municipal Drainage Act. Sometimes, where the additional water would not be large, I have made out the award, and as before recommended the outlet drain to be enlarged, which the parties may have done within a reasonable length of time, and the damage sustained in the meantime, if any, will be small.

In the matter of inspecting and letting uncompleted parts of drains, there is frequently some feeling not the best between the party requesting the inspection to be made and the person whose part is requested to be inspected. Those who have had experience in this matter know that often it is the case that a person who does not have his own portion completed in accordance with the award complains of some other part, generally lower down, and requests the engineer to have the same completed. I never consider that I am limited to the part complained of, and when I receive a proper notice to inspect any part I try to ascertain by letter whether there is *any doubt* as to the drain not being finished. If I am satisfied that such is the case I send out the requisite notices with instructions as to posting up, etc., to the party requesting the inspection. By doing this we save the expense of one trip to the delinquent persons. In our notices of letting the work, we always advertise that we will let the *uncompleted parts* of drain, etc. We have a regular printed blank form which we fill out for each particular case. Since adopting the method of advertising the *uncompleted* parts we have had much more satisfactory results than by specifying particular parts, as many who perhaps had made tolerably fair work of their parts but left it some slack, wonder if their portion is not included in those to be let, and they see that it does not before the engineer arrives. Where there is any doubt, before posting notices as to whether the drain is completed or not, we always make an inspection. Quite often when parts are complained of as not completed we write the delinquent party, intimating that his portion is complained of and that if it is not completed within a specified time we will be obliged to sell the work. This often has a good effect, and additional expense is avoided. We always have a contract drawn up and signed by the contractor, sometimes with a bond to insure the completion of the work within a reasonable time. Occasionally, for satisfactory reasons, we extend the time for completing the work by the party to whom it was awarded, generally in such cases requiring a bond to insure such completion.

A somewhat peculiar case came under our care some time ago, where an individual called for a drain where it was necessary to continue the same through a piece of land still held by the Crown, and which would be largely benefited and improved by its construction. We could not see how any part would be done that would be awarded against the lot. Fortunately the piece of land was small, and conse-

quently the ditch through it short and light, and we awarded it to be done by the parties above. Whether this was the proper course to adopt or not we are not prepared to say, but in this particular case it was the easiest way out of the difficulty and all went well.

On this same drain another point of interest has arisen, and, so far as we know, is still in dispute. The drain ran lengthwise through a lot owned by a person whom we will call "A," there being 144 rods of drain on the lot, of which A had to open up and maintain as his share for benefit a distance of 80 rods. He, instead of making an open drain as set forth in the award, put in tile without the consent of the engineer, and these tile prove defective or insufficient and impede the free flow of the water, and cause damage to the lands above the tile. While the tile is in the ground a railway company comes along and buys this whole lot and build their road through it and over the tile (not knowing it is there), and make their sewer-pipe culvert on the surface of the ground some three feet above the drain tile. Then the circumstances of the case are these: The railway company own the whole lot formerly owned by A. Their culvert through the track is not suited to the drainage of the land. The tile through their property put in by A is insufficient, and the lands above the head of the tile are damaged by the water impeded by the tile. What course is to be adopted to get the matter in proper shape? is the question I would like answered by this Association. We have requested the railway company to take up the tile and fix the culvert, but they may not do it.

I would just suggest, before concluding, as all who have had any considerable experience in these matters must know, that it is not now considered necessary to follow the natural watercourse in laying out a drain, as has generally heretofore supposed to be the case. The shortest, cheapest and best outlet, with the greatest amount of benefit, is the object to be aimed at, and to this the engineer is sole arbitrator; and if he shows good judgment in these matters his award will seldom be disturbed by a fair minded judge.

These are some of the points that have come up with many others during our practice, and although we may not have dealt with some of them as others might, I think I am justified in saying that our results have been tolerably satisfactory, and we think the Ditches and Watercourses Act, although by no means a perfect one, when not abused serves a useful end, and many farmers are materially benefited through its existence.

I would kindly ask of the members of this Association a full discussion on this subject.

DISCUSSION.

Mr. Gaviller—In regard to cross-examining witnesses under oath, my experience has been that it is better always to examine them under oath in order to provide against any appeal that may come up. I would make it a practice to take the evidence down, read it over to the parties and have them sign it right at the time. To what extent do you allow cross-examination, or do you allow it at all?

Mr. Coad—I don't like parties wanting to give evidence to think that I would at all like to shut them out from giving that evidence; and it saves a great deal of time often to let them have their say. That is the way I usually do, supposing they have any material evidence to offer, *e. g.*, if a man says, I will swear the water runs in this direction, and this is the way the drain ought to go, I let them say all they have to say, and then I take the levels and find out how it stands, and let them know what I find upon it.

Mr. Aylsworth—Under this Act, can an engineer legally order a drain to be cut through a ridge, where the work can be done much cheaper and make a better job, than by following the course of the water? Have there been any decided cases in that? It appears to me reasonable, if, by a small expenditure, you could cut a short ditch through a ridge and drain land just as well, this course should be followed; but I have always hesitated about that, because before this Act was enforced the courts forbade that sort of thing being done.

Mr. Coad—We have always thought it best to carry water to the nearest outlet, even if that were not the natural outlet; that is, if the cost were within reason. In a case I had a man called us out and we found the course he laid down was the natural watercourse, but it was in the suburbs of a village and ran through people's orchards, gardens, etc., and we told the man we did not feel disposed to carry it in that direction, when by taking it through a cut of three feet or so the drain would be shortened by about one-half and be dumped into a gully at the back of his farm, and we laid out the drain accordingly. He appealed to the county judge; the principal point in the appeal was that the natural course had not been followed, but the judge said he did not consider that any appeal at all. He said, I often set aside awards because the engineer follows the natural watercourse, and he ridiculed the idea that an engineer should follow the natural watercourse, if his judgment shows that it is not in the interest of the parties, and if a more efficient and shorter outlet could be obtained on a man's own land. He was very decided about that, that if a man can get any outlet at all on his own property, he has no right to bother his neighbour. In a case where it extends beyond the limits of one man's land, you would have to be very careful to get an outlet that would give better satisfaction than the natural outlet, because people would be more arbitrary.

Mr. Ross—With regard to maintenance, would you make the maintenance different to the way the work was performed in the first place? I understood you to say you awarded parties to maintain so that they would have an interest in it.

Mr. Coad—That is where we put in tile.

Mr. Ross—Is there any authority in the Act for that?

Mr. Coad—The way the Act is, we consider we have not exactly authority to award a man to put in tile at all; it says you may put in tile, you might recommend that tile be put in. I think that is one section in the Act that should be changed. I think the section in the

Act should be changed also about making it compulsory for a man to maintain a drain that he opens.

Mr. Ross—We have got to take the Act the way it is.

Mr. Coad—Of course, we invariably make a man maintain a drain that he opens up where it is an open drain. About putting in tile, a great many people would prefer to have tile in, and probably we infringe a little on what the law really lays down. We just simply tell the parties that, if they appeal about the matter, it may be found to be wrong, but they don't generally appeal.

Mr. Bolton—I have adopted the method of making the parties through whose lands the drain passes maintain the drain after it has been completed, with the exception that the party above is to supply any tile that may become defective. As to awarding a closed drain, I think, by the reading of the Act, the engineer is empowered to do it.

Mr. Coad—If you read the whole of the Section, you cannot say that he shall; I think it would be over reaching our authority.

Mr. Gaviller—In cases where it would not be a fair division to have the maintenance allotted to the party who dug the drain, or a large part of it, it would be far more just to allot the maintenance to some other person. (Reads from Act.)

Mr. Coad—I think that clause in the Act makes it imperative that, if a man open up a certain piece of drain, he shall maintain it. I think that is wrong. Supposing a man up a stream has to dig twenty or thirty rods on his neighbour's land down stream, that neighbour may be an arbitrary sort of a man and may make it his business to turn in cattle, sheep and hogs and keep them in that field because his neighbour has to keep it open; whereas, if a man had to maintain on his own land, nine times out of ten it would be more just.

Mr. Taylor—In case of a house drain, digging from a cellar for instance, would you consider that would come under the Ditches and Watercourses Act, there being no water on the surface?

Mr. Coad—I would not think it would come under the Act. There is no doubt that the person applying would require to do all the work extra over and above a fair depth of drain for the draining of the land.

Mr. Taylor—This man wants to lay a tile drain through his neighbour's land, and his neighbour forbids him going on with the drain.

Mr. Coad—I don't think it would come within the Act; but I think that Sec. 593 of the Municipal Act would apply.

Mr. Taylor—I was under the impression that an engineer was obliged to follow the natural watercourse, and in a case I had a short time ago I made my award in that way. The award was appealed against, and the judge directed that the course should be cut through a ridge, a shorter distance somewhat, leaving the expense about the same.

Mr. Coad—I think it is pretty generally the opinion of judges that when you go into a neighbour's land to construct a drain, you want to construct that drain as straight as possible, even if you go somewhat out of the natural watercourse, if it is to the advantage of that neighbour to have it so.

Mr. Ross—As regards the letting of uncompleted portions, has the engineer power to let one uncompleted portion without letting all the uncompleted portions?

Mr. Coad—I suppose he would. I think the Act means that, if any party on a drain complains of a piece not being completed, you can advertise that.

Mr. Ross—I have done so, but I don't know that it is strictly right. Sometimes you cannot complete the upper parts of a drain until the lower part is completed. I don't think we have authority to let one part without letting the whole.

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

DIFFICULTIES IN THE SURVEY ACT.

By P. S. GIBSON, B.Sc.; C.E.; M.Sc. (Univer. of Mich.),
Willowdale.

(1) We may first mention those difficulties which naturally occur in reading any statute, and which have given rise to the understanding that the true meaning of an Act of Parliament is not known until a case under it has been carried to the Court of Appeal or the Supreme Court, or likely to the Privy Council. So that our law, like the British Constitution, is founded on the decisions of our higher courts and precedents. And we have thus to acknowledge the astounding fact that our most profound statesmen, after having prepared and passed a statute (aided by their Parliamentary supporters and Her Majesty's loyal Opposition), do not know what it means, nor does any one else, until some litigious person, often with more money than sense, for the benefit of the public at large, and more particularly for the benefit of the legal fraternity, puts a case through the mazes of the High Court of Justice, so called.

When to the above we have added the decennial consolidation of Public Acts, we have often confusion worse confounded. The original statutes, aided by their preambles, most persons with a reasonable education may have the conceit to think they understand, but when revised and consolidated it is almost a hopeless task, and even our legal lights do not, we think, indulge in such reading as a pastime. Another peculiarity and difficulty which it may be well to mention is, that while the surveyor must be well versed in the law and precedure relating to surveys, and in actual practice is invested, we might say, with all the powers of the judge, jury and counsel, and is expected to exercise all these combined powers and duties with such profundity and exactness that his work in the field will stand law, yet when in the witness-box he is *not allowed to give an opinion* as to the meaning of the statutes by which he made his survey.

The difficulties in reading "consolidated" statutes would not be so great if the statutes were *really consolidated*, and not, as often done, compiled. A proper consolidation would not be simply dropping the preamble, often the key to the statutes, and omitting parts actually repealed, but those parts of the statutes or amendments relating to the same subject should be brought together, and often by re-writing consolidate two or more sections into one; to meet this idea, it would be necessary to employ experts versed in the matter treated of in each statute, and not leave the work to lawyers alone,

who, however well up in legal forms, terms and phraseology, yet cannot be expected to have a proper and the necessary knowledge of the subject treated of under our statutes without which it is impossible to make a proper consolidation.

(2) Another difficulty is in determining in particular cases whether there is a statutory rule for making the survey, and this is sure to occur in the most important cases, since in simple cases there can likely be no difference of opinion; but where the Act is not clear, or is ambiguous, or does not really apply, there is room for litigation.

When to the above is added the want of a proper knowledge, in some cases, of the statutes on the part of surveyors, where they could by reasonable application be informed, it can be readily understood that serious consequences may arise, as surveyors are required to make surveys according to law, failing which they are liable to damages, cases of which have occurred in the Province. Again all boundaries legally established under any ordinance or Act remains good and valid notwithstanding the repeal of such Act or ordinance, so any Provincial Land Surveyor, in making surveys in the older townships, should make himself familiar, not only with the statutes in force in his own time, but also at former dates.

(3) In municipal surveys the question arises whether surveys made under the directions and orders of the Commissioner of Crown Lands are true and unalterable, as in the case of original surveys by the Crown; and it is a surprise to some surveyors that such a survey by themselves is sometimes set aside by the court or ignored by another surveyor; and more of a surprise if they cannot get their pay for the want of a Crown Lands Department certificate.

The same difficulty occurs in cases of the old Boundary Commission surveys. A surveyor meeting with monuments planted under the Boundary Commission, and using them as true and unalterable monuments, as in case of original surveys by the Crown, to locate other boundaries from, is sometimes surprised to find his surveys set aside and the Boundary Commission work treated about the same as an ordinary arbitration survey.

Under the municipal surveys a question might arise whether the council of a city, town or village can apply to the Government to have the angles of town lots fixed as in case of angles of township lots? Again, is the Act clear that in all cases concession lines can be defined?

(4) In the case of aliquot parts of lots the law seems clear, but when we come to apply it to double front concessions there seems to be a strange anomaly, as a half lot may sometimes have acres more than the other if ends are different and sometimes the same area.

(5) In the case of re-surveys of town lots the law says the surveyor shall follow the same rules as when making surveys in townships. The question arises do surveyors actually do so? How often do surveyors get off course of the base or governing line and run lines between lots? How often do surveyers in cities take the stakes on

the opposite side of roads as the best evidence as to a lost stake? When do surveyors enquire whether there is a governing line at the end of the range of lots from which they number? When do they make enquiry as to proof lines or ask whether the work should be done under the law regulating the surveys of single fronts, double fronts, or sections, and in taking aliquot parts of lots do they enquire if the survey is to be done under the Act for single fronts, double fronts, or sections, and do they often enquire whether the fronts of the blocks have been run, or whether they would come under the law regulating the surveys of alternate concessions or cases where the concession lines are lost or obliterated, and do surveyors keep the law as to administering oaths to each and every person they examine, and filing the same?

(6) In running lines between lots it is necessary to find the course of certain governing lines. At first sight it might appear that the governing line, if crooked, should govern, and only by referring to a different part of the Act is the case made clear. Sometimes in getting up the governing line it is found partly cut off by a lake or river, or only partly run, and sometimes it is difficult to say which are the front and rear ends of the governing line and in some cases to say when to use a proof line and to say what is a proof line and when it should be used in preference to the front of the concession, and in case of alternate concessions how you would run lines when both ends of concession are bounded by a lake or river, etc., and no proof line.

(7) A difficulty sometimes occurs in defining the front of a concession, as in the case of the three concessions from the Bay in the township of York, and only by reference to the early surveys can they be determined.

(8) In the amendment to make a post on opposite side or centre of a concession road the best evidence in certain cases the expression "alternate concessions" does not appear to convey a clear idea.

(9) Sec. 61 of the Act is an illustration of a consolidation hiding the meaning of the Act, and a casual reader might wonder why it was inserted. This section applies, I believe, more particularly to townships which in the original surveys had the side lines of lots only run and not the concession lines, and was intended to regulate the manner of surveying the concession road allowances, but it would require a good deal of study to make such intention out of this section.

(10) In preparing plans of town lot subdivisions is it strictly legal for the name of a firm to be put to the surveyor's certificate? One member of a firm cannot give evidence as to surveys done by other members of the firm and the wording of the Act does not seem to justify the use of the name of the firm.

(11) A question might arise as to re-surveying town lots which were actually not staked out on the ground, or only partially so, and as to the re-surveys of town lots which in the deeds are described as starting at specific distances from some angle of the block or section, which is not an uncommon thing in deeds of subdivisions of lots before 1868.

(12) Surveyors are sometimes surprised to find that evidence taken by themselves or other surveyors, and produced by them from the Registry Office, is not presentable in court. The Statute is clear as to the duty of the surveyor to take evidence under oath from every person he examines as to boundaries, etc., and provides for the same being filed in the Registry Office and being produced in court. The difficulty arises partly from the defective character of the affidavits, many of which bear on the face of them clear evidence that they are not prepared with a view to determine the actual facts but to prove in a one-sided manner some boundary or post. Surveyors cannot be too strongly impressed with the idea that the position they hold as Government surveyors is a responsible one, and in doing their work they should be governed by a high sense of honour, and their characters should be above suspicion.

(13) Among the difficulties met with by surveyors none likely give rise to so much unsatisfactory surveying and litigation as surveys in cities, towns and villages, and it must necessarily continue so until the matter is taken up by each corporation and a complete plan of each of such cities, towns and villages made as partially provided for under the Statute, and boundaries planted for reference and to fix original angles, etc., and to govern future surveys, and the whole then established by Act of Parliament.

Special Acts of Parliament are common for townships under which stone monuments are planted at the angles of blocks and other points which form a basis for future surveys without much trouble or fear of litigation.

(14) In this paper I have merely made suggestions as to some of the difficulties in the Act, as I found, should I enter into a discussion in detail of the many points, this paper would be unreasonably long, as it appears to be growing now. So I shall only add that I am of opinion the Act should be re-written under the supervision of a committee of surveyors from different parts of the Province assisted by a Government law clerk, so that instead of being a maze to the profession generally and a stumbling block to the student it might be made reasonably clear. But as the Survey Act is not much worse than many of the older Acts which have been consolidated and re-consolidated, I suppose a re-written Act is too much to be hoped for.

REMARKS OF MR. GIBSON IN ADDITION TO HIS PAPER ON "DIFFICULTIES IN THE SURVEY ACT."

(*Clause 1.*)

With reference to this subject of reading the Statutes, I asked a lawyer: "How do you manage in reading the Statutes?" He said: "I never dream of reading up an Act unless I go away back to the first Act." The difficulty with surveyors very often is that they have not a complete library of the Statutes. I myself have attempted to get up such a library for my own personal benefit, but it is impossible

for every surveyor to do that; and if they had a library it is a question whether they would go into it and study it up as thoroughly as they should do. I know of a case in the Court of Chancery; I was called as a surveyor on the matter, and I met a Q.C. from Hamilton, and he said: What is the meaning of such and such a section of the Act? I said: If you get me the original Act I will soon show you. He got the Act, and I said: Will you please read that preamble? And he said: Oh, I see how it is now. Very often the preamble is the key to the whole thing. What is the meaning of "Consolidation"? It is supposed "to make it clear and plain," whereas the fact is, those parties who consolidate these Acts don't understand them, and very probably they simply compile them. Take the Survey Act, passed previous to 1800. From that date it has been consolidated and re-consolidated, enacted and re-enacted, until now it is almost a jumble, and it is a burden for a person to read it. At one time I was under the impression it would be as well to let it alone, for it will give us more business—I think that is the lawyers' idea.

