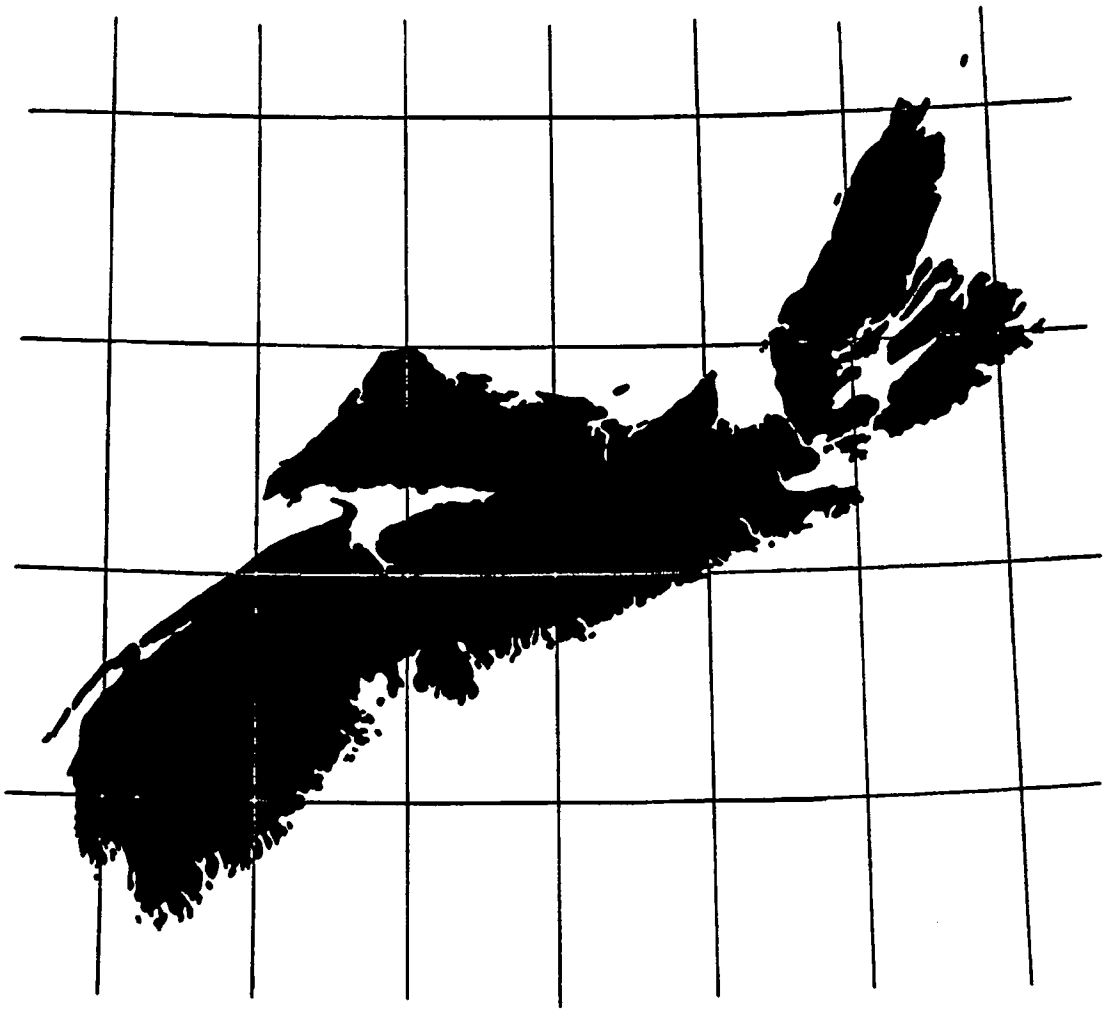
The NOVA SCOTIAN SURVEYOR



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The NOVA SCOTIAN SURVEYOR

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WALTER E. SERVANT
President

H. B. ROBERTSON
Secretary-Treasurer

R. E. MILLARD
Editor

Address all communications to P. O. Box 1541, Halifax, Nova Scotia

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Minutes of Meeting of the Council

Held in the Association Room, Y. M. C. A., 187 South Park Street, Halifax Nova Scotia, Monday, September 19th, 1960

MEMBERS PRESENT: Walter E. Servant, President; Donald L. Eldridge, Vice-President; John A. McElmon; Spencer Ball; A. F. Chisholm; Freeman Tupper; Errol R. Hebb; J. E. R. March; H. B. Robertson, Secretary-Treasurer.