(*Clause 2.*)

I think there is a case in which that matter was brought up—the case of Stafford *v.* Bell. The courts tell us distinctly that a surveyor making a mistake in making a survey, and the matter comes up in that way, it is not a question often of how you made the survey, but whether the law applies at all—is there a statutory rule for it. In that case the court ruled that there was no statutory rule for that class of surveys.

(*Clause 3.*)

It was supposed at one time among us that every municipal survey made by the Crown was binding, the same as the original surveys by the Crown; but now that won't answer, because cases have been decided against us.

If you are ordered to make a survey of a certain line in accordance with the law, and if it can be shown that you have not complied with the law, your survey is set aside at once. In the same way with a municipal survey. If you have not taken the proper evidence it will be set aside at once. Where I know the law does not apply, I have often refused to make such surveys.

It is the impression that if they have a Boundary Commission survey to work upon, they can base their work upon it. I have had cases myself of that kind that I have ignored; they were governing so far as they related specifically to a certain thing, but you could not use them to work upon. Take, for instance, in the township of York. There was a disputed line where it was decided by an arbitration. The question came up whether that would govern or not. Of course it will govern if it is found that the evidence that the arbitrators acted on was good and sufficient. It is our duty to refer to the evidence that has been filed, and see that it is good and sufficient to rule; and if it is simply a compromise, it is only binding so far as it relates to that line.

In making municipal surveys the question might arise in relation to stakes whether they are Crown stakes or planted by private individuals; and you would require to look carefully before you would proceed. It is a question of the wording of the Act.

And then as to the question of whether the Municipal Act will apply to all concession lines. For instance, if you want to define concession lines between two points, and there is only one point in that concession that is not obliterated, or there may be the whole line there until you come to the last half mile, the common practice is on the supposition that the best evidence that can be got of a line is the production from two well defined points.

(*Clause 4.*)

For instance, a lot on the one front is a chain wider than on the other. The Statute says you are to chain through, and give equal depths to each. Supposing you buy the north half of the lot, you get half of the area of the whole lot; but in case you take the east or west, you don't get the half area.

Mr. Dickson—In one case of a lot wider at one end than the other, a party wanted to purchase the east half of the lot from the Crown Lands Department; and I made the plan showing that, and it was returned as not being correct; it did not give half the lot, and I had to send in an amended plan. They wanted equal areas.

Mr. Aylsworth—They could only do that in case the whole lot was patented: if one end had been patented, then it was out of their power to deal with it.

Mr. Stewart—In regard to aliquot parts of lots I think it states that the lines shall be run so and so parallel to the division line. Now, in some cases the last lot is wider perhaps in the rear than it is in front, and it has been my practice to give equal areas.

Mr. Gibson—The Statute says that you shall chain the two sides, take half the depth, and draw a straight line between them in double fronts.

Mr. Stewart—You shall run parallel with the governing line. The law says you must chain through, plant a stake in the middle on either side, and a straight line between those shall define it. I am not speaking of a double fronted concession, I am speaking of one of these sectional surveys. I suppose there is no doubt that half means half the area. Half the area is what we are to give. Now how are you going to do that? Are you going to chain the front and rear and take half, or are you going to make up the area by giving more on one end?

Mr. Gibson—I think then it depends upon how the description reads in case of the last lot in a single front concession or section.

Mr. Stewart—Just the ordinary description.

Mr. Gibson—It is a defective description then.

Mr. Stewart—I contend that the Act does not apply to dividing up of aliquot parts of lots. I would like to know of any authority showing that the Act refers to aliquot parts of lots.

Mr. Gibson—There is where the defective description comes in. Parties purchasing should see to having a proper description. If I were given a case like that I would run it both ways. From 1819 to 1829 the surveys of the double fronts were made, then there was another Act passed in 1849 saying how it should be divided; that was a long while after these surveys had been made by the Crown, and questions sometimes arise under what Act was a survey made.

Mr. Davis—Double fronts were supposed to be discontinued in 1829, but they were not. I came across a case in the township of Puslinch where in 1835 your father laid out several concessions.

Mr. Gibson—I believe there is a list in the Crown Lands Department showing what are supposed to be run as double fronts. Double fronted concessions are those in which the stakes have been planted on both sides of the road; and they certainly make plenty of work for surveyors and lawyers.

(*Clause 6.*)

In surveying along one side of a street, how often do surveyors take the stake on the opposite side as the best evidence of a lost stake? Yet that appears to be the law; you are to follow the same rules and regulations in making a survey of town lots as township lots. I think myself that the law should be changed with reference to making surveys of town lots; because the rules do not apply. Up to a few years ago there was no actual statutory rule for surveying town or city lots. I was asked in court one day about it, and I said, strictly speaking there is no practical rule for re-surveying town lots where surveys have been made by private individuals; the law is clear as to where the Crown subdivided it.

(*Clause 10.*)

It is a common practice to sign the name of the firm isn't it? but the form of the certificate is "I."

Mr. Foster—We sign the name of the firm to a certificate.

Mr. Gibson—Is the Statute clear that you have to say "Unwin, Foster & Proudfoot" on the plan?

Mr. Foster—I don't think it is, but there is nothing against it. The three members of the firm would be responsible, I presume.

Mr. Gibson—It is not the responsibility, it is the legality. How is it in the Land Titles Office?

Mr. Foster—By the individual; that is the rule with Mr. Scott. He always rules that it should be signed by the individual surveyor who has made the survey, and I think it is more correct to do so in every case.

The President—I may say that when this new certificate first came in it was the practice amongst the firms in Toronto to sign the plan strictly "I," and for probably a year at least after the certificate was amended the firms in Toronto signed "I"; that is, the individual member who made the survey signed the plan. But in the last year or two the old form has drifted back, and you find that the firm signs its firm name. Some people have an idea that in a firm of three or four they have three or four times the security for the correctness of the survey when the firm name is signed.

Mr. VanNostrand—It very often happens that a piece of work comes in in the spring and is not completed until fall; one member may attend to it in the early part of the year and another in the later part. Lawyers sign half a dozen members of a firm and I think they should allow us to reciprocate.

Mr. Gibson—The matter should be arranged so that there could be no question about it. The name of the firm governs the individual anyway; as Mr. VanNostrand says, two of them may have made the survey.

(*Clause 12.*)

In regard to these affidavits, if the person is dead and you present these to the courts, they will say, Oh, it is just a got up affair, and they won't take it; and yet we are compelled by law to take the evidence.

Mr. Foster—Does not the law make that evidence necessary and acceptable to the Court?

Mr. Gibson—They won't take it. The fact is the affidavit is a certain kind of *ex parte* evidence; there is no cross-examination to show that the facts were got at properly. I had a case where evidence was produced in court as to these points and they would not take it.

Mr. Butler—Is not a surveyor supposed to take the evidence of the opposite side too?

Mr. Gibson—Yes, he should do it. As to negative evidence, you will find that laid down in the decisions.

Mr. Gaviller—He has to come to a conclusion, and I presume he would take all the evidence to satisfy himself.

Mr. Gibson—He should draw the affidavit in such a way as to satisfy other people as well as himself. If you are in Manitoba and your evidence is required in court, a commission is appointed to examine you. The questions are drawn up and submitted to the other side, and they go over them all and see if they are all right, and those questions are submitted then by a lawyer in Winnipeg and they have to be answered pro and con, and those questions are submitted to the court with the answers and taken down as evidence.

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

CROWN SURVEYS.

By JAMES DICKSON, P.L.S., I.C.L.S.,
Fenelon Falls.

The subject upon which I have been requested to write a paper, viz., "Crown Surveys," is a somewhat delicate one for an Inspector of Surveys to take up, as it will be necessary not only to remark on the manner in which such surveys ought to be made, but also to mention a few of the inaccuracies and errors I have met with in the field.

It is not my intention to make this paper a long one, but confine myself to a few examples of how some members of our profession do their work, and then, very briefly, point out the manner in which Crown Surveys ought to be made.

I think you will all agree with me that the first object a surveyor should have in view is to keep up the standard of his profession. And no matter whether the commission he may have on hand is great or small, no matter whether the survey is of little or much importance, it should be his ambition to do it as accurately as possible. It should be his ambition to show the public that accuracy is within the compass of possibility. And leave everything behind him done in such a manner that there could be no room for either doubt or trouble in the future. Were this object always held in view there would be no necessity for any government to appoint an Inspector of Surveys.

I presume that it is not necessary to take up your time with a recapitulation of Departmental Instructions, as many of you have had experience in making such surveys, and no doubt those who have not are perfectly familiar with all the details.

I believe every person will agree with me that if there is any survey which should be made with perfect accuracy it is that of a new township, for to inaccuracy and ambiguity in original surveys are to be traced the beginning of most of those long and expensive law suits touching the ownership of lots and parts of lots which are almost constantly before our Superior Courts. During my own practice I have been engaged in a good many such cases, and I cannot recall a single instance in which there would have been room for either doubt or dispute had the original survey been correctly made.

Of course it is not to be expected that any surveyor, no matter how careful he may be, or how accurate his instruments, for as much depends on the integrity of his chainmen as on himself, and those he cannot have always under his eye, can cut up a township into 1,000 acre or 640 acre blocks, and have all his lines intersect at the exact

spot, but it is expected that every line will run straight from one intersection to another, and that the dimension of the lots and bearing of the lines in the field will be the same as those returned on the plan and field-notes.

Perfect accuracy is neither expected nor looked for, but perfect truthfulness is.

Some will say, Oh, the land is so poor there is no use in being too particular. To such I would simply reply, the quality of the land is something they have nothing whatever to do with in making the survey. Their duty is to carry out their instructions; that, and that alone, should be the only object in view. They should not lose sight of the fact that, although in many places the land is utterly worthless for agriculture, the recent discovery of valuable minerals has made it more than ever necessary that the surveys should be accurately made. In some of what seemed the most worthless townships has been found the most valuable nickel and copper mines perhaps in the world, and the surveys of some of the townships where those minerals have been discovered—but which were made before the inauguration of the present system of inspection—have been performed in such a loose manner that I predict, at no distant day, to hear of some of our legal friends reaping a rich harvest.

While discharging the duty of Inspector of Surveys I have been over a good many townships, and it has been my unpleasant duty to report a considerable percentage of bad work. It has been a matter of no small astonishment to me that some surveyors should leave so many errors, both of omission and commission, behind them, when they have been duly warned that their surveys would be inspected after they left the field before their accounts would be closed. While I find the greater part of the work now well done, there are still some who seem to think the Inspector will only go over the lines as a matter of form, and either not see, or wink at, irregularities, or, in other words, that he is either a knave or a fool. Such men should bear in mind the Inspector has a reputation to maintain; that he has been sent out at considerable expense, the Department having confidence in his integrity to report everything exactly as he finds it; that he must be no respecter of persons; that, while it may be in the interest of the contractor to slight his work, or leave some of his lines not run at all, to the Inspector it makes not the slightest difference whether the work is well or ill done, his pay and thanks are the same. The only difference it makes to him is this, where the lines are well opened and fallen timber, which must have obstructed the view, cut, his work is much lighter than where he is constantly either climbing over logs or parting brush, perhaps laden with snow or rain, which ought to have been removed when the survey was being made.

I shall now give a few specimens of what I have met with in the field, which were not laid down either in the field notes or in the plan.

I have found lines run straight to within a short distance of those they were intended to intersect, then suddenly bend either to the right or left, sometimes in the form of a bow, in order to strike the post; when, had they been run out straight, they would have struck from

ten links to five chains to one side—lines in which there were scarcely ten consecutive chains straight.

I have found the whole four posts at an intersection made of trees. A man could stand at any one of them, pay out forty links of the chain, and touch the other three. The post on one side of a concession line within twenty links of the guide post, that on the opposite side eighty links distant, the three upwards of ten feet out of a straight line, some posts standing at almost any angle with the line except the correct one, others tossed off the line, not even set up; bearing trees sketched in the notes for every post, whole blocks without a single bearing tree marked in the field, numbers of the lots not even posted; one line run up to another, end there, and start off on the opposite side at from a few links to several chains to one side, only one of them posted; a post instead of standing at an intersection planted on the concession line as much as two chains from it; in numerous instances, lines only partly run, others not even started; a block, which contained five lots on the plan, with six posted in the field; a side line start at lots 20 and 21 and strike the next concession line, 100 chains distant, at lots 25 and 26; lines start from each end of a block, and miss each other at an intermediate point by from a few links to six chains; beautifully proportioned triangles across and offsets around lakes, in the notes, where it was simply impossible to have got any such in the field at all; lines run from other lines on either side of a lake to the water, which, instead of striking at opposite points, would miss each other by as much as seven chains, and the water assumed to contain whatever the two added together lacked of making the full block; a carefully calculated triangle in the notes showing the water fifty chains wide, when by actual measurement it was found to be less than thirty; some lots which were returned twenty chains not eight chains, others as much too large.

I have found three separate lakes with high ridges between in the field which were returned as one, their combined acreage not half what the one was shown to contain; two lakes on the plan which were only one in the field, and a mountain which was returned a lake; a marsh on the plan where I found a mountain of bare rock, several hundred feet above the level of the surrounding country.

Streams in the field not on the plan, others on the plan but none in the field; and as many as seven streams all crossing the line at right angles in a distance of half a mile, which turned out to be only one small creek. I have found posts with holes in them a man could run his fist into; others made of poplar, with cedar and spruce trees of the proper size standing as near as the tree from which they had been cut. In some cases not a lake traversed in a whole township, their outlets not even shown; in others, while there had been a rough traverse made of the largest, the smaller not even sketched, no attempt whatever made to show either their size or shape.

I have found a whole township of 50,000 acres divided into 100 acre lots, each lot returned exactly twenty chains by fifty, and not three trees the size of a man's thigh cut in the whole township; where one could only follow the lines by keeping his eye constantly fixed on

the blazes, and those small, few, and far between, the hands almost constantly occupied in separating the brush in order to force the body through.

Need I ask any practical surveyor if such a survey could be even approximately correct? What chainmen could make correct measurements under such circumstances? Am I using too strong language when I say that a man who does his work in this manner is a disgrace to the profession?

In a good many townships, which are otherwise well surveyed, I find the line across the block next the boundary, on the side towards which the lines have been run, a mere trail; why is this? why should not this line be as well opened as any of the others?

In most cases where I have found angles in the lines they were very poorly opened, while in others there had been a good deal of work done. In the latter case, I attribute the errors to placing too much dependence on the magnetic needle, and not being sufficiently careful in taking back-sights, especially in thick swamps and going over knolls. In others which have been run by theodolite, to the instrument not being standing solid while crossing soft ground. In every case where the instrument cannot be made solid, posts should be driven into the ground, and the instrument set on them, then the surveyor can move around it without any danger of throwing it out of line.

In still other instances the errors are undoubtedly traceable to unskilled assistants and insufficient instruments. Some men even go so far as to use a small compass without a ball and socket attachment.

I would now briefly point out a few of the most important points to be observed by a surveyor in making a Crown Survey.

His instruments should be of the very best to be had, and both them and the chain kept in proper adjustment. If at all possible, an astronomical observation should be taken before commencing the survey, and check observations taken as frequently as circumstances will permit during its progress.

He should not hang his work on any other man's, assuming it correct, but should depend entirely on himself. By doing this, each man's work is a check on the other; if they are both correct they must agree, if not, and he knows he has done his correctly, he will then be in a position to confidently invite inspection without any fear of the result.

If he is running two parties, one of them at least should constantly use a theodolite, and too much care cannot be taken in back-sights. It is well to, at least, start all lines with the theodolite, and then, if proper care is observed in the back-sights and trees cut where a good back-sight cannot otherwise be had, local attraction will be a matter of secondary importance.

All triangulations should be made either with the theodolite or a box sextant. The compass should never be used to make a triangulation. The angles cannot be read close enough with the magnetic needle. Where the concession lines have been accurately established, a lake or river, crossed by a side-line, may be measured by micrometer.

but I do not think that a sufficiently accurate instrument with which to measure lakes on a concession line where the size of lots may be affected.

All streams, however small, should be carefully noted ; their width and apparent average depth. Their points of convergence or where they empty into lakes approximately shown on the plan by full lines where they intersect open lines, in other places by dotted lines. All springs should also be noted, also marshes and swamps laid down in their proper places, and the hills sketched in.

If one line does not intersect another at the expected point, if it is not over two chains out, leave it there, but return everything exactly as you find it, and change the bearing in order to have the error corrected at the next intersection. If it is over two chains out I think the line ought to be run over again, but under no circumstances should an angle be made in a line in order to have it strike a given point.

Every lake of over two or three acres area should be traversed, and its outlet and connection with another lake or river shown, if possible. It is not enough to simply show a body of water at a given point ; its shape and size should be accurately laid down. It is a great injustice to a settler to find that what he supposed was a one hundred acre lot has a number of acres of water, which he must either pay for or have a survey and plan of it made at his own expense, when such an outlay would have been avoided had the man who made the original survey simply done his duty.

All lines should be so opened out that an open line can be plainly seen at any point, no matter whether the bush is close or scattering, and every tree within a foot of it marked by three blazes—not a small piece of bark knocked off by one stroke of the axe, but a good, deep, broad blaze cut well into the timber at least nine inches long, which can be seen at a considerable distance. If the timber is scattering it is necessary to blaze trees at a greater distance. If this is adhered to there will be no danger of persons complaining that they cannot find lines while any of the timber near them remains standing.

The posts should be of the most durable timber to be had, not less than four inches square and three feet long, neatly made and marked —a ragged, ill-made or ill-marked post always looks bad—and firmly planted in the ground. A bearing tree, taken wherever obtainable, with a good-sized, smooth blaze on the side next the post, not at right angles to the line of the post, as I sometimes find them, and the letters " B. T." neatly cut thereon.

Wherever a live tree of six inches or more in diameter is standing within one foot of where a post is to be planted, I should say take it for one by all means. Cut neat blazes on it sufficiently large to hold the figures, but be very careful not to make them so large as to run any risk of killing the tree. Leave as much bark as possible untouched between the blazes. Do not cut the tree down and then dress the stump into a small post, as I have sometimes found. In one instance I found a poplar tree about ten inches in diameter taken for a post. It had been cut off three feet from the ground and the stump squared into a four inch post. Could anything be more absurd ?

In conclusion I would simply add that a very little additional outlay and a little more care exercised by the surveyor and his assistants in the field will make all the difference between a good survey and a bad one, and very materially tend to raise the standard of the profession in the estimation of the public.

DISCUSSION.

The President—There are a great many good points in the paper Mr. Dickson has just read, but I hope no member of this Association comes under his thumb with regard to some of the remarks he has made.

Mr. Kirkpatrick—I would like to emphasize one remark that Mr. Dickson made, that you are not to assume that all the Crown Surveys are made in that style. When these township surveys are left in that way the surveyor has to go back at his own expense, and very often finds it a very poor policy from a financial point of view, because he has to go back and go over the whole survey again, and then Mr. Dickson has to examine it over again. With regard to leaving lines un-run, some surveyors have told me that they honestly believed they were run, but they had left it to their assistant, and the assistant with the chain men, I suppose, sat down and had a pipe and said they had run the line and prepared field notes, which was really almost as much trouble as it would have been to run the line. That is the only way I can explain it, because the field notes are apparently accurate —creeks and everything else—and yet he reports that the lines are not run at all on the ground. When you get a Crown Survey be sure whom you get for an assistant; don't take the first greenhorn that comes along. Now, young surveyors should recollect that the thing will come back upon themselves at some future time, because it leaks out who the assistant is, and it will be a discredit to the surveyor all his life.

Mr. Aylsworth—I am sorry to learn that during the last four years when the profession has made such rapid strides and with such perfection in instruments that Crown Surveys are being made in a manner so that it is possible for an Inspector to make such a report. But is the blame altogether to be laid on the surveyor? Years ago it was done by days' work, and then there was not the same object in slighting the work as now. There were difficulties in the old system but I am not sure but there are greater difficulties in the present system. Long before my time the surveys were given out by contract, and the result was they reported lines run that they had not run. Now, maybe better work would be done if they were paid by

Mr. Miles—In the North-west the requirement of the law is that all lines should close within fifty links in a six mile survey. In a township I surveyed a year before last I had to take several observations to check outlines, and they almost all checked within .005°. That is just about as close as it can be run; and very late this fall,

in December, I examined six contract surveys, about fourteen townships, and there is only one contract that did not come up to the requirements, and I thought perhaps it would be a very good idea if the Crown Lands Department had a similar limit in closing their lines across a township.

Mr. Chipman—This paper, I think, is a very opportune one, and it is something that interests the whole Association, whether they are participators in the Government surveys or not. I for one feel that there should be a revision of the instructions given to surveyors. Mr. Miles has pointed out that there should be a limit to the error allowed, and I have felt that as it is now there is no limit, we are supposed to do our work exactly correct, but that is an impossibility, especially in our northern country. There is another matter in which I think the instructions should be amended; and that is in the matter of traversing lakes. A surveyor goes in there and is paid so much an acre, but gets nothing for his lake traversing. I have found in some of my townships fifteen or thirty lakes, where we did not expect more than one or two, and it is rather discouraging work to know that we are supposed to traverse those lakes and get no payment. I think there should be extra payment for traversing. I think also the instructions should be amended in such a way that the plan when it is given in to the Crown Lands Office should bear some resemblance to the natural features of the country as they exist. And I think it should be the duty of the surveyor to trace all streams—the physical features should be correctly shown on the plan. There is another point that I don't feel I can agree with him on—running a straight line through from concession to concession and not making any bend in the line. Well, I believe in bending in to the post at the upper end. That is my practice. I have had no hesitation at all in making bends in alternate side-lines. I can't see the force in running them through and having two posts on the concession line. I would prefer seeing a bend in the side-line than having two posts at the north limit.

Mr. Dickson—I meant if you had a concession line run and your post at that concession line, and then if you came some distance from the last post you should not angle to strike that post but change the bearing of your line.

The President—You would leave one end of the lot small and the next large correspondingly. You want the field notes made to show what actually was done on the ground?

Mr. Dickson—Exactly.

The President—And as I understood, as long as the limit is within two chains let it be.

Mr. Dickson—That is a matter of opinion. Some would think, perhaps, if it is that much it should be run over again.

The President—As long as you give the man the right number of acres.

Mr. Miles—That shows my contention that there should be a certain limit of error in closing.

Mr. Kirkpatrick—A great many of these mistakes arise in running two parties.

(Discussion continued by the aid of diagram on blackboard.)

Mr. Dickson—I think the great trouble is in not taking back-sights.

Mr. Miles—Is a jog in an Ontario township permissible?

Mr. Chipman—If you follow out the instructions, if they could be followed out, there would be no jog.

The President—Could not some system be arrived at by running up a tier of blocks along the east boundary and check from the east boundary, or take a tier of blocks running from the south boundary; some such scheme as that would surely make the chain and theodolite check each other instead of running promiscuously the way some townships have been run. The cause of a good deal of the peculiar surveying that I have come across appears to be want of system in running out the original survey. Even if it doesn't come out to the exact eighty chains to each block, the field notes should show what the difference is. Then if there was a shortage in one block it might be corrected in the next.

Mr. Kirkpatrick—The instructions say where they shall commence, they shall run their lines north and west or east just as the lots number; they are also told to show the exact lines as they come out on the ground, to give them in the field notes whether they come out the exact distance or not; if one comes out 78 chains show it. In one case a surveyor went to the trouble of moving his 40 chain post to 39 to make them both 39. Now, there is no necessity for that, because we are selling the land, and it is no matter whether it is 320 acres or 325 if we know the fact that there is 325. But if there is 320 in one and 340 in the other and there is only 320 put down in each there is 20 acres unaccounted for. That is where the real trouble is; if surveyors would just send in what they find on the ground I don't think we would complain very much if it was two chains out. I have always maintained that two chains would be a legitimate amount to allow. As to what Mr. Miles says about closing, you must recollect that in this system there is really no closing line at the end because every block closes itself; every mile square is a little township in itself. And as to being paid by the day: it was at the urgent request of the surveyors themselves that the contract system was adopted, because it was preferred.

Mr. Niven—So far as the two systems are concerned I prefer to work under contract. So far as the accuracy of the work goes I can't run a line unless I get it right, and I think I do my work under contract just as well as I would paid by the day.

Mr. Dickson—I would be very glad to assume that in the majority of cases surveyors are not aware of it, and I daresay they are not, but there are some men who always do their work well, and others who do not. This matter of traversing lakes is a very important thing. It is not enough to sketch them, I think when a lake comes to be two or three acres it ought to be traversed and put in the returns. With regard to creeks it is surprising how few there are who really show the water connections. I remember one time going out to inspect a contract. On the plan there were hardly two lines the same bearing, the angles were shown in the plan, and I think that was one of the most beautifully performed surveys I ever travelled on in my life. There was not much difference in the angles but every one of them was shown. That is what I call a beautiful survey, much better than a beautiful plan. I maintain still that a great portion of the errors in running lines is because there is not sufficient care taken in back-sights.

Mr. Fawcett—I was just thinking of the difficulties that arise through the burning up of the posts. That matter came up in connection with the Dominion surveys last year, and they changed their system entirely. Their system now is to plant iron posts and build mounds in the woods; they have discarded the bearing trees all through Muskoka and Algoma too. After a fire runs over the country in many cases there is nothing left to show that a post has ever been there. I have known places where the country is so rocky that surveyors have, in order to fix up their posts, had to pile stones around them, and in some cases I have found those stones with a little piece of the post, and I think it would be a good plan to adopt in all that north country. If one of the posts could be established there would be something to go by, and a person would not have to go perhaps five or six miles before they could find any definite point. Another thing I might mention; Captain Bolton has made a survey of the Georgian Bay and has made a chart of it, and in connection with that survey he has made plans of his triangulation and established points. His triangulation has been made very carefully, and he has built up piles of stones in many places at his stations. The Crown Lands Department, I think, could get a copy of his charts showing the position of his stations, and perhaps they might be used in making mining surveys.

Mr. Kirkpatrick—I may say we have given Captain Bolton all our plans for the purpose of tying in his survey to our survey. About the iron posts: we have that in operation too, but you must remember that iron posts are pretty heavy to carry, and it is a very different thing putting them into a cart and carrying them on your back. Another thing I would like surveyors to remember is that it looks very poor in a report to say the posts are marked "as per instructions." If they would simply say how the posts were marked, giving the letters on these iron posts, it would be a vast improvement. These reports are published and Americans coming in find that a post is marked "as per instructions" when they don't know what the instructions are.

The President—There is no doubt a great deal in what Mr. Kirkpatrick has just told us about having all this in the field notes, but I think the remedy lies with himself: don't accept the field notes unless they are all put in.

Mr. Miles—I was surveying some coal limits near the Rocky Mountains a year ago last fall near the boundaries of the National Park, and as soon as I struck the line I went along a little distance and I found a post there marked so many miles and so many chains, and I immediately knew where I was.

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BRIDGE ABUTMENTS AND FOUNDATIONS.

By JAMES WARREN, P.L.S., A.M., CAN. SOC. C.E.,
Kincardine.

It frequently happens that the surveyor, on being appointed County Engineer, or when otherwise called on, has to do with bridge building, in its various details, such as preparing specifications for wooden bridges, or iron and wood combined, also for the piers and abutments for them. However well these designs may be carried out, there is another point that must be previously attended to before any bridge can be built, namely, the foundations for the abutments and piers for the bridge to rest on.

The foundations must be good, or, however well the abutments may be built, there is no safety as long as there is a bad or unsafe foundation. Where the ground in the locality is not of a nature to be safe to build on, it must be made safe by artificial means, a few of which I will try and describe. The first thing I would do, if the ground is soft, is to test by boring, which can be done by having a common three inch auger welded to an inch bar, with a handle so arranged to it that it can be moved up or down as required. By this means the kind of soil may be tested to the depth of twelve or fifteen feet and find out if within that depth there is a stratum hard enough to build on. If such cannot be found, then the foundation must be made secure by piling. Should it happen that where the abutment or pier has to be built is under water, or where water would run into it, it will be necessary to build a coffer-dam around the place in which the foundation has to be built, so as to prevent the water from coming in when carrying on the work. This may be done by driving piles made of timber sawn four inches thick and of such widths as can be got out of logs at command. These piles must be hewn wedge shape at the end, and also tapered to one side so as to cause it to follow close to the one already driven. The piles can be kept in line by having two wale timbers secured by bolts, so as to be four inches apart, and placed in the direction in which the dam has to be built. These timbers may be moved on as the work progresses, so that one set will be quite enough for any bridge abutment. After they are removed a wale timber must be bolted on inside and outside of the dam, especially if the foundation has to be deep. After the dam is completed, the next thing to do is to drive piles in the space included inside the dam, and of sufficient numbers to meet the requirement of the case. I will describe how I directed the founda-

tion to be prepared for the abutments for a bridge I had charge of some time ago. The dam was built as already described, having previously tested the kind of soil. I ascertained that there was a layer of hard-pan about fifteen feet below the surface of the water in the river. Then a test pile was driven so as to prove the depth and nature of the stratum. The pile on reaching the hard-pan would not yield a quarter of an inch from a blow of an 1,800 pound hammer falling twenty feet. This I thought quite secure, and had the rest of the piles driven thirty inches centre to centre, also driven in rows. The size of the piles was not less than twelve inches at the top end. The ground was now excavated to a depth of five feet below the surface of the water, after which the piles were sawn off evenly at the depth of four feet from the surface. The space inside the dam was filled with concrete made with water-lime and coarse gravel, and was well rammed down all around the piles. A timber 10x12 was laid on the top of the piles, and the space between and under the timber was also filled in with concrete, taking care to have the space under the timber well filled up. The whole space is now filled in even with the top of the timbers. A covering of plank of three inches thick was placed in two courses, laid crosswise, and each course spiked with 7-inch spikes to the timbers. The piles used were cedar, but sound straight timber of any kind may be used, say elm, beech, tamarac, etc., as long as the foundation is entirely under water.

The concrete used was made with water-lime from Thorold, the proportion being one of lime to three of gravel, well mixed and shovelled into place from wheelbarrows, and not allowed to fall to any depth, so as not to separate the lime and gravel. The whole trench or excavation should be filled up solid with concrete, and not leave any space outside the concrete for any other filling. On the foundation thus prepared the stone work was built.

If the ground is firm and solid, and away from any danger of wash, then if an excavation to the depth of three or four feet is made, so as to be below the frost line, a foundation may be safely built upon it; but would in any case advise a layer or bed of concrete to be placed in the bottom, say eighteen or twenty-four inches deep, and well packed into the space excavated. If the bottom is rock care must be taken to have it levelled, as any work built on a sloping foundation is unsafe, as the stone work may slide from the pressure of the earth behind the abutment. The whole bottom need not be quarried out to the same depth, but may be left in steps or benches, as long as each bench is level in itself. It may be somewhat paradoxical, but sand when dry is quite safe to build on, but care must be taken to have no water come near it, as then it will form into quicksand.

The stone work should be built of quarry stone, laid in courses of not less than ten inches thick, and each course all around should be of the same thickness. The footing course of the foundation should be twenty-four inches wider all around than the wall, and should be reduced in by, say, three courses of eight inches to the wall proper. The face should have a slope of not less than one inch in ten. The courses should be laid alternately in headers and stretchers, well

bedded in mortar made with water lime and sand in the proportion of one to three, well mixed together when dry, and should be used at once after its being worked up with water. Mortar of any kind should be thoroughly worked. Too much water is very injurious, as it takes too long to set, and it is not so apt to be well worked as when a less quantity of water is used. None of the mortar that is left over should be allowed to be used under any circumstances. The stone should be laid on their natural bed with the best side under, and should be wetted before laying, and when once laid and bedded should not be moved. If it has to be moved all the mortar must be cleaned off and a new bed made for it. The joints must be straight and not more than half an inch wide, and should not be less than twelve inches deep on the side of the stone into the wall. Care should be taken to have stone of a good and durable nature, that will not be ejected by frost or wet. Some of our limestone are apt to scale off, which makes the wall unsafe as well as unsightly. The joints should be neatly pointed with mortar prepared for the purpose.

There is another kind of foundation that I might mention that is sometimes used to very good advantage, and is much cheaper than stone work. A cylinder made of steel, say three or four feet in diameter, according to the size of the bridge, is sunk into the ground and driven as far as it will go, so as to be well below the water line. Piles are then driven inside the cylinder, so as to fill it up. The space between the piles is filled with concrete, so as to make a solid mass. This cylinder may be lengthened by having the plates flanged and well rivetted together. They must be well stayed by counter braces if they are over eight or ten feet above the ground. By having a proper cap made to fit on these tubes the bridge seat may be safely placed on them.

Iron piles may be also used, but care must be taken to have them well protected from ice jams or floating timber, as they will not stand any heavy strain when standing alone and unprotected.

DISCUSSION.

Mr. Warren—I may also state another matter that I intended referring to, that is cast-iron piling. These are used in the States largely in building bridges, but in our northern climate they would have to be very well protected from the ice. That was just the failure in a case lately. The piles were driven in the river, and there came a heavy freshet two weeks ago, and a jam of ice came against the bridge and carried it away bodily two or three hundred yards down the river. If these piles could be protected, they would make a very safe and cheap foundation. They are driven down till you come to a solid foundation, then there is a cap prepared to fit on top of them, and in order to protect them they are braced to make them secure. The Columbus Bridge Co. of Ohio manufacture them largely in the States.

Mr. Butler—What was the nature ot the ground above the blue clay that your piles stood in when you sawed them off?

Mr. Warren—It was a clay soil, and we excavated all the loose earth out from around the piling until we came down to this clay.

Mr. Butler—The only danger with pilings is from scouring.

Mr. Warren—The concrete is down below the bed of the river. I should have mentioned we had Portland cement and we used a good deal of Thorold; in the concrete foundation and for a distance up we used Portland cement. These were mixed one to three for the concrete.

Mr. Butler—How about the stone in the cement?

Mr. Warren—It was coarse gravel; large coarse gravel.

Mr. Butler—I presume you recommend that for highway bridges specially?

Mr. Warren—Yes.

Mr. Butler—With regard to these cast-iron piles, I think, if there is a sufficient quantity of metal in them and well bonded together, it makes a very secure foundation; but when it is placed to sheer the the ice, I don't think that any form of piling is fit to stand at all. At a bridge down at the Bay of Quinte the piles are about 45 feet long, carrying masonry on top, and also protected by a guard round about the pile. This spring the line of least resistance to the ice, the motion of the ice, the expansion, was about parallel with the axis of the bridge. The result was the expansion of the ice shoved the piers bodily out of line, twisted them; but after they cut away the ice every one of the piers of that bridge sprang back to its place. So that in any case where you are subject to ice shoves, I think it is very dangerous, indeed, to trust to pile foundation.

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NOTES ON THE THEORY OF RAILWAY LOCATION.

By HENRY K. WICKSTEED.

PROBABLY no department of engineering has been more neglected, at any rate until very recently, than the theory of railway location. The older text-books which I used as a student, Rankine's and others, passed over the subject in the briefest and most indifferent way, apparently as something too simple or too unimportant to be worth considering, and devoted whole pages and chapters to exhaustive mathematical researches, bristling with algebraic signs and symbols. As to the exact pressure which might be brought to bear on a retaining wall or a masonry arch, and after bringing out the result in a long string of figures running into five places of decimals, they would generally wind up by telling us that under such and such conditions, which were quite within the range of possibility, these figures might be doubled, and then it would be only wise to multiply by a factor of safety of three or four, as the cement could not always be relied on to do what it was supposed it would do, and an earthquake might so shake up the whole business that the bond might be destroyed: in fine, that the data on which the calculations were based were quite indeterminate and the conclusions useless, and the following "empirical rule answers well in practice." The abstruse calculations gave, I have no doubt, a great deal of satisfaction to the authors, and as they had spent much time over them doubtless their consciences pricked them less for the drain which the purchase of their books was upon the meagre resources of the student, the price being generally in proportion rather to the number of pages than to the amount of information conveyed. A good effect the study of such works undoubtedly has in accustoming the student to such processes of reasoning—and no one has a greater respect for the higher mathematics than I,—but the practical results are often such as are by no means a safe guide in a great many cases, and the money saving effected almost infinitesimal. Coming down a little later in date we have "A Manual for Railway Engineers," by George L. Vose, who devotes several whole pages to this branch of his subject, and goes into calculations again based on erroneous assumed data as to the money value of a certain location with so many degrees of curvature, and so many feet of rise and fall, as compared with some other alternative location having different quantities of the same elements. The conclusions he arrived at were

certainly erroneous, but his book undoubtedly served a most useful purpose in pointing out the paramount importance of considering a location thoroughly, and what vast sums of money were involved. It has only been within the last few years that a great work has been published, devoted wholly to this branch, and reading it one cannot but wonder that some one had not before put in print some of the many simple and obvious but much ignored truths which it contains, during the construction of 130,000 miles of railway in America, and many more thousands in other English-speaking countries. Thousands of pages of comparatively unimportant researches such as I have mentioned had meantime been given to the world, and the results corrected by experience and revised in controversy had developed formulæ of real value to the constructing engineer. The science of engineering had in fact closely approximated to an exact science in many of its branches, yet in this particular department millions of dollars had been expended unnecessarily, squandered or left for other generations to pay in the shape of operating expenses, because of mistakes in location, repeated year after year, and on one railway after another. The reasons why such a state of things should have obtained so long are plain to see; the men who really excelled in this department were busy practical men who left little or no literature behind them, and their successors copied their works blindly, faults and excellences alike, and whether the conditions were the same in the new case as in the old or not. Again, there is little or no chance to lay down definite rules and formulæ, or for mathematical investigation, such as delighted the souls of the savants. Every road has an individuality of its own aside from that imparted by the topographical features of the country it traverses, and the governing conditions of one are different from another's. Some are built where money is plentiful; some where it is scarce. Some have traffic as heavy as they can well carry assured from the very opening, others must struggle along for years with very little. In some the preponderance of traffic is in one direction and some have it equal in both. Some make more revenue out of passenger traffic, and others from the carriage of freight. There are a thousand and one considerations which affect the proper location of a railway, and many of these can be estimated only, not ascertained with precision, beforehand by the engineer. Hence, judgment and common sense have more to do with the subject than mathematics, and the possession of these qualities is rarer than moderate dexterity in the manipulation of figures and symbols.