President Servant called the meeting to order at 3:00 p.m. He said that the minutes of the last meeting had been printed and mailed to all members of the Council, and asked for a motion that the minutes be adopted as printed.

It was moved by Spencer Ball and seconded by A. F. Chisholm, that the minutes of the last meeting be adopted as printed. Motion carried.

President Servant then asked the Secretary-Treasurer for a report on the finances of the Association.

The Secretary then advised the meeting that when all outstanding accounts have been paid ,the Association will have a balance of approximately $75.00. He said that many of the members have not paid their 1960 dues. He said that he has not sent out Bills since the first of the year, but has been waiting until the by-laws have been passed by the Governor-in-Council.

President Servant then asked if there was any business arising out of the minutes of the last meeting, and as there were none he then called on Col. Ball to give a report on the Board of Examiners.

Col. Ball said the Board has had several meetings, and they are now making an effort to line up the subjects for the examinations. He said that a working committee, comprised of Prof. Chisholm and J. R. Cameron, who are empowered to call in others if necessary has been formed to prepare the basic material for preliminary examinations. He said that they hope to have the Text Books, and Syllabus of Examinations lined up and ready to go by the next meeting of the Board, which will be held sometime in October. He said that they expect that they will be approached by some who wish to sit the final examinations, but that they do not feel that they are obliged to give a final examination at this time. He said that the Board feels that December is the wrong month to hold examinations, but that under the new Act it is compulsory that examinations are held at that time. He said that they feel that this does not present the best opportunity to the candidate. He said that they feel that sometime in the spring is the best time to hold the examinations.

President Servant said that he feels that it will be necessary to amend the Act.

Mr. Eldridge asked the reason that the Board feels that the December examinations should be dropped.

Prof. Chisholm said that the Act should be amended because at the present time if examinations are held in the spring, that under the present Act the Board must also offer examinations in December.

President Servant said that if examinations are held in March, that the student has the opportunity to write his exams, get the results, and have time to write a supplemental before time to go out for summer employment.

Mr. Eldridge said that this would only give one month at the most, and that he does not feel that this is time enough for the student who must write more than one supplemental.

President Servant said that he agrees with Mr. Eldridge, that one month is not enough for the student who will be required to write more than one supplemental, but for the student who only needs to write the one subject, one month is ample time.

President Servant then called on Mr. March, Chairman of the Committee to study the Registry Act, and the Proposed Co-ordinate System, to report on the activities of his committee.

Mr. March informed the meeting that very little had been done since the last meeting of the Council, due to the very heavy pressure of business.

President Servant asked Mr. March if he would be able to have a report ready for the Annual Meeting.

President Servant then called on Mr. McElmon, Chairman of a Committee appointed to study the Costs and Fees Act.

Mr. McElmon said that this Committee also had little to report since the last meeting, also due to the extra heavy pressure of business this past summer. He said that he had discussed this matter with a few lawyers, and other surveyors, and did not feel that this was too serious a matter.

President Servant then called on Mr. March to report on what had been done in connection with the case in the Cape Breton area, where a surveyor had been accused of receiving payment for a survey which he had not actually made on the ground.

Mr. March said that because of the extra work this past summer in connection with the new Pulp Mill being erected at Point Tupper that he has not had the opportunity to investigate the matter on the ground, but that he is turning the matter over to Mr. Boehk, who is now working in that area.