Another reason for the want of interest shown in the subject is that it rarely "pays" to do work of this kind well. Railway directors and presidents are seldom capable of distinguishing between good work and bad, and will blame the management for losses and failures in financial success which are really attributable to the location engineer. Even when they do realize that faults of location exist, they are quite unable to see whether they can be corrected, or whether they could have been eliminated in the first place, and it will take time and money to find out. And finally, even when it is proved that

a better line is to be had, it takes a lot of persuasion to induce them to abandon the one already extant and build the new, without actually doing which the proof is incomplete. Such things have been of late years done, and the results have been so favourable that the responsibility of the location engineer is getting to be better understood. But in weighing such matters, it must be remembered that the best location now will not necessarily be the best ten years hence. For the reasons given above, railway location has been left very much to young men of the profession not sufficiently matured in judgment and experience to build important works and without sufficient training to design them. I speak advisedly in these matters, because I was early turned out on to railway surveys myself, with only a college training, and, having a natural aptitude and liking for topographical studies, soon came to be considered a good hand, and was entrusted with and undertook, with the most o'erweening confidence in my own ability, the location of works of considerable magnitude, but which, in the light of riper experience and more extended study, I can see that I was no more competent for than I was to design the Forth bridge or the St. Clair tunnel. It is a comfort to me to look back and think that, bad as some of my work was, having from the start taken a warm interest in it and learned to love it for its own sake, and not merely for the sake of the pay which it brought, I read everything which I could lay hands on bearing on the subject, and soon acquired some ideas of my own as to the reasons for what I did. Some of them were very erroneous, but they were better than none at all, and being prevented from running into extremes by the restrictions of my chief, I made on the whole fewer mistakes than might have been expected, and no more than my contemporaries. Stephenson, the father of railway engineers, made some admirable locations and fitted his lines well to the topography of the country, the rolling stock then in use and the character of the traffic, and I have no doubt he spent many hours of labour and much thought upon them. The sudden birth of a great multitude of railway schemes, consequent on the success of the first roads in England, created a great demand for railway engineers, and hundreds of men who were only competent to handle instruments were pressed into service, and found for a time lucrative employment in locating new lines. Most of them were mere servile copyists, and reproduced the features of Stephenson's locations as far as they appeared on the surface, without enquiring into the reasons which led to their adoption. As the new conditions were generally similar to the old this plagiarism did on the whole less harm to the English railways than might have been expected, and taking into account the small value of labour and capital at the time they were built, the immense traffic which was almost certain to be secured so soon as the line was opened, and the high price which had to be paid for land damages; the peculiar features of English location, the flat curves, long straight lines, excessively heavy work and numerous tunnels in only moderately difficult country, were, perhaps, less worthy of condemnation than they appear to an American eye. It was when these men and their ideas were imported into this country

that the blunders became glaring and disastrous in a financial sense. They appear to have been impressed in some way with the idea that the excessive work of the English works must be avoided, if possible, that the comparatively thin traffic on a colonial road could not justify such unlimited expenditure of capital as they had been accustomed to. They located their lines and looked over their profiles to see how economy could be effected, and fixed on that means which made least work for themselves both of hand and brain. They substituted on the same profile steep undulating gradients for the long straight ones of Stephenson, retaining the line as it was, when the proper course would have been to determine the gradients from the preliminary survey, and so locate the line as to bring the amount of work within reasonable limits.

Meantime the early American engineers, with the independence and boldness which characterized them, and with no precedents to hamper them, thought out the problem for themselves and decided that as they had not capital enough at their disposal to carry them *through* the hills nor prospective traffic enough to pay interest on the capital even if they could get it, and further, that if they adopted such gradients as would carry them up one side and down the other with such work as they could afford, the whole of the prospective receipts would be swallowed up by the operative cost, wisely concluded that their only resource was to go *round* the hills, and adopted such curvature as would enable them to do so without getting too far from the surface with their projected grade-line. Instead of adapting the line to the rolling stock, they adapted the rolling stock to the line, and substituted the swivelling truck under their cars for the long, straight wheel-base of the English coach. This, I believe, was not an American invention, but one of Stephenson's own; but the fact remains that they were the first to bring it into general use. Some of the early American locations are, both in location and construction, the most perfect examples of the adaptation of means to an end which are extant in any country.

Smiles, in his "Lives of the Engineers," compares Stephenson with Brunel—the hard-headed north-countryman with the brilliant Frenchman—in something like these words: "Brunel's great ambition was to build the best railway that could be built. Stephenson paused to enquire whether it would pay." Brunel made his name famous and left monuments of his skill behind him. Stephenson did not only this but more: he made his fortune and that of his country. Brunel died in middle age, and the financial failure of his great steamship experiment had much to do with hurrying his decease. Stephenson enjoyed an honoured and prosperous old age. We must remember that while other engineering works are built for political, commemorative or æsthetic purposes, and an expenditure in them which will add to their beauty or majesty is always more or less justifiable and sometimes praiseworthy, railways are in a majority of cases commercial ventures pure and simple, and true economy is the only basis on which they can be successful. The earlier American engineers were less great than Stephenson in that they did not create, but they

showed by their works that they had grasped this great underlying principle of railway construction, they modified their railways to suit the conditions under which they were built, and they were great in being masters if not originators of their art. They, too, had their copyists and successors, men of the so-called American school, who had no more conception that the schools were only different because the one was built on a foundation which would not carry the other than Adam had; and some of them, too, found their way into Canada, and the result is that Canadian railways exhibit more blunders and afford better opportunities, perhaps, of studying "how not to do it" than those of any other country under heaven.

There are many charges against the revenue of a railway in operation which are grouped under two distinct heads. The interest on bonds and other securities, taxes, etc., which are known as the "fixed charges," and remain practically constant whether the railway is doing a good business or a poor one, and the "operating expenses," which rise and fall with the business and "gross earnings," though not necessarily in the same ratio. If anything remains after these charges are paid it goes to the shareholders in the form of dividends on stock. Roads doing a heavy business find the last series the heaviest drain on their earnings, while the roads with light traffic find the "fixed charges" the item which is hardest to meet at the end of the fiscal year. New railways in modern times have generally a light traffic to begin with, and must often fight hard for that little, hence the policy of Government aid in construction of such railways through undeveloped countries. The Government helps the railway and the railway pays back to the Government in aiding settlement and increasing subsequent revenue.

In such cases low first cost is generally imperative or the railway could have no existence whatever, and the locating engineer is compelled to choose a line which can be cheaply constructed in the first place, but he is by no means justified in assuming that the conditions which then exist will exist for all time, or that they may not be even entirely changed in a few years. Consequently he should endeavour to obtain such a line as will admit of a railway being built on it at low cost, but which is also susceptible of being afterwards altered into one of low operative expense with as little expenditure of capital as possible and with the abandonment of the minimum distance of the original line.

Some of these propositions are so simple and so exactly what every one knows or thinks he knows so well, that I feel half ashamed of offering them for your consideration. My justification must be in the violation of the conclusions to be drawn from them which is much more frequent than the observance. I can point out cheap roads doing a large business on heavy grades and consequently at terrible expense, which can only be improved by the complete reconstruction of miles of the original. On the other hand, I can show expensive ones doing a small business, and whose interest charges are eating them up, although they can haul cheaper and faster than their competitors. And lastly, worse than either, lines built at heavy cost

through comparatively easy country, which are more expensive to operate than cheaper ones would have been. I suppose the engineers who located them must have had some governing principle under which they worked, but so far as anyone studying their works now can judge, it was nothing more than to do as little as they possibly could and to plant as few stakes as possible.

To criticize in such a way is disagreeable, but if we wish to excel ourselves we must learn to avoid what is bad in others, as well as to imitate what is good—and having undertaken to explain what my views are, and what the views of the ablest men of the times are, it is impossible to avoid reflecting on those who have gone before.

There are three elements in location which are introduced in all works of the kind to a greater or less extent, in order to save first cost—distance, curvature, and gradients, or rise and fall. By distance I mean increased length, or distance over that of the air line. This is often confounded with the second, but erroneously, for while we cannot depart from the straight line and introduce curves without lengthening the distance we can often find two lines, the longer of which has less curvature than the shorter.

These three elements in location are almost always more or less interchangeable; we can substitute any one, or any two, for the third, and all have a more or less prejudicial effect on operative economy, varying with the quantity and character of the traffic, as also with its direction.

For instance, a line with heavy undulating grades may be run over with little or no extra cost for locomotive power or loss of time by a fast express train, which gains speed and momentum sufficiently on the level to carry it to the top of the rising grade, while a few very sharp curves on a level track might seriously reduce the safe speed and increase the wear and tear. The heavier freight train, on the other hand, with which high speed is inadmissable, cannot acquire the necessary velocity, and sticks or "stalls" on the grade, while the curves would scarcely affect it at all.

Again, distance considered *per se* may be a serious item in the passenger business, where speed is the main object, while to the slowly-moving freight train which waits around on sidings and in yards for a large portion of its time, and with which cheapness of haul is of more consequence than speed, an extra mile involving two or three minutes more between stations is of little consequence, as compared with the number of freight cars which can be hauled away by one engine. While no general rule can be laid down for comparing the relative amount of harm, or the relative expense which is entailed, I think it can be proved that, in a majority of cases, distance does least, although it is probably that which is least made use of. Euclid, to the contrary, notwithstanding, the straight line is not always the shortest distance between two points in a railway sense—measured either in time by the express train, or by the cost per ton mile in the case of the freight. How often do we see the valley of some stream or river abandoned for a short cut across the hills, with sharp curves and heavy gradients reducing the possible train-load by one-half and increasing the wear

and tear by a serious percentage, when a little consideration would have shown that even the comparatively light express train could have run over the long line in the same or even less time than the shorter? But Euclid is right, after all, for the railway straight line does not take into account the vertical deflections and does not "lie evenly between the two points"—or, at least, not necessarily so. The error arises in the assumption that horizontal deflections from the straight are as hurtful as the vertical ones, which is very far from being the case.

Next, curvature has been unreasonably cold-shouldered off some of our lines on the score of danger, and, on the other hand, lavishly used on others, without sufficient cause, by men who located simply as they had been accustomed to do on some line on which they commenced their career, who act simply according to precedent.

Some will introduce 10° curves on the very smallest provocation, and to avoid an almost infinitesimal quantity of work, while others will avoid them as something quite unfit for use, except in a yard or on a branch line—and as ruinous to the reputation of any respectable road—yet, as far as cost of haul is concerned, a 10° curve is only equivalent to the same length of a 3 per cent., or 16 ft. per mile gradient. In speed, it is quite permissible to run trains over it at the rate of thirty miles and more per hour—and, for safety at such speeds, there is little or no difference between a 10° and a 4°. Lastly, the gradients are nearly always heavier than necessary—and the gradients are, from a financial point of view, the life and soul of the road, and fix, more than any other factor, the minimum rate at which it is profitable to haul freight or passengers. On the level, the resistance to traction is 6 lbs., or thereabouts, per ton; on a 1 per cent. grade it is 26 lbs., and on a 2 per cent., 46 lbs.—and the total weight of trains which can be hauled on each by the ordinary 45-ton engine, with 20 tons on the drivers is about 1,000 tons, 230 tons, and 130 tons, deducting the constant weight of engine and tender, the net weight of the train is 955, 185, and 85 tons, or in the ratio of 11.2, 2.2, and 1. Everyone realizes that a level road is a very good thing, and that heavier loads can be hauled on it than on a hilly one, but few, even among railway men themselves, realize how terrible the disproportion is. The new decapod engines, built for the purpose of taking the 30-car trains of the Grand Trunk Railway through the St. Clair Tunnel, with its 2 per cent. grades, could haul on the level 200 to 250 cars at the same cost per train mile. There are, of course, other things to be considered besides the cost of haul. Danger, especially, is urged against curvature, and loss of time against increased distance.

To the first argument it may be answered that some of the most appalling accidents in modern times have been due to gradients. Accidents to express trains occur because the reduced speed at the top of the grade and the consequent loss of time are a strong temptation to the driver to "let her out" on the succeeding down grade. The average speed between stations being fifty miles, if the minimum

falls to thirty the maximum must necessarily approach seventy, which is a speed by no means uncommon for short distances, as anyone can prove for himself, and by no means safe except upon the very best of track. Let us, too, always remember that while the centrifugal force on curves varies inversely as the radius it increases as the square of the speed—hence a 4° degree curve at seventy miles per hour is just about as dangerous as an 8° at fifty miles. Accidents, again, are not caused merely by derailments due to curvature and bad track but also by breakage of wheels, tires, and other moving parts to which there is much more liability at high speed than at low. To freight trains heavy grades are dangerous, owing to the increased difficulty in stopping on the down grade to avoid a danger ahead, to the "stalling" on the up grade owing to a "greasy" rail, or some other unfavourable condition where they are liable to be run into by a following express. Again, there is the danger due to "breakaways" and "runaways," cars running back to collision with a following train, or ahead into collision with the remainder of its own train which is, perhaps, coming cautiously back to pick it up. The tendency of a curve is to bring a train to rest no matter in which direction it is travelling. Hence two trains approaching to collision from opposite directions are much easier stopped on curved than straight line, compensating, to some extent, for the limiting of the field of view in the case of the curve, which is sometimes (not by any means invariably) an accompaniment and consequence of sharp curvature.

This obstruction of view by a curve is urged by some as a terrible drawback, but it may be remarked in reply that trains are getting more and more independent of extended outlook by the driver, and more dependent on train orders and on signals placed so far from the points they refer to that a train has time to attend to and obey the warning, even where it comes to within a few feet of them at full speed, and further, that the choice is not so often between a curve and a straight line as between a sharp curve and a flat one, and that a 1° curve will cut off the view in many cases practically as effectually as a 5° or a 10°.

For the loss of time due to distance I would say that the difference between an abominably crooked-looking line and a fairly straight one will seldom be found to amount to much more than 10 per cent. If the other conditions are such that the almost insensible increase in speed from forty-five miles to fifty miles per hour is practicable, as is often, very often, the case, there is no loss from this point of view at all.

The introduction of distance and curvature is also more likely to afford chances for after improvement than the adoption of heavy grades; take, for instance, the conditions I have sketched. In Fig. 1, for which Fig. 2 is the corresponding profile, A and B are two arbitrary points, one in a valley and the other on a plateau 495 feet above. By A E B the distance is eleven and a-half miles, and the rise can be distributed over nearly the whole, giving a maximum of

forty-five feet per mile. A D B is a line climbing the ascent at the rate of eighty feet per mile, and eleven miles in length altogether. At E is a short tunnel or very heavy cutting which we do not feel financially equal to taking out. Rather than be driven to building A D B it will often be better to see if, by the liberal use of curvature, we cannot round the bluff at C with more moderate work. If, then, at some future time we find that the traffic warrants the expense we can get a line within half-a-mile, or less than five per cent., longer than A D B by building only two miles of new line; while to reduce the grades on A D B to anything like the standard of A E B we should have to abandon the whole nine miles between the first and tenth mile posts. Even if the short cut at E be impracticable we may at any rate flatten the curvature and materially reduce the distance, as shown by the dotted line, fitting less closely to the topography and using the old roadbed for the greater part of the distance.

The lengthening in the distance by going through C makes it possible to flatten the grade to thirty feet to the mile, for the three miles between the fourth and seventh, which is precisely what is needed to compensate for the extra resistance of the sharper curvature to the upward bound trains. If 2° curves are the standard for the forty-five feet gradient we shall, therefore, be justified, as far as resistance is concerned, in freely introducing 10° curves on the temporary line. There are circumstances under which A D B would be the better line to adopt, even as a permanent line, but in a great majority A C B is undoubtedly the best, although I think that at any rate five years ago most engineers would have adopted the heavier grades. I know that in dozens of similar cases the heavier grades have been built upon.

The exceptional circumstances are where, somewhere on the same line, and not very far off, we are compelled to adopt 80 foot grades; and, on the principle that the whole is no stronger than its weakest part, if the train weight is limited at some particular point, we gain little by flattening grades at some other points. Again, it may be that all the traffic is from B to A, as in the case of a mineral road, and that the loaded trains are met by a 40 foot grade at some point beyond B. In this case we shall gain very little by flattening between A and B, except in so far as will equalize the resistance to the light trains to that experienced by the loaded ones. Again, there are some few cases, of which Mr. Wellington exhaustively treats, in which it would be preferable to keep an extra engine at A in order to help trains up to D, after which they would proceed by themselves, but the cases are very few in ordinary practice. As far as a general rule can be laid down it is that easy maximum gradients are what must be looked for first, last, and all the time, and that to obtain them we may freely introduce increased length and curvature, especially in such a form that they can be eliminated afterwards. Between the two the choice is not always so easy, but generally speaking curvature will be found to reduce the cost most in construction and to increase the cost of operation. Because the mere cost of rails and ties alone is generally

in the neighbourhood of $4,000 per mile even on our cheapest roads, and track laying and ballasting amount to nearly another thousand—$5,000 per mile will do a large amount of grading. On the other hand, once built, the longer line will often be, even if only a trifle better in grades and curvature, very much the more inexpensive in operation.