President Servant then read a letter from Major Church, dated May 14th, 1960. In his letter Major Church stated that it was with regret that he had to state to the Council and to President Servant his profound disquiet at the action taken by the Board of Examiners for the following reasons:

1) That only one member of a sub-committee set up by the Board of Examiners for the purpose of setting papers, co-ordinating exams, setting fees and dates of examinations and other relevant matters, is on the faculty of any University. That this is contrary to the Association's endorsement of the Holloway Report of Standardized Education and Examinations for land surveyors. That the basis for the Association's endorsement of this report is that the Board of Examiners obtain the services of members of the Faculties of Maritime Universities, who shall set the various papers for candidates, and submit the papers with complete solutions to the Board of Examiners to ensure their suitability as land surveyor's problems.

2) That he feels that the ruling by the Board of Examiners, that examinations should be set as to require the return of the examinations is a deplorable attitude.

3) That the suggestion that the District Forest Ranger be appointed as invigilator for an examination to be held in Lawrencetown is somewhat unfortunate, that because of his occupation he is subject to the hazard of unpredictable absence at a forest fire or other urgency. That is the absence of such invigilator the duty would fall upon an instructor, which he feels most undesirable.

In his letter, Major Church also asked if the Committee on Syllabii had been discharged, and if so he said that he had not been notified. That as the matter now stands a sub-committee has been found to set examinations, and that no syllabii for Intermediate or Final examinations has been formulated.

Prof. Chisholm said that the sub-committee appointed by the Board were not appointed as examiners, but only to set up the required text books, and subjects for the examinations.

It was the opinion of the Council that the Committee referred to by Major Church as the Committee on Syllabii for Examinations, was the committee appointed at the meeting of the Council held on April 13, 1959, which consisted of Prof. Chisholm, Major Church, and D. L. Eldridge. The duties of this committee was to examine the organization of the Board of Examiners, and report back to the next meeting of the Council. This being done the Committee had completed its duties.

Col. Ball said that at the start we should insist that the examinations papers are returned to the examiner. He said that if there are too many objections to this it could be brought up at the Annual Meeting.

President Servant said that he feels that the candidate should have an idea of the type of questions that he will be required to answer. He suggested that a sample set of examinations should be made up for the guidance of those who intend to write the examinations.

Prof. Chisholm said that it is desirable to use the old examinations over and over. He said that it is most difficult to set up new examinations each year, especially in the legal examinations.

President Servant said that entirely new examinations each year is going to run into money, but that he feels that identical questions should never be used.

Mr. March reminded the members that there is one source of assistance that we are not taking advantage of, and that is, "The Canadian Institute of Surveying". He said that he feels that the present President, Mr. R. Thistlethwaite, who is also the Surveyor General of Canada would be willing to assist us in the setting up of our examinations.

Prof. Chisholm said that for the first two or three years it will be necessary to use an entirely new set of examinations for each year.

President Servant said that at the meeting of the Board mentioned by Major Church, it had been suggested, that for the convenience of the students at the Nova Scotia Land Survey Institute, that the examinations might be held at the School at Lawrencetown, and that Mr. Creighton had suggested that the District Forester for that area might be used as proctor during he examinations, and that it had been misquoted in the minutes of the Board of Examiners to read "District Forest Ranger." He said that he did not feel that there would be any objection to having the District Forester acting as proctor as many of them are also Provincial Land Surveyors, and members of the Association.

President Servant said that the question of an amendment to the Act in order that examinations could be held in the spring without the necessity of another examination in December as is now necessary under the present legislation, is now being considered by the Board.

Col. Ball said that he feels that very few will want to write the examinations in December, but that he does not feel that examinations held in May, as suggested by Major Church would work out too well as it would probably conflict with the University Examinations.

President Servant said that he agrees with Col. Ball, and said that he feels that the P.L.S. examinations should be over at least one month ahead of the Universities.

Prof. Chisholm said that he feels that the most of our future land surveyors will come from the Nova Scotia Land Survey Institute.

President Servant said that in a few years time we can also expect some of the candidates for P.L.S. will come from the University of New Brunswick survey course.

President Servant then read a second letter from Major Church, in which it is suggested that the Association prepare a brief for presentation to the Government of Nova Scotia, explaining the necessity for the support of the newly formed Aerial Survey Company recently set up at Dartmouth. In his letter, Major Church stated that there is little benefit to the surveyors in this Province when highway contracts for aerial surveys are given to firm outside of the Province, who in turn bring in their own survey crews to do the ground control surveys.