Curvature freely introduced will often reduce work to an enormous extent with very little increase in distance; and where such is the case, and the work *must* be reduced, use it liberally and don't be afraid of the radius. It is better to run a train slowly than not to run it at all; better, in a great majority of cases, to run a long train slowly than a short one fast. It it were necessary to retain a 4° standard the C.P.R. would hardly be built and running to-day, and if a shorter radius had been adopted on the Grand Trunk when it was first built it might now be hauling more cheaply, and might be free of a large portion of the great incubus of debt which it carries. Nor need the standard have been retained to the present day. One thousand dollars saved in the first instance and invested at five per cent. for the thirty years between 1855 and 1885 would then amount to $4,320, and the whole amount saved would have amounted to enough to rebuild the line to the highest standard, and very much better than it is to-day. A good deal of the prejudice which exists against curvature is no doubt due to the way in which curves generally are laid out, or rather, not laid out. With careless laying and centring, a curve which was originally a 4°, or intended for such, will often at points approach to double that pitch; and on the same principle mentioned above, that "the whole is no stronger than its weakest point," the curve might, as far as risk of derailment is concerned, be an 8° throughout. A discussion of such points as this is, however, quite foreign to the object of this paper, which, I fear, is already unnecessarily lengthy and wearisome. If I have even called attention to some of the general principles governing good location as distinguished from bad I shall have attained all that I hoped to do. The scope of the subject is immense, and if any of the Society find it as fascinating a study as I have done I beg to refer them for a most elaborate discussion and numerous examples to the work which I have already referred to, "The Economic Theory of Railway Location," by A. M. Wellington, not as merely the best, but as really the only treatise on the subject. To surveyors it is more interesting than most branches of engineering science, as their knowledge of the topography of the district they live in necessarily is or should be more accurate than that of any one else, and for this reason they are often called upon to make at any rate preliminary surveys for railways. For an estimate of comparative cost, and for the exact determination of the centre line on the ground, some knowledge and experience of construction is desirable, but a general route may be sketched out in most cases by any one with sufficient techical knowledge to accurately delineate on plan and profile the natural features of the country, and a sufficient insight into commercial statistics to enable him to foretell approximately the

character, volume and general direction of traffic, if he will think for himself on the lines suggested, and if he has, above all, sufficient patience and industry to make his examination thoroughly exhaustive, and not conclude, or lead others to conclude, that a fairly good line which he shows is necessarily the best which can be obtained. I think it may be said with perfect truth that no line was ever located yet which even closely approximated to its correct position. This is not merely because of carelessness, ignorance or indifference on the part of the engineer, but because sufficient time is seldom allowed him for the work, which is a work of time rather than of expense, and also because many of the elements which influence the selection are only approximately determinative, and while a shrewd man can make a tolerably close guess at the future of a railway, no man can foretell it accurately. Hence, location is a matter of judgment, rather than mathematics.

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COUNTRY PRACTICE.

By C. F. AYLSWORTH, Jr., D. and P.L.S.,
Madoc.

For undertaking to write upon the above subject I do not deem an apology necessary, because as a young member of the Association I have selected a subject which any older member of the Association could have handled in a more satisfactory manner. I merely selected the very general subject because I am not sufficiently posted on the details of any one of the special branches which enter into a country practice to give the Association anything new upon any one of those branches, and so in order to add my quota, such as it may be, towards advancing the welfare of the Association, I have selected a subject that when I cannot advance argument I can use abuse, and thereby avoid details.

There is not an old saying that will better describe the qualifications of a man pursuing a country practice in surveying and engineering for a livelihood (not for recreation or health) than "That he should know everything of something and something of everything."

He should be master of Land Surveying in all its details and the laws relating thereto. The writer cannot say that the public demand any hair-splitting precision, provided we can only convince society that we are endeavouring to dispense even-handed justice to all parties concerned. The "Ditches and Watercourses Act" is another important factor of the country practitioner. The writer has made awards on from fifty to one hundred ditches; he does not make the statement in a boastful sense, but he has never had an award appealed from yet. I always endeavour to get a knowledge of the men I am dealing with, and I seldom leave the neighbourhood of the ditch without effecting a settlement. When interested parties do not attend after being notified, I always make a point, if possible, to see them. He must be a very cantankerous man indeed, who will not allow his prejudice against fair play to be allayed to some extent after being once convinced that if there is one thing above another that the engineer prides himself upon, it is his love of justice. Bridge building, road construction, drainage for small villages, are also branches of the same calling. The country practitioner should also be sufficiently informed on railway building to enable him to make an exploratory survey of and give an approximate estimate at any rate of the cost of construction of the road-bed and appurtenances. But why recite further details? As I indicated before, a man should know something

of everything, if he would make his practice a success and keep starvation from the door.

I have frequently heard surveyors and engineers say that the practice of land surveying, etc., was so monotonous that it was a dead issue; the same old sing-song, day in and day out; but my limited experience has taught me that if I take enough interest in my chosen profession to make it a success, I also find the practice sufficiently exhilarating to suit my constitution. And last, but not least, how is the surveyor compensated for his services in comparison to the remuneration paid for the services of either the legal or the medical professions? Take for example, two neighbours living on adjoining farms; the one to the south, called Mr. Fleeced, has reason to believe that his neighbour to the north has enclosed some of his land, because the latter, for some malicious purpose or other, has moved his fence about five rods farther south on to the land of Mr. Fleeced, from where the old fence has stood unmolested and undisputed for the last thirty-five years. Mr. Fleeced straightway resents such liberties being taken with him and his property by consulting one of, if not the ablest lawyers in the county, an old and respected particular friend of his, who, after hearing Mr. Fleeced's recital of his grievance, says: "Yes, Mr. Fleeced, you have, in every particular, an unassailable case. It looks to me as though your neighbour, of whom I have never heard a good word spoken, is endeavouring to steal and defraud you of your rights as a natural born British subject, guaranteed to you by the British North American Act, subject, of course, in all such cases to the reservations contained in the preamble of the Jesuits' Estates Bill; although I do not advise you to get into law with your neighbour, still I am of opinion that, by placing your grievance at the feet of Her Majesty's jury, even-handed and unvarnished justice shall be meted out to you." "Well," says Mr. Fleeced, "although I am not as bountifully supplied with this world's goods as others, I am not going to allow that to deter me from vindicating my rights, so you may fire ahead with a suit." "Very well," says the lawyer, "but as you know it always takes money to run these things, perhaps it would be a good idea if you would give me a small retainer, in order to grease and start the wheels of justice revolving." "Oh," says Mr. Fleeced, "but I thought you would get your pay out of my neighbour, after you won the case; that you would get back my land and make him pay all costs." "That's all right," says the lawyer, "but I must have something to start the wheels of justice revolving, as I said before. So you have that fifty-acre lot there, free of all encumbrances; you had better just slip a little loan through on that; I am agent for loaning money, and we can arrange that matter in a few minutes." "All right," says Mr. Fleeced, "I know you will make good use of it, that you will expend it judiciously, and to the best advantage; I have always heard, though, that lawyers were pretty expensive luxuries." That matter arranged satisfactorily to the lawyer, he now says to Mr. Fleeced, "Of course you and I know that your neighbour has his fence upon your land, and has a large quantity of your land enclosed to be used to his advantage, but how are we to

convince the jury to that effect, excepting by you calling upon a provincial land surveyor? because the proper place for fence and possession is what is in dispute."

So Mr. Fleeced calls in the surveyor, who runs the side line and finds that Mr. Fleeced's contention is substantially correct; thus proving, in the opinion of the writer, that the surveyor is, in such cases, practically the arbiter.

What does the surveyor receive for such services?—ought to be pretty well paid one would think. But no; if he charges $20 in extreme cases, people generally say that he is extortionate; that it is downright robbery; and, in some cases, will insinuate that the surveyor will very soon become too opulent. And how does the lawyer fare? In the first place, as stated previously, he has the proceeds of a mortgage which he has induced his client to embellish his fifty-acre farm with, great or small, as the lawyer's conscience dictates. If the case is settled out of court, the financial situation remains as above; if the case goes on to trial, ten to one but the lawyer has a clear deed of the fifty acres.

Now my opinion is, that a man requires to have just as much natural ability to make a first-class and successful surveyor as another man must have to make a first-class and successful lawyer, although the latter profession may require faculties that the other does not, and *vice versa*.

If such be the case, how is it that society will smile on the lawyer after collecting such extortionate charges, and would frown on the surveyor who would be sufficiently courageous to charge even one-tenth of what the former does?

In this short article I shall not attempt to answer that question, any more than to state that I would like to see the two professions standing upon such an even and equable basis that when the suit that I have described above is settled, that the surveyor would retire from the fray with one-half that fifty acres and the lawyer the other half, and the former sufficient to boot to pay half expenses of dividing the lot.

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DESCRIPTIONS.

By M. GAVILLER, P.L.S.,
Barrie.

THE importance of knowing how to correctly draw a description of "a parcel or tract of land and premises" is made sufficiently prominent by the endless trouble to surveyors caused by the abortive attempts of the non-professional conveyancer and the large amount of litigation involved in deciphering obscure descriptions.

The description of a property should be so drawn that any qualified person could lay it out on the ground without doubt or dispute as to the position or content.

Let your description stand upon its own merits, and not be dependent upon the surrounding *private* surveys.

Have a definite point of commencement. Use no tree, building, stump or any object easily liable to destruction or removal.

Do not commence at "A," "B" or "C's" lot, or give distances more or less up to or along the boundaries of other properties stating "A," "B" or "C," as this may entail the survey of several properties beside that of the one described.

As it is indispensable for the drawing of a proper description that the use of the different terms should be understood, I have endeavoured to arrange, under different headings, rulings by good authorities.

The description of land in a deed is to be taken most strongly against the grantor, and must be construed according to the condition of things at the date of making the same. Marshall *vs.* Niles, 8 Con. 369; Ryan *vs.* Wilson, 9 Mich. 262.

The certain description must prevail over the uncertain in absence of controlling circumstances. A description is to be construed so as to make it effectual rather than void. 35 N. H. 121; 11 Con. 335.

When one part of a description is false and impossible, but by rejecting such false and impossible part a perfect description remains, such part should be rejected and the deed held good. Johnstone *vs.* Scott, 11 Mich. 232; Anderson *vs.* Baughman, 7 Mich 79.

Where description calls for land owned and occupied, the *actual* line of occupation is a material call to be considered in locating the lines of the land bounded therein. Fahey *vs* Marsh, 40 Mich. 239: Cronin *vs.* Gore, 38 Mich. 386.

When a distance is given to a post, if the point can be found it governs; if not, then in the absence of other controlling words, the distance governs.

Flagg *vs.* Thurston, 13 Pick. N. Y. 135.

When land is described as running a certain distance, by measure, to a known line, that line will control the measure and determine the extent of the grant. Not so if the line is obscure and not definitely fixed, and therefore likely to be looked upon by the parties as less certain than the measurement given.

Howell *vs.* Merill, 30 Mich. 282.

Cleveland *vs.* Flagg, 4 Cushing (Mass.), 76.

Where land is conveyed as beginning at and bounding land of "B," the point of beginning is the *true line* of "B's" land, and not the line of occupation as shown by a fence set up and maintained by "B" before and after the conveyance, with the consent of the owner of the lot conveyed, under the mistaken belief that such was the true line.

MORE OR LESS.

Domin'n Land Surveyors. 1889.

In case of description of survey under Dominion Lands Act, and where the monuments planted in such survey become "the original, true and unalterable ones," it has been held under good authority that the distance between these monuments should be given in such description as more or less, and more or less *not* to be used for measurements defining position of point of commencement in regard to formerly *established* point.

When in a description, not giving the length of any side, a definite quantity of land is conveyed, on the corner of an original lot, if the sides of such original lot are or are not at right angles, the sides of the described portion should be considered equal.

AREA.

Butler *vs.* Widger, 7 Con. N.Y., 723.

A conveyance by metes and bounds will carry all the land included within them, although it be more or less than is stated in the deed.

Remember that in township lots that are described in Crown patent as half lots, that the north half of the west half, or south half of the east half, may contain a different acreage to the north-west quarter or south east quarter.

Sections 36 and 43 of Ontario "Surveyors' Act" give directions how descriptions in Crown patents are to be construed, viz., that actual survey courses and lengths hold against courses and lengths given in any letters patent, grant or other instrument, and actual area ascertained by survey holds against quantities given in patent or grant purporting to be for any aliquot part of former survey.

Where boundaries are doubtful then quantity often becomes a controlling condition.

COURSES.

Baker *vs.* Talbott, 6 Mont. Ky., 182.

Linear measurement should be given the preference over angular measurement deduced from courses.

A course from corner to corner means *prima facia* a right line, but this may be explained by other matters in the case, to be a crooked or curved line; as following a ditch, hedge or stream. Jackson *vs.* Reeves, 3 Canis, N.Y., 293.

Northward or northerly means due north; when nothing is mentioned to show deflection of the course to east or west. Brant *vs.* Ogden, 1 Johns. N.Y., 156.

It is best to say northerly, southerly, easterly and westerly *along* the boundaries of township lots having original magnetic bearings, and not give those magnetic bearings.

In drawing descriptions of lands bordering on water, it is necessary to inquire into the local law of the Province or State in which the premises are situated.

HIGH AND LOW WATER MARK.

Where a sea or bay is named as boundary high water mark is always the line where common law prevails. United States *vs.* Pacheco, 2 Wallace, U.S., 587.

High water mark as to river with changeable river bed is held to be determined by river bed, and that only is river bed which the river occupied long enough to wrest it from vegetation.

In computing the number of acres in a survey, "from" "to" and with the bank of a stream mean to low water mark. Lamb *vs.* Ricketts, 11 Ohio, 311.

A boundary given in a description as a certain distance above the border of a river at high water mark is not ambiguous, and if disputed is to be fixed like any other fact by testimony and examination of the ground. Brester *vs.* Pitts, 59 Mich., 348.

BANK AND SHORE.

A bank is the continuous margin where vegetation ceases. McCullough *vs.* Wainright, 14 Pen St., 59.

The shore is the sandy space between the bank and low water mark.

A boundary on the bank of a river, referring to fixed monuments on the bank, limits the grant to the bank and excludes the flats.

A boundary on a stream and by or to a stream includes flats, at least to low water mark, and in many cases to the middle thread of the river. Thomas *vs.* Hatch, 3 Summer, U.S., 587.

A boundary, by the shore of a mill pond, takes to low water mark. Stevens *vs.* King, 76 Main 197.

When a post is planted at shore it is best to use the term adjoining, not at.

AREA.

A sale was made of the north half of a lot, which is bounded by a river; the river was not straight at this

point and the north line of the lot is longer than the south line. Held, that the north half must mean the north half in quantity divided from the remainder by an east and west line

In compiling the above I am much indebted, amongst other authorities, to the rulings in the United States Courts, compiled in the new "Manual of Surveying," and our exchange reports from State associations.

DISCUSSION.

Mr. Gaviller—The question has been asked, whether rulings in the United States would hold in this country. I was informed by a lawyer that where the cases are similar undoubtedly their rulings would hold.

Mr. Abrey—In describing between two fixed points, would you call that "more or less" or describe it as absolute?

Mr. Gaviller—The question where "more or less" came in was taken from a Dominion Land Surveyor's question, and I simply took it from their ruling. It was a case of a mining location, and the plan had been returned because "more or less" had not been put in. I think the less the term is used the better.

Mr. Abrey—Here in the city the surveyors are coming into conflict with the lawyers on that. They don't see why a measurement should not be precise.

The President—If the points are fixed, then what is the object of putting in "more or less"?

Mr. Abrey—If I were describing between two centre walls I should certainly mark it "more or less," or between a street and a lane. I think it makes it true and correct, otherwise it would not be.

The President—It is easy to understand why a layman would naturally take objection to "more or less" where, as far as he knows, there is no cause for it; but a layman does not understand that it is possible for the distance between two centre walls to be measured twice by the same person and not come out exactly the same, so a very technical surveyor, wishing to protect himself from any difficulty, adds the words "more or less," and he is perfectly right technically in doing it; but it occurs to me that it is unnecessary to put the words in, because the points are there and they speak for themselves. The question with regard to centre walls comes up in this way: supposing the houses were burned down, you would have to refer back to the distances. No great injustice would be done, if that distance is within the limits of ordinary accuracy, either to the buyer or to the seller. But by putting the words "more or less" on the face of a description it gives a sounding of doubt as to the certainty of what is there, whereas it is simply a technical objection.

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THE RECLAIMED LANDS OF KENT.

By JOHN C. MACNABB, P.L.S.,
Chatham.

The westerly portion of the County of Kent, adjoining Lake St. Clair, and extending from the Chenal E Carte to Baptiste Creek, is a low-lying and apparently valueless tract of marsh land, irregular in outline, differing in formation, and with but one feature, that of lake level, common to all of it. The marshes in the township of Dover on the north side of the River Thames have a "sand bottom," evidently having been formed from the driving in of sand by the westerly winds from Lake St. Clair, whilst those in the townships of Tilbury East and Raleigh, lying south of the river, sheltered from those winds, and at the foot of an extensive slope, from which they have received the erosion of ages, have a surface of alluvium and decaying vegetable matter, on a clayey subsoil, and are therefore better adapted for agricultural purposes than those in Dover, but doubtless when land values become such as to warrant the use of fertilizers to supply the lacking constituents of the soil, these also will be brought into cultivation. Up to within a few years ago all of this territory was allowed to stand, a natural preserve for water fowl, and a few fur-bearing animals; wild rice, interspersed with flags, and the coarser grasses grew luxuriantly and seemed to be at a first glance the only vegetation the tract was capable of producing, for in times of high water the whole area, comprising thousands of acres, was covered by the waters from Lake St. Clair and the River Thames. Upon a closer examination, however, as to the possibilities of converting portions of it into arable land, the conditions were found to be far more favourable than at first appeared, as the land itself was good, and the question of reclamation narrowed itself down to the permanent lowering of the water level, and the adoption of some means for the disposal of the rainfall; this has been devised and put in successful operation in three of the municipalities of the county, viz., the townships of Raleigh, Gore of Chatham and Tilbury East; and large areas have thereby been brought into cultivation. The areas are:—

Pike Drainage Works	2,500	acres.
Extension do.	2,000	"
Forbes	5,500	"
Skinner	5,000	"
Total	15,000	"

The scheme known as the "Pike Drainage Works" in the township of Raleigh has been chosen for purposes of this paper, as it was the initial work of the kind in this district, and one with which the writer is familiar. Mr. W. G. McGeorge, C. E., who designed the work, has contributed much of the information given herein relating to this scheme; also the plan and report of the Skinner Works. The accompanying plan shows the territory that has been reclaimed, with its system of interior drains, embankments, location of pumping station, flood-gate, etc., etc. The photographs were taken on the opening of the works, and show the marsh in its natural state.

The first examination of the marsh lands in Kent, with a view to draining them was made in 1869 by the late Thomas N. Molesworth, Esq., P.L.S., in his capacity of Chief Engineer of the Public Works of Ontario, who recommended dyking and pumping. Nothing was done under his report, as the scheme, which advised the treatment of the whole marsh, involved two or three municipalities and the co-operation of the Local Government, was allowed to drop. The municipalities at that time, having their attention fully occupied by the clamorous demands for upland drainage, lost sight of the fact that the work at the point of discharge governed all operations above that point. However, they have had their attention drawn to it in the last few years. In 1882 Mr. McGeorge received instructions from the Raleigh Township Council to examine and report upon a scheme which had for its object the reclamation of about two thousand five hundred acres of marsh lands in that township. The report was favourable, and as follows:—

"I beg to report that I have, in compliance with instructions received from your honourable body, made a survey for the purpose of draining and embanking the tract of land lying east of the town line between Tilbury East and Raleigh, and between said town line and the Drake Road, and between Jeannette's Creek and the River Thames. These lands will be greatly benefited by the works contemplated, and a large tract now unfit for cultivation owing to their low level will be reclaimed and rendered valuable. The works contemplated will consist of a drain and embankment along the town line road, as shown on the plan, from the River Thames to Jeannette's Creek, at its northerly side, and a drain and embankment along the northerly side of Jeannette's Creek, from said town line to line of road between Concessions 3rd and 4th, in Raleigh. These drains will be on the outer side of the embankment, excepting for a short distance from said Concession Road.

"It is contemplated that the work be done by a dredge, as better adapted to reach the more solid material best suited for the embankment; next, there will be a drain and embankment along the road between the 3rd and 4th Concessions from Jeannette's Creek to the Drake Road, and a drain and embankment along the Drake Road from the road between 3rd and 4th Concessions to the Great Western Railway. These drains will also be on the outer side of the embankment, to catch the waters from the higher lands and to convey them to Jeannette's Creek. The inner drain to convey the waters within the

territory to be drained to the pumping works will be the Johnson Drain enlarged and improved from the Drake Road to the diverted road; thence it will continue north-westward along the road to the road between Lots one and two; thence north-westward along this line to the Great Western Railway; thence westerly along said Railway to a culvert near the Tilbury and Raleigh town line; thence north-westerly parallel to the said town line to a point about twenty chains from the River Thames; thence south-westerly to the pumping works at said town line.

"These, together with the pumping works, which, in my opinion, is necessary to effectually accomplish the drainage of said lands, will constitute the system, which I trust will meet with your approval.

"The pumping works will comprise an engine house, a steam boiler and two engines, a water-wheel twenty-four feet in diameter and eight feet in width of blade, the necessary gearing, and a discharge sluice. I estimate the cost of the works to be as follows:—

DRAIN ALONG DRAKE ROAD AND 3RD AND 4TH CONCESSION ROAD.

From Station	0	to Station	10,	a distance of	60	rods, at	$1	50	per rod...	$90 00
"	10	"	20	"	60	"	1	50	" ...	90 00
"	20	"	30	"	60	"	1	50	" ...	90 00
"	30	"	40	"	60	"	1	50	" ...	90 00
"	40	"	50	"	60	"	1	50	" ...	90 00
"	50	"	60	"	60	"	1	50	" ...	90 00
"	60	"	70	"	60	"	1	50	" ...	90 00
"	70	"	80	"	60	"	1	50	" ...	90 00
"	80	"	90	"	60	"	1	50	" ...	90 00
"	90	"	100	"	60	"	1	50	" ...	90 00
"	100	"	110	"	60	"	1	50	" ...	90 00
"	110	"	120	"	60	"	1	50	" ...	90 00
"	120	"	125	"	30	"	1	50	" ...	45 00

JOHNSON DRAIN EXTENSION.

From Station	0	to Station	10,	a distance of	60	rods, at	$1	00	per rod ...	$60 00
"	10	"	20	"	60	"	1	00	" ...	60 00
"	20	"	30	"	60	"	1	00	" ...	60 00
"	30	"	40	"	60	"	1	00	" ...	60 00
"	40	"	50	"	60	"	1	00	" ...	60 00
"	50	"	60	"	60	"	1	00	" ...	60 00
"	60	"	70	"	60	"	1	25	" ...	75 00
"	70	"	80	"	60	"	1	25	" ...	75 00
"	80	"	90	"	60	"	1	50	" ...	90 00
"	90	"	100	"	60	"	1	50	" ...	90 00
"	100	"	110	"	60	"	1	50	" ...	90 00
"	110	"	120	"	60	"	1	50	" ...	90 00
"	120	"	130	"	60	"	1	50	" ...	90 00
"	130	"	140	"	60	"	1	50	" ...	90 00
"	140	"	150	"	60	"	1	50	" ...	90 00
"	150	"	160	"	60	"	1	50	" ...	90 00
"	160	"	170	"	60	"	2	00	" ...	120 00
"	170	"	180	"	60	"	2	00	" ...	120 00
"	180	"	190	"	60	"	2	00	" ...	120 00
"	190	"	200	"	60	"	2	00	" ...	120 00

DREDGE WORK.

From River Thames to a distance of 60 rods S. E. along the town line, at $13 per rod.....	$780 00
Along town line and Jeannette's Creek, 890 rods, at $10 per rod.....	8900 00
Making a total for excavating and embankment.....	$12575 00

To this add for engine house, engine and boiler, gearing, sluicing, pumping works, complete and in running order	$3000 00
Bridge at River Road	400 00
Bridge at Jeannette's Creek	400 00
	$3800 00
Surveying, estimating, etc	100 00
Assistants	30 00
Letting and superintending	200 00
Publishing By-law	50 00
Registering By-law and Debentures	3 00
Clerk's fees	250 00
	$4433 00
Making a total of	$17008 00

"This sum I assess as in the annexed schedule against the lands and roads benefited. The embankments, pumping works and internal drain to be kept in repair and maintained at the expense of the lands and roads within said embankment assessed for the construction of the works, said lands and roads paying in the same relative proportion as for construction.

"The sums in the last column of the annexed schedule are a special annual rate, necessary to run the machinery and keep up the pumping works.

(Signed) W. G. McGeorge."

This report was adopted, and the contract awarded to the "Chatham Dredging and Contracting Company," who with their fleet of specially equipped dredges completed the work satisfactorily so that in the following year the owners began breaking up the land preparatory to cropping it. The reclamation in this instance was so thorough and complete that other schemes were advocated, three of which are in successful operation, viz.: the Forbes Drainage Works, and an extension of Pike Drainage Works, and the Skinner Drainage Works in the Gore of Chatham. Across the last mentioned the writer in 1884 ran a line for railway purposes and found it covered with water two feet in depth, now it is divided into farms and yielding good crops. The style of work adopted in these schemes for marsh land reclamation is of the simplest character, and consists of running a dredge cut around the territory embraced in the scheme, and with the excavated earth forming an embankment about seven feet in height, sixteen feet top, side slopes one foot horizontal to one foot vertical, the seven feet elevation is taken above ordinary lake level and the embankment is continued at that height till it runs out in the high land. A system of interior drains is constructed to conduct the rainfall to the point that has been selected for the site of the pumping station. Here a water-wheel, of the pattern as shown in the accompanying photograph of model, driven by steam power, throws the accumulating water up and out over the embankment. One wheel twenty-four feet in diameter completely controls an area of the extent of the Pike Drainage Works, so efficiently, in fact, that in years

of very wet springs farming operations are started inside the embankments a great deal earlier than in other parts of the township. As an additional precaution a relief or flood gate has been built in the embankment in the position as shown on the drawing, so that in the event of the water level at any time rising in the interior drains above that on the outside, an increased discharge would be possible without increased expenditure. Wood is used as a fuel, and the times and duration of pumping are determined by the rainfall of the season. A man in charge of the pump lives in an adjacent house, and is ready to "start up" at short notice. All of the work in the schemes mentioned has been done by the local company, who have the advantage of machines adapted to the work, manned by trained crews. The accompanying photograph shows the style of machine used in the dredging operations in this section. One beneficial feature of this work is, that the cut made to form the embankment also answers as an outlet for the upland drainage, though recent events show that these dredge cuts must be extended to the foot of the upland slope before injury from overflow will be prevented. The drainage works that have been constructed in this district for the past twenty years have improved the country in a marked degree. This accounts for the disappearance of the malarial fevers that were once so prevalent. The only territory remaining where much room for improvement exists is that tract of country adjoining Lake St. Clair, known as the Plains, and these by the pumping schemes described are gradually being brought into cultivation. As an indication of the improvement that has been effected the following amounts obtained from sales of reclaimed land at different dates may be given. In the Pike Drainage Works a block of 700 acres was purchased in 1882 for $4,500, and sold in 1888 for $20,000. The west half Lot 1, Con. 3, 100 acres, was purchased in 1880 for $227, and sold in 1890 for $1,594; in the township of Tilbury East, Lot 13, Con. 1, 102 acres, was purchased in 1884 for $400, and was sold in 1887 for $1,000; 100 acres of Lot 13, Con. 3, was purchased in 1881 for $300, and sold in 1888 for $1,100. A large amount of work yet remains to be done about these marshes, though some of them in the vicinity of St. Anne's and Walpole Islands will be held for many years as fishing and shooting preserves by the clubs that have patented them for that purpose. As they are mostly in the sand area agriculturists will be satisfied that it should be so. In connection with the marsh land drainage a cut has been spoken of extending from Baptiste Creek to Lake Erie, to act as an overflow channel in times of freshet; the distance is thirteen miles. With a cut of twenty-three feet at the summit, or an average cut of about ten feet throughout, such a work though expensive would absolutely control the waters which now flood the unprotected portions of the Plains; the scheme as yet is only in embryo. The large area of lands reclaimed on Peele Island should be mentioned herein. About one-half of the island has been embraced by a system of artificial drainage such as has been described, and as this is the most southerly point of Ontario the land is very valuable for fruit raising, all our finer fruits ripening there to perfection. These reclamation

schemes are simple and effective and not at all costly, the first cost being the only serious expenditure, as the cost of operation and maintenance is light. In a few years this whole area that has been so long a wilderness will be brought into cultivation, and contributing to the support of prosperous and happy homes.

DISCUSSION.

Mr. Stewart—Do they contemplate irrigation in connection with these drains?

Mr. Macnabb—If it is necessary they can irrigate it by this floodgate.

Mr. Bowman—What is the capacity of that water-wheel?

Mr. Macnabb—I cannot give you that; but it is such that it will empty the system of drains in twenty-four or thirty hours.

Mr. Bowman—Is it operated by an ordinary stationary engine?

Mr. Macnabb—Yes.

Mr. Bowman—Is it considered better than a centrifugal pump for that purpose?

Mr. Macnabb—I think so; it is cheaper, I fancy, and would throw a great volume of water.

Mr. Bowman—It seems to me that in a rough wheel of that kind there would be a great deal more friction and power lost than in a finished centrifugal pump of approved design.

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THE KINCARDINE WATER-WORKS.

By HERBERT J. BOWMAN.
Supt. Water-works, Berlin.

At the last annual meeting of this Association, the writer in a paper on "Water-works for Towns and Villages" gave some general principles connected with their design and construction, and will now take up a particular case, the works at Kincardine, Ont.

The town has a population of about 3,000, and is situated where the little river Penetangore empties into Lake Huron. Various attempts, without success, were made to have the people sanction the passage of a by-law to raise money to build a system of water-works for the town. As none of these schemes met with the approval of the property owners, the council finally contracted with Moffett, Hodgkins & Clarke, of Syracuse, N. Y., to build and maintain a system of water-works, the town to pay an annual rental of $2,100 for its fire protection, water for street sprinkling, and for public buildings and schools.

The Kincardine Water Works Company was formed under the Ontario Joint Stock Companies Act, and the works were commenced towards the end of May, 1890, and completed in four months and accepted by the town council.

The supply, being from Lake Huron is unlimited, but during the stormy weather in spring and fall the water is muddy for more than a mile from shore, probably on account of the proximity of the Goderich clay banks, and also on account of the muddy water from the river. To lay an inlet pipe out far enough into the lake to insure a supply of clear water at all times would therefore have been an economic impossibility in connection with a system of water-works for a town of this size. Therefore, the writer determined upon the excavation of a filtering basin along the lake shore, and from this an abundant supply of clear water is obtained at all times.

This basin is seventy-five in length by sixteen feet in width and has a maximum depth of about twelve feet below lake level. The sides are timbered up with four-inch plank kept in place by 8x8 stringers and cross-beams, and the whole is covered over.

In case of emergency, when the tell-tale in the pump-room would show that the water in the filtering basin was nearly exhausted, as after continuous pumping for a large fire, water may be admitted direct from the lake through a ten-inch inlet pipe laid for that purpose. This inlet pipe extends out 430 feet into the lake where a depth of ten

feet of water is reached, and is made up of cast iron pipe with the ordinary bell and spigot joints, except that to prevent any undue strain on the joints and to allow the line of pipe to conform to the irregular slopes of the lake bottom about every fifth joint was made flexible. The bells of these flexible joints are hollowed out, and the spigots so constructed that when the joint is poured with lead a ball and socket joint is made exactly similar to that of a surveyor's compass. The usual method of laying a pipe of this kind under water is to construct a float made of empty barrels supporting a suitable frame work. This float would carry about sixty feet of pipe, and this having been lowered into place the float is towed to shore for another load. To lay over 400 feet by this method would have been a tedious job taking several days to finish, and as Lake Huron cannot be depended upon to stay calm for more than a few hours at a time, the writer determined to put the whole length of the inlet pipe together at once. It was found that if the ends of the pipe were plugged and the water kept out it possessed sufficient buoyancy to carry about half its own weight, and a lot of 12x12 dry cedar timber being available, the remainder of the weight was easily carried by placing a line of these timbers on each side of the pipe and binding it with rope to 4x6 scantling laid across and spiked to the timbers. In a shallow part of the river the pipe was thus put together length by length and shoved out into deeper water, where it was bound to the timbers. When it was all joined together and both ends plugged it was towed down the river, out through the harbour and up along the shore to the pumping station, where the crib at the outer end was loaded with as much stone as it would carry without sinking. The pipe was then towed into position, and a few planks being removed the shore end was shoved inside the cofferdam which extended from the filtering basin out into the lake till a depth of about five feet of water was reached. The work of cutting off the floats now began at the shore end, and in a few minutes the pipe was lying in its place on the bottom of the lake. The crib at the outer end was afterwards loaded down with stone lowered upon it from a scow.

The pump house is of brick, having 15-inch hollow walls, and contains a boiler-room, 43x25 feet, with concrete floor. The pump-room is 22x24 feet, with walls plastered, wainscoting and ceiling of white pine and maple floor. There is telephone connection with the town central office, and the engineer's residence was built by the company, close at hand, and is an eight room house of modern design.

The water is pumped by a compound duplex pumping engine, manufactured by the Osborne Worswick Co., of Hamilton, Ont. The high pressure steam cylinders of this pump are 12 inches in diameter, and low pressure cylinders 18 inches, water plungers 10 inches, and stroke nominally 12 inches. The actual discharge is about 15 gallons (U.S.) per stroke, or, at 60 strokes per minute, a discharge of 900 gallons per minute, or a maximum capacity of about 1¼ million gallons per day. This pump, during the Underwriters' Association test of the works, kept up four good fire streams over 100 feet high, in the business part of the town. There is a Fisher automatic regulator on

the steam supply pipe, so that when the pump is once started it may be set at any desired pressure, which will be maintained with great uniformity, and without danger to the pipe system, when hydrants are shut off or turned on again.

Steam is supplied by a return tubular boiler, 60 inch diameter and 16 feet in length, having sixty-four tubes of 3½ inch diameter. This boiler was made by Hunter Bros., Kincardine. A small feed pump for the boiler, and a Wainwright heater, complete the equipment of the pumping station.

The water is pumped through a 10 inch force main to a steel standpipe of 16 feet diameter and 100 feet in height, situated in the highest part of the town, which is about 90 feet above lake level—fortunately in a thickly populated district, so that no extra length of main was required to reach it. The standpipe is made up of twenty courses of boiler plate, each building five feet, and the first course is half an inch thick.

The distribution system embraces about four miles of mains of 4, 6, 8 and 10 inches in diameter. The pipe is cast iron, nearly all Canadian, and cast vertically in lengths of 12 feet. However, a few carloads were American pipe, and most of the 4 inch was Scotch pipe cast horizontally in lengths of 9 feet.

There are twenty-four Ludlow valves placed throughout the system, so that if any repairs to mains are required only short lengths need be shut off, and thus the inconvenience to consumers reduced to a minimum. For the use of the fire department there are thirty-four double delivery Ludlow fire hydrants, placed, as a rule, at street intersections.

On the completion of the works they were officially tested by Mr. James Warren, P.L.S., on behalf of the town of Kincardine, the mains being subjected to a pressure of 115 pounds per square inch for one hour without showing any defect in any part of the system, and Kincardine claims to have, for its population, one of the most efficient systems of water-works on this continent.

DISCUSSION.

Mr. Stewart—What is the population of Kincardine?

Mr. Bowman—About 3,000. The works cost about $35,000, standpipe and all. The standpipe is in the highest part of the town.

Mr. Butler—Have you many of these four-inch mains?

Mr. Bowman—Quite a number in the outskirts. The mains are located at one side of the street.

Mr. Gibson—Do the consumers pay directly to the company?

Mr. Bowman—Yes; and $2,100 paid by the town. They are built by a private company. The same firm have works in Belleville. The firm is in Syracuse, N.Y., formerly of Watertown. The first works they built here were in Cornwall, the next in Belleville, the next in Berlin, and then in Cobourg. They extended the Berlin works to Waterloo this year, and built in Kincardine and Ingersoll. On the other side they have a great many, from South Carolina to Dakota—in all, about fifty different works that they control.

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INCORPORATION.

MR. J. P. B. CASGRAIN.

I WANT it clearly understood before I begin to address you on this subject that I am not here of my own accord; I was asked to come here, as your President said, by a telegram I received yesterday from the Executive Committee. This telegram reads thus: "Executive earnestly request your attendance at meeting with or without paper." The fact of my having no paper to read before you to-day is because my time has been taken up—and many of us I dare say have the same story to tell—with the elections; and the time between this and the elections was too short to enable me to complete the rather lengthy paper which I was asked to prepare. However, if you will bear with me, I will try and give you the views that I hold on this subject

It is useless for me, before beginning, to emphasize the many benefits we have derived in Quebec from this incorporation, and which I believe you will also obtain in Ontario. If we follow the evolution which is marking the advancement in art and learning we observe a general tendency towards the principles of association. We know that the lawyers a long time ago applied to the Legislature for an Act of Incorporation, and we find to-day that they have the undeniable right to admit whom they please into their profession, holding their own examinations and establishing what the qualifications of a candidate must be before he is admitted to the practice of law. The doctors, following in the footsteps of the lawyers with an Act of Incorporation, are now dictating very rigorously the conditions, qualifications and the number of years of study in colleges and universities, after which they will admit one to the practice of medicine. We see these two professions, together, guarding most jealously the rights they have thus acquired, and if there has been advancement in those professions it is due in a great degree to the fact of their having Acts of Incorporation. Now, that there has been advancement in the profession of Land Surveying no one will deny. We all know that the old days of the variable compass are passed, leaving us the precise theodolite: we all know that the old elastic chain has been discarded for the solid steel tape, and "Polaris," once our predecessors' only guide, has now many bright rivals in the dark blue sky. But we must not suppose that there is now no room for advancement and improvement in our profession.

We have, as you know, in Quebec some five or six years ago had a Bill passed for Incorporation. This Bill, which I have here, has

been amended from time to time, and it is now what we think, as far as surveyors are concerned, almost as perfect as we can desire. Some two years ago the civil engineers of the Province wanted an Act of Incorporation giving them some of the privileges now solely enjoyed by the land surveyors. The land surveyors opposed this Bill of Incorporation, and when the civil engineers came before the Legislature they had not only to contend with an ordinary opponent, but the surveyors, each of them in their own counties, had influenced their members as much as they could against it. They met in Quebec, and the Association had there a President and Secretary able to write and address the members of the Committee of the House with the whole Association at their back. The consequence was that the Member who introduced this Bill had not even a seconder for his motion, and our contentions were sustained. It shows the force of incorporation. Had the surveyors had no organized system the consequence would have been that a Bill of Incorporation might have been granted, perhaps not giving to the engineers all they asked for but part of it, and we would have lost so much thereby.