President Servant explained the reason behind Major Church's letter, and said that in the spring of this year the Department of Highways called for tenders for aerial mapping of large portions of the Province, and that the contracts had been awarded to a Montreal firm. He said that from their bids, which were much lower than those tendered by the local firm it would appear that they were only after the contract in order to keep their staff busy even if it meant that they did no more than meet expenses. He explained that there is very little benefit to the Province other than the actual mapping. He said that if the ground control surveys are done by outside surveyors, that the notes for these surveys are not available for future reference.

Prof. Chisholm said that he does not like to see the survey notes going out of the Province, but feels there is little we can do. He said it is like asking them to use coal when oil is cheaper.

Col. Ball said that we could put in a brief asking for protection for the local firm against unfair competition.

Mr. Eldridge said that we can not get anywhere with further discussion of this subject, and reminded the meeting that there is still considerable business to be dealt with.

President Servant then read a letter from Maurice Lloyd, Planning Engineer for the Town of Dartmouth. Mr. Lloyd wanted to know when our Regulations will be finalized, and suggested that more rigid standards of surveying be adopted by all Provincial Land Surveyors. In his letter, Mr. Lloyd stated that the surveyor must certify that the plan shows the manner that the land was surveyed and subdivided; that tentative plans are coming in and certified by a P.L.S., then a later plan of survey, also certified, will be sent in of the same area, but does not agree with the tentative plan; that one certified plan was submitted on which one lot was missing.

President Servant said that at last Annual Meeting we were approached by Mr. Reardon, Planning Engineer for the Municipality of the County of Halifax, to set up permanent monuments. He said that a report was submitted, but that the Planning Board did not know what to recommend for their coming revised sub-division regulations. He said that Mr. Reardon had suggested that the Association should go before the Planning Board and explain co-ordinates.

President Servant said that if the Board insisted that all surveyors adhere to the existing planning regulations that their problems would be solved. He said that he also feels that we should meet with Mr. Lloyd.

Mr. March said that they are looking for co-operation and we should co-operate with them.

President Servant said that he would meet with Mr. Lloyd. He then called on Col. Ball to read a letter that he had prepared to be forwarded to all of the Planning Boards in the Province.

Col. Ball's Letter:
To "X" Planning Board,
Gentlemen,

As you are no doubt aware, the Association of Provincial Land Surveyors of Nova Scotia have received recognition from the Government of Nova Scotia and are now under obligation to administer the Act in regard to qualifications, examinations and discipline, of all Nova Scotia Land Surveyors.

It has been the aim of the Association to promote the best interests of the public and the members of the Association in every way possible, and in view of the experience of the past fifteen years, it appears that one avenue would be to make available to all bodies concerned with surveying, the benefit of our experience and training.

Since town planning is inevitably interwoven with surveying, it seems that planning boards are the logical bodies to which this offer be made.

We therefore are approaching you with the suggestion that one of our experienced members be made available to sit with your board at meetings concerned with surveying, not as a member of such board, but as a delegate from this Association, to act in an advisory capacity, when requested to do so by your board.

In the past there have been many situations which, we feel, could have been greatly helped if such a course had been followed, and these situations could arise in the future, particularly in the case of boards where membership does not include a Provincial Land Surveyor.

It is in this thought of mutual assistance, that we present this suggestion, and request your careful consideration of our proposal.

Assuring you at all times of our fullest co-operation in all matters relating to surveying.

We remain.
Your truly,

The Association of Provincial
Land Surveyors of Nova Scotia.

It was approved by the Council that copies of this letter be sent to all Planning Boards in the Province.

President Servant then suggested that a "Halifax Metropolitan Committee" be set up, to deal with the many survey problems that come up from time to time, and that in most cases apply only to this area. He said that he feels this is important because the survey problems in this area, are in most cases entirely different from those which may arise in other parts of the Province. He said that he is getting calls almost every day, from surveyors who do not know who to turn to for assistance with their problems. He said that he does not feel that the full Council should be called in to act on these problems whcih are only of interest to the surveyors in this area.