Now, the Provincial Land Surveyors of Ontario have formed themselves into an Association to which most of the practising surveyors belong; I myself have belonged to it ever since I have been a P. L. S. in Ontario, but this Association has no legal existence. We pay almost as large an annual subscription as we would if our Association were incorporated. To make the thing a little more clear here is just a simple enunciation of the powers that are given to societies that are incorporated, and this is a right that is given to almost any association. Revised Statutes, Article 4086, reads:—

POWERS OF CORPORATION.

"4086. The corporation has full power:

1. To acquire and possess moveables and immoveables and enjoy the same, provided the value thereof does not exceed twenty thousand dollars;

2. To pass by-laws, not inconsistent with the provisions of this section, for the:

a. Government, discipline and honour of its members;

b. Management of its property;

c. Maintenance of the corporation by levying contributions or otherwise;

d. Election of a board of management;

e. Examination and admission of candidates to the study or practice of the profession;

f. Establishing fees for professional services in connection with land surveying.

3. To pass all other by-laws which may be deemed necessary for the proper working of the corporation." 52 V. c. 41, s. 2.

The enunciation of these rights shows the immense power our Association would have if we were incorporated. These are given to

almost any incorporated body. We are not asking anything that would not be granted to anybody else who would ask for it.

To commence at the beginning: the maintenance of discipline and honour of members. On that subject the Board of Management sit as a court of justice, and if one surveyor should commit any act against another surveyor in a professional way for which he might be made accountable, a complaint in writing is made in the proper form and certified before a Justice of the Peace, or before the President or Vice-President, and due action will be taken upon this, and the Board, sitting as a court of justice, will hear the case, the accused being allowed to come there represented by counsel. These offences would be such as appropriating another surveyor's notes, divulging professional secrets, etc. The Board hear the case, and if, in their judgment, the accused is guilty, they have the power to impose a fine of $100 or suspension for two years, and this suspension is such that if a surveyor is suspended and his name struck off the roll he is no longer a surveyor for the time being. You see the mere fact of the surveyors having to themselves the maintenance of their own dignity and honour is also a great advantage. All deliberations of the Board are perfectly secret. Since their incorporation only two surveyors have been tried before the Board, and only one of these found guilty, and it was a case of giving a pupil a certificate that he had served three years when the pupil had not actually served that time. This was considered a serious offence, and we have the right to suspend a surveyor for such misdemeanour.

We have the power of passing by-laws not inconsistent with the Act. Those I have here number 214, every one of which is designed and calculated to better the profession. By our Act we have the power to enforce these by-laws; of course I will not attempt to explain them, but they give the Board of Management virtually control, for the time being, of the Association.

If there is really a desire on the part of the surveyors of Ontario to become incorporated, I may explain how we commenced in the Province of Quebec. We were not in as good a position as you are, because we had no association, no officers, but we assembled a number of surveyors together—we were not as numerous as we are here to-day,—and we decided to first frame an Act of Incorporation. This was a very serious work, and it took us no less than a couple of years before we could get this Act drafted and presented to the Legislature; but after we got it before the House there was no further trouble. We retained the services of a good lawyer, who gave it a suitable form to receive the sanction of the House, and our Act was duly passed. From time to time we have had it revised. When once we were incorporated there was a general meeting of all surveyors in Quebec, and the first move was the appointment of a board of management to draft by-laws, and a board was appointed numbering fifteen. The reason for this large number is that surveyors are often called away; the quorum is only seven. This board is elected, by ballot, for three years; and once this board is elected the other members have virtually no control over the affairs of the Association.

The Board meet the same day and select a president, two vice-presidents, secretary-treasurer and syndic. If there is any examination to be held five members of the Board are selected to act as examiners, and these examiners are only appointed just at the time of the examination, so that nobody can know who the examiners will be. Of course it often happens that the same member will be re-appointed, but any pupil who goes and studies with a surveyor thinking that that member will be an examiner will very often find himself mistaken. The examiner must be perfectly free from and have no connection whatever with a candidate; and furthermore the examiners do not know whose papers they are correcting. The answers are all written in ink on papers bearing the seal of the corporation, and these papers are all put into a large envelope, and together with these papers in the large envelope is placed a smaller envelope in which there is a piece of paper bearing the name and address of the candidate. Both envelopes are carefully sealed. The President takes out every paper and marks the same number on every one of these papers and on the smaller envelope, and they are kept by the President until the end of examination. At the end of the examination the large envelopes are marked with the number of points that the candidate has obtained, and at the end of the session the small envelope is opened and the Board sees to whom the paper belongs. And then the examiners themselves do not admit a pupil, they simply report to the Board that such and such paper has retained so many points, and it is the Board that actually opens the smaller envelopes. But if a candidate has failed in any particular subject, and there is no use in his continuing his examination, the small envelope is opened by a special resolution of the Board, to see to whom the paper belongs, and this candidate is told that it is useless for him to continue his examination any longer. All the answers of candidates for examination are kept in the archives of the Association, and they could be immediately produced if the Board deemed it expedient.

In addition to sitting as a court of justice and conducting examinations, the Board of Management has also the framing of new by-laws. Before the Board of Management can send a by-law for the approval of the Association outside it must be approved by a two-thirds majority in the Board. Then it is sent out by letter to every member with a ballot attached to it, and if it receives a majority of the votes of the corporation it is adopted.

The preparing of the questions for examinations is a very important matter, and is left to the examiners. When the five members of the Board are appointed as examiners then they have to prepare these questions. The sittings commence at nine o'clock in the morning and continue till twelve at noon; then from two until five. During a sitting four or five questions are given on each subject, the same questions being given to everybody. One of the examiners sits in the room. At twelve or five o'clock the candidates should have worked out these questions; and if one has not completed his papers then they are taken from him and he is considered as having failed on those he has not answered; but the questions put are always such

as can be answered in the allotted time. The examiners correct these papers as they come in, so that the result of the examination is known very shortly after the last paper has been answered. We have also on certain questions such as mineralogy and geology the right of our by-laws of retaining the services of the professors of the universities. Questions of history, geography, etc., are put by professors of Laval University, so that students cannot take issue as to the competency of the examiners on such special matters. We have also the right to demand an oral examination. If a candidate has gone through the written examination, and if the Board has reason to suspect that something is not exactly right, then they can submit him to an oral examination.

As to paying the surveyors who attend, the members of the Board receive $4.00 a day besides their actual travelling expenses. The examiners, when they sit as examiners, do not receive the $4.00 a day but get $6.00 a day according to the tariff and their travelling expenses. It amounts to the members of the Board to about $100 a year. We do not make any money out of it, but it pays a member for his time.

The expenses in connection with the administration of the Association are not high. We simply pay per annum a subscription of $4.00 to get all the benefits of incorporation, and we now have at our credit in the bank over $2,000, besides a great number of books and tables and all the necessary appliances for holding meetings and examinations, and we are looking forward in the near future to being able to make a material reduction in the yearly $4.00. Part of the funds are raised by the fees paid by the candidates. The fees paid by the candidates are very much the same as the fees paid here. $1.00 for coming up for examination ; $4.00 certificate admission to study ; $2.00 for passing indentures, etc. ; $20.00 being admitted to study ; $20.00 to be admitted to examination for practice ; $20.00 more to get a diploma ; and if a candidate fails, $5.00 for any subsequent examination. So there is quite enough money generally to defray the expenses of the session. It is only in cases where there would only be one or two candidates that there would be any shortage.

It has been the duty of the Board to raise as much as possible the standard of the profession by making the questions not what you might call hard, but raising them somewhat and getting a straight answer from the students. Whispering, talking to one another, or copying is very strictly guarded against, and the minute a candidate is caught in the act he is immediately dismissed from the examination.

About the collection of dues, the law gives us the right to make by-laws and to levy contributions as I told you. We have put the annual contribution at $4.00, and the surveyors throughout the province who do not wish to belong to the Association have to state in writing to the President that they do not wish to practise, that they have gone to some other avocation and that they will claim none of the advantages of the corporation. In that case their name is left off the roll, and they cannot act as surveyors. All those who do not give

this notice are charged with the $4.00, and any one who after the 1st of January has not paid, his name is simply handed over to our attorney, who collects it. And we can not only collect the actual yearly contribution, but we can also collect the arrears. We pay from $200 to $400 a year to our President, who lives near the office and can attend there daily. The Secretary receives $100. If a surveyor in any part of the Province wants information on any subject, all he has to do is to write to Quebec and he gets an answer immediately. If a surveyor finds that an engineer is doing some surveying work in his neighbourhood, he at once notifies the President in Quebec, and the syndic goes at once to the place and enters a suit immediately against the offender. There are in Montreal some very good clients of mine who threatened me with bringing down a surveyor from Toronto, but I told them that he had better bring a very good instrument, so that it might be held as security for the costs of the suit of illegal practice.

Now, with regard to the advantages, there is everything to gain and nothing to lose. Supposing incorporation were to take place, no better qualified people in Ontario to act as members of the new Board could be found than those who are now members of the old Board. They have always carried on examinations before and they could keep on doing it; and, besides that, surveyors could, if they liked, alter any of the questions or programmes that are put now. They would have full control over that.

Now, I may have omitted a great many things, but if there is any question any member would like to ask I would be only too glad to answer it.

DISCUSSION.

Mr. Ogilvie—How is the tariff regulated?

Mr. Casgrain—The law gives us the right to make a tariff, and I have here a copy of the tariff which we have a right to collect in a court of justice. Land surveyors have a right to charge a fee of $6 for a day's work or *fraction of a day*, the regular day's work being six hours. Besides that, after a regular day's work, they have a right to charge $1 for each additional hour employed in the practice of their profession; and they have a right to charge for all sums paid for board and expenses at current rates. For each boundary mark they have a right to charge $1 besides the other fees stipulated, and I have put as many as thirty-two boundaries in one survey. Why we charge for these boundaries is, we are responsible, and we have no right to put down a boundary anywhere without in the description giving the exact locality where this boundary is and its astronomical bearing. For a description, $2.50, if it does not contain over 400 words; if it is more than 400 words and takes the shape of a report, we have a right to charge $2.50 for the first 200 words, and for each additional 100 words, 50 cts. For a copy of a description or report, $1; for every 100 words over 400, 20 cts. additional. For making a copy of a plan, we charge at the rate of $1 an hour, and keep our own time.

Mr. Ogilvie—Can you make it a misdemeanour if any member of the Association works for less than the tariff?

Mr. Casgrain—It is almost impossible to prevent a man from working for nothing if he chooses to do so, but if you make your bill according to this tariff you have a right to sue and collect your money for it.

Mr. Dickson—In case of a surveyor coming in and working against another surveyor—working for less—what would you do?

Mr. Casgrain—When you are incorporated you avoid that a great deal; it will raise the standard of the profession. We have had one surveyor working for another for less than the tariff, but for outside people we have had no such complaints.

Mr. Miles—What proportion of the surveyors attended your preliminary meeting?

Mr. Casgrain—I don't think they were as numerous as we are here to-day, between 20 and 25.

Mr. Chipman—How many surveyors have you on your rolls?

Mr. Casgrain—We have all the surveyors in the Province now, about 141.

Mr. Butler– Is there any particular form of study recommended, such as the School of Science?

Mr. Casgrain—There is a special provision for those who have gone through a course of applied sciences and have graduated in the Province. They save two years on their term; instead of serving three years, they only serve one.

Mr. Ogilvie—With reference to legislation, is it not a fact that any legislation affecting the land surveyors is submitted to them for approval before being taken into the House?

Mr. Casgrain—No; any Member is free to bring in a Bill regarding surveying without heeding our Association, but before it would be passed it would certainly be submitted to our Association, or to the Board.

Mr. Foster—Is the scale of prices that has been adopted in advance of the former ones?

Mr. Casgrain—Yes. Before we were incorporated the tariff was $4 a day; it is now $6.

Mr. Foster—Does that bind the members to that tariff?

Mr. Casgrain—We have never had any complaint of anybody charging less than the tariff. Every member of the Association is to-day, financially speaking, in a better position than he was before the passing of that law. I have been asked by a member if the Government in Quebec offered any opposition to our incorporation, and I say assuredly not. The Government was quite willing to part with that part of its powers and delegate them to the incorporation.

Mr. Gibson—Are you called Government Surveyors down there?

Mr. Casgrain—We are called Provincial Land Surveyors.

Mr. Abrey—In regard to outsiders, are their rights not taken away by this Act?

Mr. Casgrain—I don't see there was any right taken away from them. Those who don't want to pay the contribution have simply to notify the Secretary or President of their intention not to practise as land surveyors, and their names are immediately taken off the roll.

Mr. Gibson—If any of these men are unwilling to come into this Association is their standing affected in any way by your incorporation?

Mr. Casgrain—Certainly, for they cannot practice. At first there were some who said they did not see any use in the Act of Incorporation, but it has been decided that no surveyor can get out of paying his dues, and they have all come in. Another thing that helps us is, that the Commissioner of Crown Lands gives no work to a surveyor who has not paid his dues. The law says that those who are entitled to practise in the Province of Quebec are those only whose names appear on the roll published yearly by the Association, and who are in good standing. Supposing you give notice to-day that you do not intend to practise, and some years after you give notice that you want to join again, nothing would be charged against you for the time you have not practised.

Mr. Gibson—Supposing you made a survey during that time would it be legal?

Mr. Casgrain—No; not according to the Act. It is exactly on the same principle as if a lawyer appeared before a judge and he had not paid his dues; no judge will hear his case.

Mr. Gibson—And if I afterwards paid my fees, then would it be legal?

Mr. Casgrain—No; you must pay them before.

Mr. Dickson—Then you are not licensed by the Government but by a board appointed by yourselves?

Mr. Casgrain—Yes.

Mr. Dickson—I think it would be very unfair if a man has a license from the Government to practise and that Act says, in the face of his diploma, unless you pay $4 a year you cannot practise as a land surveyor.

Mr. Foster—As I understand it the Government delegates its power to appoint surveyors to the incorporated Society.

Mr. Chipman—I can't agree with Mr. Dickson in thinking it is a hardship for a member of the profession to have to pay $4 a year into the Association when by so doing he is putting $10 or $20 into the other pocket. Our Association is putting from $5 to $100 a year into every surveyor's pocket that is practising in Ontario; and the fifty or sixty of them who have not seen fit to join our Association I think can now afford to join our incorporation. They may think we are interfering with vested rights, etc., but I am surprised to find those who have spoken in that strain speaking in that way. I think we are doing them a kindness—putting money into their pockets.

Mr. Gibson—This Association would have the privilege of fixing the fees?

Mr. Chipman—Yes; subject to the approval of the Lieutenant-Governor, I suppose. There is nothing unreasonable in that; that is what every profession does. I don't mean to say that the Quebec Act will suit our case exactly; I think it might be improved on, but I think we are now in a position to go on with incorporation. Other professions are encroaching on this profession; the legal profession is encroaching on every profession; and if we don't become incorporated I think our Association will have a very struggling existence.

Mr. Aylsworth—I supposed that the object of the organization of this Association was, when the proper time came, to get incorporation, and I believe it would not only be to the interest of the profession but to the interest of the province as well.

Mr. Kirkpatrick—As far as I am personally concerned I think it would be the very best thing the surveyors could do. Of course I don't know what the Government's idea would be in the matter, but you all know that the Government give $400 towards the expenses of the Board of Examiners every year; that of course they would be freed from, and that might be something from a Government point of view.

Mr. Gibson—I look upon it as something of an experiment. There are no surveyors in the world who have the standing of the Provincial Land Surveyors of Ontario; and there are many holding good positions in the States who got them simply from the fact that they had a P.L.S. certificate from Ontario; and what would our standing be after having lost our position as Government surveyors? You speak of medical men and lawyers, but you must remember that they are a great body of men with immense influence compared with what we have; but whatever the Association says, I say. If we do get incorporation let us not lose our status as Government surveyors.

Mr. Kirkpatrick—At present we are licensed by a Board of Examiners appointed by the Government. If the Association is incorporated they will have power to appoint their own Board of Examiners, and we would just simply be changing from one board to another I quite agree with Mr. Gibson in saying, make haste slowly. I don't think it would be possible to do anything this session, but it might be possible to do something next year. In the interval let all the surveyors be sent a copy of this Act, and let all the members of this Association use their influence, so that in that way the opposition would be minimized which would come next year, and I think there would be no difficulty it getting it carried out.

Mr. Chipman—As to the point raised by Mr. Gibson about P.L.S., I don't see anything in the Act of Incorporation to prevent their adding P.L.S. to their names; all they have to do is to pay their fees and practise. A man can be a P.L.S. and not practise; he is in a state of static equilibrium, as it were.

Mr. Ross—I don't think it would be at all creditable to hold back in this matter. Incorporation is the order of the day among other bodies. In Manitoba, where there only a few surveyors, they are incorporated, and this chief province of the Dominion should not wait till all the other provinces are ahead of us.

APPENDIX.

REMINISCENCES OF A CANADIAN LAND SURVEYOR.

BY JOSEPH KIRK, STRATFORD.

WHEN quite a boy, and before coming to Canada, I was placed under the tuition of a gentleman named Robert Crompton, a duly authorized land surveyor in Ireland, resident in the City of Londonderry, for the purpose of learning the art of land surveying. I first commenced a course of mathematics, and after a while commenced the field practice of surveying in different parts of the country where our services were required on different estates. Have done a good deal of surveying on the Earl of Abercorn's estate, in the north of Ireland. Many a night I have slept in a hut on a bed of rushes in the heather mountains of old Ireland.

Emigrated to Canada in the year 1829, under the impression, I suppose, like many others, that I could at once enter on the practice of my profession, but soon found that if I wanted to practise land surveying here I must serve a term of three years under an authorized Provincial Land Surveyor, which for different reasons I could not at that time undertake. Then obtained a position in a mercantile and lumbering supply establishment, owned by Messrs. Bernard & Rainville, in the village of By-Town, then a little French village of two or three hundred inhabitants, now the City of Ottawa. The building of the Rideau Canal was just then commenced under the management of Col. By and a corps of Royal Sappers and Miners recently sent out from England. Very soon the inhabitants of the village began to increase as the work of the canal went on, and the village became a town. Remained in my position until the year 1840, when an opportunity offered for me to indenture myself to a Provincial Land Surveyor for Upper Canada, named John Robertson. In the course of my practice under him he obtained the survey of several lumbering limits on the Ottawa River and some of its tributaries, namely, the Madawaska and the Bon-Chere. Our first work was on the Ottawa, much further up the river than any lumbering operations heretofore, being above the Roche à Capitaine and Deux Rivieres where I wintered; snow being from two to two and a half feet deep in the woods all the winter, we travelled on snowshoes and prosecuted our

work all the winter. I might just mention an incident that occurred when going up in the previous fall. I had three bark canoes, laden with provisions, blankets and cooking utensils, etc., and, as all voyageurs in bark canoes well know, had to stop at the foot of all portages going up, and carry everything across the portage to the head of the rapids. On this occasion the carrying distance was about a quarter of a mile, and for my part I took up the paddles and some other light things and proceeded over the portage About halfway there was a rising ground, and on nearing the head there I met a large bear browsing on what are called "Labrador berries." This plant we often make tea of, and very good, too. However, Mr. Bear lifted up his head very leisurely and looked at me. I, being afraid to retreat, looked directly at him for about three minutes, when he turned round and walked slowly away, to my great satisfaction and relief. My canoe men in the meantime were busy arranging the goods to carry them over the portage on their backs.

I might add another incident. I had occasion to travel about twelve miles along the York branch of the Madawaska River on the ice, it being in the winter, and when nearing the head of a rapid there is a turn in the river. I noticed at this bend in the river, as I thought at the moment, about half a dozen of Indian dogs coming around the bend towards me, and expected to see the Indians every moment, as it is a very common thing when Indians are travelling to have their dogs with them. After a few minutes I thought it strange that no Indians were making an appearance, when immediately I heard a noise behind me, and a deer was coming full run right in my tracks, and after it three or four wolves. The deer came to within about twenty feet of me, when it made a sudden bound off the river and into the woods (the river being only about three rods wide) and the wolves after it, accompanied by those I first saw. I then saw through the wolf arrangement. Those which I thought were Indian dogs at first were wolves, showing that a pack of wolves starting a deer back in the woods they will divide themselves, and one-half will run to the adjacent rapids on the river, and the other half will run the deer to the river, where they are sure to meet and the deer is killed at once. When a deer is hunted it is sure to make for the nearest rapids. I was quite alone and had no weapon except a small hand axe in my belt, with which I was determined, if attacked, to fight to the last. But all the wolves pursued the poor deer and left me, I suppose, for a more convenient time. Then I made my way with all speed, about one mile more, to where my men were at work clearing out a line, and so escaped being killed by the wolves.

These incidents, though not coming exactly under the head of surveying, show some of the risks, dangers and difficulties that are to be met with, and so I thought it proper to mention them. But I have diverged from my canoe trip so much that I must now return. Our canoe-loading being all carried to the head of the portage, we got the canoes loaded again and proceeded as before to our destination, where the surveying work commenced. The manner in which the surveys of lumbering limits were performed in those days was, for the limit to

commence at a certain known point on the river; then find the magnetic course or average bearing of the river for some miles; then at a right angle from this course or line run one mile back from the river; thence, parallel with the river line, three miles; thence at a right angle with last line to the river, blazing the trees throughout. Thus was each limit defined.

After completing my instructions here I was ordered to the Madawaska and the Bon-Chere Rivers. My first work was on the York branch (a tributary of the Madawaska), then to Round Lake on the Bon-Chere, where I made similar surveys. The parties who made square red pine timber first in these regions were Peter Aylen and Messrs. Wells & McCrea. I spent twelve months in these sections of country, and was not in a house or covering of any kind except my blankets, and in case of rain or wet weather made a camp composed of poles and hemlock brush. The above places were far beyond any settlement or inhabitants at that time (1841) except Indians, and at certain points a Hudson Bay fort, as it was called, composed of a small log shanty, about twelve feet square, and a couple of Frenchmen or halfbreeds, with stuff to trade with the Indians for furs.

After this I came down to By-Town and the surrounding country in the townships of Nepean, Gloucester, etc., and had a good deal of practice in ordinary surveying, running lines, etc., until my three years were expired. I then proceeded to the seat of Government, which was then in the City of Kingston, Sir Charles Bagot being Lieutenant-Governor. After passing my examination as a surveyor successfully, I received my license to practise on the 16th of February, 1843. Proceeding to Stratford, then a very small place, I was soon employed by the Canada Company in drawing copies of the original plans of each township in the Huron District in duplicate, one copy for the Company's office in London, England, and the other for their office in Canada, besides surveying several town plots, namely, Mitchell for the Canada Company, Clinton for Isaac Rattenbury, Poole and Trowbridge for the Government, and more recently many townships in Manitoba and the North-West. I have been a member of the first Association of Provincial Land Surveyors, Civil Engineers and Architects of Ontario during its existence (see report of meeting appended), and of our own present Association since its commencement six years ago, and now believe I am nearly the oldest practising Provincial Land Surveyor in the Province of Ontario.

The following meeting was held on the 5th day of May, 1873:—

"PROVINCIAL LAND SURVEYORS' MEETING.

"A meeting of surveyors from different counties in Western Ontario was held on the 5th instant, at the Revere House, London, when an organization was effected under the title of 'The Surveyors' Association of Western Ontario,' and the following officers were appointed:—Mr. B. Springer, of London, President; Mr. Kirk, of Stratford, Vice-President; Mr. T. W. Dyas, of London, Secretary; and Mr. Wm. McMillan, Treasurer.

"They decided to recommend the following scale of prices to the consideration of the Surveyors of Ontario:—

"Field and office work, $8 per day and all expenses.

"Astronomical observations, $5 each.

"Descriptions, minimum price, $2.

"Time to be charged from leaving office until return.

"A day to be eight hours.

"Moved by Mr. A. Macdonald, of Chatham, seconded by Mr. J. H. Jones, of Sarnia, and resolved, that the next meeting be held in London, on the 12th day of May, when this tariff will be discussed, and that all surveyors in Ontario be invited to become members of the Association."

OBITUARY.

SINCE our Sixth Annual Meeting a break in the ranks of membership has been caused by the death of Mr. A. C. Webb, D.L.S. and P.L.S., who passed over to the great majority on the morning of May the 29th, after an illness of several months.

Mr. Adam Clark Webb was born in the Township of Cramahe, near Colborne, on August 9th, 1840. His father, the late Thomas Webb, was a native of the County of Cavan, Ireland, and emigrated to Canada in the early part of this century. A pioneer of the County of Northumberland, he rose to a position of influence and wealth. Mr. A. C. Webb, the youngest of the family, after completing a course at Victoria College, Cobourg, became articled to the late Richard Brown, P.L.S., and received his commission as Provincial Land Surveyor in 1864. He then attended the Royal Military College at Kingston for military instruction, and in 1866 formed the first volunteer company organized in Brighton. Eminently fitted in all respects for a soldier, he remained a member of the 40th Battalion, and rose to the rank of Lieutenant-Colonel, which position he recently resigned owing to the pressure of his duties as a surveyor. His fine physique, thrilling voice and genial disposition will long be remembered in the regiment.

Mr. Webb was one of the first surveyors entrusted with professional work in the North-West Territories, being in command of the surveying party whose operations were peremptorily ended by Louis Riel at the commencement of the Rebellion of 1869. During the seasons of 1871-'72-'78-'79-'80-'81-'83-'84-'85 and '86 he was employed by the Dominion Government on the more important surveys of the Territories. A sunstroke received when at Medicine Hat, N.W.T., in 1885 had a lasting effect on his constitution.

For many years Mr. Webb was a member of the Boards of Examiners for Provincial Land Surveyors at Toronto and for Dominion Land Surveyors at Ottawa.

The Village of Brighton, which was the home of Mr. Webb during the last twenty-five years of his life, was almost entirely laid out by him. Mount Hope Cemetery, in Brighton, which was subdivided by him many years ago, now contains his earthly remains.

Mr. Webb leaves a wife, two sons and a daughter to mourn his loss. Prominent in matters political, municipal, and professional, he will be missed by many.

TORONTO, JUNE 10TH, 1891.

LIST OF MEMBERS.

ACTIVE MEMBERS.

NAME.	OCCUPATION.	ADDRESS.
Abrey, George Brockitt		35 Adelaide Street E. Toronto.
Aylsworth, Wm. Robert		Deseronto.
Engineer for Napanee, Tamworth and Quebec Railway.		
Aylsworth, Charles Fraser, Jr...		Madoc.
Engineer for Tps. of Sydney, Thurlow, Rawdon, Huntingdon, Hungerford, Madoc and Tyendinaga, also Villages of Madoc and Tweed.		
Baird, Alexander.....		Box 195, Leamington.
Engineer for Tps. Romney, Tilbury W., Colchester S., and Malden, also Town of Leamington.		
Beatty, David		Parry Sound.
Berryman, Edgar, M. Can. Soc. C.E.....		Sherbrooke, Que.
Chief Engineer Quebec Central Railway.		
*Bolger, Francis		Penetanguishene.
Bolton, Jesse Nunn		Albion.
*Bolton, Lewis.....		Listowel.
Engineer for Townships of Elma, Grey, Morris, Town of Listowel and Village of Drayton.		
Booth, Charles Edward Stuart, A. M. Can. Soc. C.E.,		Radford, Virginia.
*Bowman, Clemens Dersteine		West Montrose.
*Bowman, Herbert Joseph, Grad. S.P. Sc. (Toronto); A.M. Can. Soc. C.E.		Berlin.
Superintendent Berlin Water Works.		
Browne, Harry John.....		17 Toronto Street, Toronto.
Browne, Wm. Albert		17 Toronto Street, Toronto.
Burke, Wm. Robert.....		Ingersoll.
Butler, Matthew Joseph, M. Am. Soc. C.E.; M. Can. Soc. C.E.; Asso. M. Inst. C.E.....		Napanee, Ontario.
*Campbell, Archibald Wm., A. M. Can. Soc. C.E.....		St. Thomas.

NAME. OCCUPATION. ADDRESS.

Campbell, David Suter.....Box 253, Mitchell.
Engineer for five Townships.

Casgrain, Joseph Philip Baby, A. M. Can. Soc. C.E...Morrisburgh.

Cavana, Allan George ..... Orillia.
Engineer for Townships of Rama, Mara, Carden and Dalton; Land, Loan and Ins. Agt.

Cheesman, Thos.....Mitchell.

Chipman, Willis, B.A.Sc. (McGill); M. Am. Soc. C.E.;
M. Can. Soc. C.E.....103 Bay Street, Toronto.
Branch Offices at Brantford, Galt, Barrie and Brockville.
Civil and Sanitary Engineer.

Coad, Richard .....Glencoe.

*Cozens, Joseph.....Sault Ste. Marie.
Mem. Am. Soc. M.E., Pres. Sault Ste. Marie & Hudson Bay Ry.

Davidson, Walter Stanley.....16 Warren Ave., Petrolea.

*Deans, William James ..... Oshawa.

*De Morest, Watson.....Sudbury.

De Gursé, Joseph ..... Windsor.
Chief Engineer, Lake Erie, Essex & Detroit River Railway.

Dickson, James.....Fenelon Falls.
Engineer for Tp. of Fenelon, Inspector Crown Lands Surveys.

Doupe, Joseph, C.E. (McGill)....7 Princess Street, Winnipeg, Man.

Drewry, William Stewart.....Dept. of Interior, Ottawa.
Triangulation Survey of part of Rocky Mountains, Topographical Survey of Canada.

Ellis, Henry Disney, C.E .....Toronto.
Assistant Engineer in charge of Roadways, City Engineer's Dept.

Esten, Henry Lionel .....157 Bay Street, Toronto.

Evans, John Dunlop, M. Can. Soc. C.E.
Copper Cliff, near Sudbury, Ontario.
Chief Engineer Central Ontario Railway, General Manager Canadian Copper Company.

Fairbairn, Richard P.....127 Major Street, Toronto.
Public Works Dept., Ontario.

Farncomb, Frederick William.....Box 107, Exeter.
Engineer for Exeter, also Townships of Hay and Stephen.

Fawcett, Thomas, D.T.S.....Gravenhurst.
Dominion Government Surveys.

NAME. OCCUPATION. ADDRESS.

Fitton, Charles Edward ..... Drawer 31, Orillia.
Engineer Wahnapatae Mining Company, Land and Insurance Agent.

Flater, Frederick William ..... Chatham.

Foster, Frederick Lucas..... 157 Bay Street, Toronto.

Galbraith, John, M.A.; Assoc. M. Inst. C.E., D.T.S..... Toronto.
Professor of Civil Engineering, School of Practical Science.

Galbraith, William ..... Bracebridge.

Gardiner, Edward ..... St. Catharines.
Engineer County of Lincoln.

Gaviller, Maurice, C.E. (McGill)..... Barrie.

Gibson, Peter Silas, B.Sc.; C.E.; M.Sc. (Univ. of Mich).. Willowdale.

Hart, Milner..... 103 Bay Street, Toronto.

Henderson, E. E..... Henderson, Maine.

Jephson, Richard Jeremy ..... Calgary, Alberta, N -W.T.

*Johnston, Robert T..... 131 Wellington St. W., Toronto.

Jones, Thomas Harry, B.A.Sc. (McGill)..... Brantford.
City Engineer.

Jones, Charles Albert ..... 215 Dundas Street, London.

Keefer, Thos. Coltrin, C.M.G.; M. Inst. C.E.; Pres. A. Soc. C.E.; Can. Soc. C.E. ..... Ottawa.

Kirk, Joseph ..... Box 373, Stratford.
Engineer for Townships of Mornington, South Easthope, North Easthope and Village of Melverton.

Kirkpatrick, George Brownly..... 8 Coolmine Road, Toronto.
Chief Clerk Survey Branch, Department of Crown Lands.

Klotz, Otto Julius, D.T.S.; C.E. (University of Michigan).. Preston.
Astronomer for Department of Interior.

Laird, Robert, Grad. S. P. Sc. (Toronto.)
City Surveyor's Office, Toronto.

Lawe, Henry.....Hare Building, West Main St., Norfolk, Virginia.

*Lendrum, Robert Watt ..... Vankleek Hill.

Lewis, J. B..... Brunswick House, Ottawa.

Low, Nathaniel E..... Wiarton.

NAME. OCCUPATION. ADDRESS.

Lumsden, Hugh David, M. Inst. C.E.; M. Can. Soc. C.E. ..... 7 Homewood Ave., Toronto.
Engineer for Atlantic & North-West and International Railways.

McAree, John, Grad. S.P.Sc.; D.T.S. ..113 Winchester St., Toronto.

McCulloch, Andrew Lake, Grad. S. P. Sc., Toronto ..... Galt.
Engineer in Charge of Construction Galt Water Works, and Engineer for Town of Galt, Townships of Beverley and North Dumfries.

*McEvoy, Henry Robinson ..... St. Mary's.
Tourists' Guide, North Bay.

McFarlen, George Walter ..... 11 St. Vincent Street, Toronto.

*McGrandle, Hugh ..... Huntsville.

McKay, Owen ..... Windsor.
Assistant Engineer L. E. E. & D. R. Ry.

*McKenna, John Joseph ..... Dublin.

McNabb, John Chisholm ..... Chatham.
Engineer for Erie & Huron Ry. and Town of Chatham.

Miles, Charles Falconer ..... Walkerton.
Engineer Minto, Normanby, Carrick, Brant, Greenock, Bruce, Arain and Town of Wingham.

Moore, John McKenzie ..... Albert Building, London.
Engineer for four Townships.

Morris, James Lewis, C.E. (Toronto University), A. M. Soc. C. E. ..... Pembroke.
Engineer County of Renfrew.

Mountain, George A. ..... Ottawa.
Chief Engineer Can. Atlantic Ry., and Chief Engineer Ottawa and Parry Sound Ry.

Murphy, Chas. Joseph ..... 157 Bay Street, Toronto.

Niven, Alexander ..... Haliburton.
Outline Surveys, Crown Lands Department.

Ogilvie, William ..... Ottawa.
Dominion Land Surveyor.

Patten, Thadeus James ..... Little Current.
Agent for Can. Perm. Loan and Savings Co.

Paterson, Jas. Allison, M. C. Soc. C.E.
9 Masonic Chambers, Toronto St., Toronto.
Engineer for Toronto Belt Line Ry.

Proudfoot, Hume Blake, C.E. (University of Toronto) ..... Toronto.

NAME.	OCCUPATION.	ADDRESS.
Purvis, Frank	Engineer for Townships of Bromley and Wilberforce.	Eganville.
Rainboth, E. J		48 Sparks St., Ottawa.
Roberts, Vaughan Maurice		11 Peter Street, Toronto.
*Robertson, James, Grad. S. P. Sc.		Glencoe.
*Rogers, Richard, Birdsall; B.A.Sc. (McGill)	Superintending Engineer Trent Canal.	Peterboro'.
Ross, George, B.A. Sc. (McGill)	Engineer for Towns of Welland and Niagara Falls, and six Townships.	Welland.
Russell, Alexander Lord	Mining Engineer.	Box 240, Port Arthur.
Sankey, Villiers	City Surveyor.	City Hall, Toronto.
Sanderson, Daniel Leavens		Enniskillen.
*Saunders, Bryce Johnston, B.A.Sc. (McGill)	Engineer for Counties Leeds and Grenville, Townships Augusta and Elizabethtown.	Box 114, Brockville.
Scane, Thomas	Engineer for Townships of Orford and Done, and Town of Ridgetown.	Ridgetown,
*Selby, Henry Walter		Castile, New York.
Sherman, Ruyter	Assistant City Engineer.	Brantford.
Smith, Henry	Supt. Colonization Roads.	Crown Lands Dept., Toronto.
Speight, Thomas Bailey		Arcade, Yonge Street, Toronto.
Steele, Edward Charles		34 Yonge Street, Toronto.
Stewart, Elihu		Collingwood.
Stewart, Louis Beaufort, D.T.S.	Lecturer on Surveying.	School of Practical Science, Toronto.
*Tiernan, Joseph M	Engineer for three Townships.	Tilbury Centre.
Tyrrell, James Williams, C.E. (Toronto)	Engineer for Townships of Ancaster and Flamboro' West, and Village of Burlington.	42 James St. N., Hamilton.
Unwin, Charles		157 Bay Street, Toronto.
Ure, Frederick J.	Engineer for Town of Ingersoll and six Townships.	Woodstock.

NAME. OCCUPATION. ADDRESS.

VanNostrand, Arthur Jabez.....Arcade, Yonge Street, Toronto.

*Vicars, John ..... Cannington.
Engineer for Village of Cannington.

Warren, James, Asso. Mem. Can. Soc. C.E. .. .. Kincardine.
Engineer for the Townships of Ashfield and Culross, Kincardine and Bruce, and Lucknow Water Works.

Weatherald, Thomas .....Box 116, Goderich.

Webb, Adam Clark, D.L.S. ..... Brighton.

*Wheeler, Arthur Oliver ..... Ottawa.
Department of Interior.

Wheelock, Chas. Richard..... Orangeville.
Engineer for Counties of Wellington, Dufferin and Peel.

Whitson, James Francis ..... North Bay.
Engineer for six Townships.

Wicksteed, Henry King, B.A.Sc. (McGill), M. C. Soc. C.E..Cobourg.

Wilkie, Edward Thomson.....Carleton Place.

Yarnold, William Edward ..... Port Perry.
Engineer for Townships of Brock, Reach, Scugog, Mariposa and Georgina.

HONORARY MEMBER.

Carpmael, Charles, M.A.....Toronto.
Superintendent of Meteorological Service.