Mr. March said that he feels this is a good idea.

Mr. Eldridge asked President Servant how he proposes to set up this committee.

President Servant said that the members who are interested in local problems could meet once a month, and talk over their problems and report back to the Council.

Mr. Eldridge said that in some cases the problems may also apply to the rest of the Province, or to some other areas, such as Truro, Sydney or one of the other larger areas.

Col. Ball said that in the cases such as this, the information obtained by the committees would be made available to the other areas.

Mr. Eldridge said that under those conditions he would give his full support to the setting up of such a committee.

Col. Ball suggested that the committee be limited to five members.

Col. Ball then moved that a committee to be known as the Halifax Metropolitan Committee, be set up to deal with problems affecting surveyors in the Halifax Metropolitan area. That this committee consist of: John A. McElmon, R. J. Donovan, George Bates, Ed Rice, the President of the Association, and that Mr. John Pertus of the Department of Highways, if he is willing to serve shall be on call in the case of any problem affecting the layout of roads in sub-divisions in the County area.
Seconded by Prof. Chisholm. Motion carried.

President Servant then called on Col. Ball to read the recommendations of the Board of Examiners re: Amendments to the Provincial Land Surveyors Act.
Col. Ball then read the proposed amendments:

That the examination dates be changed from December to sometime in the spring.

That the clause giving automatic license to Dominion Land Surveyors be amended.

That provisions for a Practical Examination and an Oral Examination be included in the Regulations for Provincial Land Surveyors.

President Servant then asked the Council to consider the setting up of a permanent legislation committee. He said that he feels that such a committee is necessary to study the Act, the By-Laws, and the Regulations and to make recommendations for any amendments they consider necessary. He said that this committee could also study all Bills going before the Legislature to determine any legislation which may affect Provincial Land Surveyors, or the Surveying Profession in this Province.

Col. Ball moved that Mr. V. P. Harrison be chairman of a legislation committee to be comprised of Mr. J. F. Doig, and Freeman Tupper, with the power to add if they feel it is necessary.

President Servant then asked the Members of the Council to consider the matter of the Tenth Annual Meeting. He suggested that we are inviting too many guests. He informed the members that arrangements have been made at the Lord Nelson Hotel, to hold the meeting on Monday and Tuesday, November 21st and 22nd, and asked the meeting for approval of those dates.

It was moved by Mr. March that the Tenth Annual Meeting be held on November 21, and 22, 1960, at the Lord Nelson Hotel, Halifax.
Seconded by Mr. Eldridge, motion carried.

It was moved by Prof. Chisholm that the Vice-President shall be program chairman.
Seconded by Col. Ball. Motion carried.

President Servant then asked that if there was no further business, that a motion to adjourn would be in order.

Moved by Mr. Eldridge that the meeting adjourn.
Seconded by Mr. March.

The meeting of the Council adjourned at 6 p.m.

REPORT OF BOARD OF EXAMINERS

For the Association of Provincial Land Surveyors of Nova Scotia

Mr. President:

Your Board of Examiners met regularly at about monthly intervals except for the summer months when business activity prevented the Members from being present, largely on account of absence from the City.

The Meetings were well attended and discussion was very active, with the result that most of our problems were overcome with unanimous decisions.

Our chief target was the arranging for the December Examinations, and preparing the ground for future Examinations. Fees for Examination are still under consideration.

It was found that the month of December, which is stated in the Act as the only one required month for Examination, is not likely to be satisfactory. The Survey Institute, the Universities and other educational establishments finish their yearly instruction about May, and it would be more acceptable for our Examinations to take place at a date closer to the end of the educational year. We are therefore asking that the Act be amended to substitute April or May for December; there would be the added benefit that students could receive their marks before taking steps toward summer employment.

The question of the December examination for the current year was placed in the hands of a committee composed of Prof. Arthur Chisholm and Mr. Bob Cameron. These gentlemen did a notable piece of work, and the results were accepted by the Board. In brief, the only examinations to be held in December 1960 will be the Preliminary Examinations, and the Legal Paper for engineers as prescribed under the old Act. Intermediate and Final Examinations are planned for the spring, and will be announced later.

All arrangements are complete for the December session, but similar details for the spring must wait for information regarding the number of students writing. Tentative plans however, have been laid for the spring, and will be adjusted as further reports are received.

In closing, I should like to thank all Members of the Board for their fidelity in attendance, their unfailing co-operation and the degree of their accomplishments. It has been a privilege to serve with these gentlemen.

The Act states that the Members of the Board are elected for one year; we, therefore, in the moment of our dissolution, wish to express our appreciation to the Members for the opportunity to serve during the past year.

Respectfully submitted.

Spencer Ball,
Chairman Board of Examiners

THE LAW AND THE SURVEYOR

By W. Marsh Magwood, Q.C., in *The Canadian Surveyor*

PART ONE: THE EFFECT ON RETRACEMENT OF LAND TITLES AND REGISTRY SYSTEMS

The basic difference between the two prevailing systems of land registration in Ontario (Land Titles system and the Registration system) has given rise over the years to two dissimilar and frequently opposing methods of retracement of boundaries of property. This variance is disclosed in many instances when an owner desires to bring his land under the Land Titles Act and submits in support of his application a survey or surveys of his property made at some earlier date.

The outstanding differences in the two modes of retracement may be expressed in general terms as follows:

(a) Under the Registry Act, many surveyors show the fencelines or other lines of occupation as the boundaries, without sufficient investigation for survey monuments, and often without sufficient regard for whether or not title has always accompanied occupation.

(b) Under the Land Titles Act, many surveyors adhere strictly to the measurements and bearings on the register, without sufficient investigation for survey monuments and with complete disregard for occupational evidence.

Both concepts are entirely erroneous and in fact the differing systems of registration have no bearing, or should have no bearing, whatsoever on the duties of a surveyor in retracement work.

Perhaps a brief outline of the Registry and Land Titles systems, and some comments on the Limitations Act in relation thereto, will serve both in showing how these conceptions came about and why they are erroneous.

The Ontario Registry Act, first passed in 1795, originally provided for the registration of memorials of instruments, not the originals, by means of alphabetical indexes. This system still prevails in the Maritimes and in the Commonwealth of Massachusetts and many other American States. Under it, to each title one must have the owner's name. Unfortunately, in many areas the indexes were inadequately maintained.

In 1865 the Ontario registry system was changed by the introduction of the "abstract index". By this innovation registration books were opened and kept with pages reserved for the recording of registered instruments affecting each original township lot or, where a plan of subdivision had been registered, each lot shown on the plan. With the introduction then of the "abstract index" it became no longer necessary to know the owner's name in order to search title.

The registry office system therefore, as its names implies, is simply a registry of deeds, and while the actual instrument registered is required by the Act to be properly executed, legally speaking, there is no requirement as to the accuracy, standards, or even the validity, of the description or plan or both that form part of the instrument.

The only measure of guarantee available to an owner, under the Registry Act, is the personal guarantee of the conveyancer, and that only to the extent that would be assessed against him by a court of law. Moreover, obtaining judgement is one thing, recovery another.

The advent in 1929 of the Investigation of Titles Act had the effect of limiting the investigation of title to 40 years in order to obtain a good root of title. However, 40 years back represents a lot of searching and, whereas one need not go beyond that time for a root of title, I cannot see that this limits in any way the period that a surveyor must go back in his search for evidence of the extent or the boundaries of a lot or parcel. This search frequently must go back to the original grant, because the original grant may contain references to evidence of boundaries that today may still exist on the ground.

The Land Titles, or Torrens, system was devised in 1857 in South Australia by one Robert Torrens, later knighted for his efforts. Many Commonwealth countries adopted the system shortly thereafter and Ontario did so in 1885.

The three essential principles of this Act may be stated as follows:

1. The Mirror Principle. This involves the proposition that the register of title is a mirror that reflects accurately and completely and beyond all argument the current facts that are material to a man's title.

2. The Curtain Principle. This means that the register is the sole source of information for proposed purchasers, who need not, and indeed must not, concern themselves with trusts and equities that lie behind this curtain of information.

3. The Insurance Principle. This means that the mirror (register) is deemed to give the absolutely correct reflection of title, but if through human frailty (as was brought to light in the Turta case in Alberta) a flaw appears, anyone who suffers loss must be put in the same position, so far as money can do, as he would have been in had the reflection been a true one.

There are many advantages accruing under this system, to the owner, to the surveyor and to the lawyer. Those that affect the surveyor particularly are as follows:

1. It is the registry of title, not of deeds. Hence the searcher need not search through a long list of documents.

2. The register contains the certified title and the deeds (transfers) are mere evidence of it.

3. Th registers are conclusive as to the state of ownership. Therefore,

(a) it is not necessary for a person searching the title to a parcel of land to enquire further than the register for that parcel;

(b) a person shown in the parcel register as the registered owner is conclusively the owner of that parcel and he is the only person who may deal with that parcel;

(c) no right, title or interest in or to the land can be acquired by any length of adverse possession or prescription in derogation of that of the registered owner.

4. The titles of registered owners are guaranteed and compensation to persons wrongfully deprived of an interest in land may be awarded out of the Assurance Fund. This is one of the main features of the Act.

Item 3 (c) above, nullifying any claims of possession that might be made against an owner has recently been fortified by an amendment to the Act, specifically excluding any application that the Limitations Act might be said to have had with regard to length of adverse possession.

The fact that no right, title or interest in or to land can be acquired by any length of adverse possession in derogation of that of the registered owner has led frequently to surveyors' ignoring evidence of monuments and occupation on the ground, and has caused them to follow exactly the measurements and bearings on the register. Such procedure of course is contrary to the ancient laws of retracement and leads to the perpetuation of error and all manner of infringements of property rights.

Conversely, in retracements made under the Registry Act, the adherence of many surveyors to the belief that the Limitations Act confers a new title every ten years, and that such title is bounded by the existing fence, has led to serious lapses in the duty of a surveyor to search for the original monuments. Then too, once possession is shown (and it can only be shown if the original line is proven as well as the possessory line), that alone does not confer title on the claimant. He must get title either by deed or under the Quitting of Titles Act.

What the claimant, if he can show open, notorious and undisturbed possession for ten years or more, does in fact have is a better right to that land than the original owner who may not have done anything to disturb the occupation of the man in possession.

This fact of possession may be looked as title to land, even though unregistered, but the surveyor should beware, for what may often be claimed as good

possessory title, because a fence has existed for ten yars or more, may turn out on further investigation not to meet all the lawful requirements of open, notorious, undisturbed possession.

In effect, whether retracing Registry Office deeds or Land Titles land, the surveyor should allow nothing to divert him from his duties of searching for evidence, and this concept of surveying will be discussed in detail under "Judical functions of a surveyor," which follows later in the series of lectures.

Thus far I have dealt principally with the Ontario system. However, the four western provinces have land registry systems, likewise patterned after the Torrens system, under which the titles to land therein registered are guaranteed much as they are in Ontario. The relative acts are:

Alberta Land Titles Act, R.S.A. 1942, Chap. 205.

Land Registration Act (British Columbia) R.S.B.C. 1948, Chap. 171.

The Real Property Act (Manitoba) R.S.M. 1954, Chap. 220.

Saskatchewan Land Titles Act, R.S.S. 1953, Chap. 105.

The Ontario Act is The Land Titles Act, R.S.O. 1960, Chap. 204.

All these statutes, being patterned after the Torrens system, with the exception of Ontario's which was taken from the Land Transfer Act of England, are basically the same in that, by procedures varied in many respects, titles guaranteed by the state are issued. In fact, in the West they call the Certificates of Title The Title. A person interested in any land under these systems can with facility learn from the certificates the ownership and that to which the titles are subject. In Ontario, of course, our registers are the certificates and they are consulted.

To be truthful, I could not say that in the western jurisdictions you need not go behind the certificate for the purpose of ascertaining relevant matters thereto, but to distinguish the various procedures that necessitate doing so would be too time-consuming for our present purpose.

Under these various statutes, accuracy of description of land is required. The West was far ahead of us in this respect until we succeeded in having promulgated our regulations with respect to surveys and plans. They in the West, being surveyed in the grid system of sections, townships and ranges common to the larger part of the great central plain area of North America, and being accustomed to the use in cities of filed plans, do not experience great difficulty in securing succinct descriptions. Of course such work in the West is more recent than ours in Ontario.

In Ontario in addition to our Land Titles Act and Registry Act, we now have The Certification of Titles Statutes of Ontario, 1958, Chap. 9. The principles of this new act are twofold: (1) Any person who is the owner of an estate in fee simple in land, or who, in the terms of regulation 7(b), can show that he is so entitled under the Limitations Act or by prescription, whether or not it be encumbered, may apply to the Director of Titles to have his title certified. (2) In an area proclaimed by the Lieutenant-Governor in Council as a certification area, no plan of subdivision may be registered unless and until the title to the lands shown on the plan has been certified.

The advantages of the Act are: (1) A certificate of title when registered in accordance with section 12 is conclusive, as of the day, hour and minute named therein, that the title of the owner of that land is absolute and indefeasible. (2) Exceptions, limitations, qualifications, and reservations of a general nature found to apply to the title by the Director of Titles (many of which may be eliminated by him) and specific encumbrances and conditions are set out in a schedule of the certificate. (3) The certificate when registered constitutes a new root of title, and it is unnecessary to go behind it. (4) After a plan of subdivision has been registered in a certification area, the same situation will apply as in (3) above. (5) The survey and plan must be prepared in accordance with the regulations (the Code of Standards for Surveys) which ensure, adequacy, proper monumentation and accuracy in defining the perimeter boundaries of the land.

PART TWO: SCOPE AND FUNCTIONS OF A SURVEYOR

Province of a Surveyor

A surveyor is carefully trained in the theory and practice of the linear and angular measurement of boundaries of land, and this, in general, determines the scope of the greater part of his functions. While it is true that certain surveyors receive a more intensive and scientific training, usually by the Government of Canada for the express purpose of conducting geodetic, hydrographic and topographic surveys, in the main the survey carries out the following functions, which may be indicative of the province or scope of most of his work: (1) plane surveying, including mining surveys, engineering surveys, building location surveys, etc.; (2) subdivision surveys of land; (3) re-definition of properties for various purposes.

It is in connection with the last two functions that the surveyor requires a thorough knowledge of the law relating to transactions with land and it is on this aspect of law that these lectures are designed.

JUDICIAL FUNCTIONS OF A SURVEYOR

I do not know of a better definition of this function than that given by Justice Cooley of the Michigan Supreme Court, and the following is the substance of his opinion, excluding only those references to statutes that do not apply there:

"When a man has had a training in one of the exact sciences, where every problem within its purview is supposed to be susceptible to accurate solution, he is likely to be not a little impatient when he is told that, under some circumstances, he must recognize inaccuracies, and govern his action by facts which lead him away from the results which theoretically he ought to reach. Observation warrants us in saying that this remark may frequently be made of surveyors.

"In the State of Michigan all our lands are supposed to have been surveyed once or more, and permanent monuments fixed to determine the boundaries of those who should become proprietors. The United States, as original owner, caused them all to be surveyed once by sworn officers, and as the plan of subdivision was simple, and was uniform over a large extent of territory, there should have been with due care, few or no mistakes; and long rows of monuments should have been perfect guides to the place of any one that chanced to be missing. The truth unfortunately is that the lines were very carelessly run, the monuments inaccuratelyly placed; and, as the recorded witnesses to these were many times wanting in permanency, it is often the case that when the monument was not correctly placed it is impossible to determine by the record, with the aid of anything on the ground, where it was located. The incorrect record of course becomes worse than useless when the witnesses it refers to have disappeared.

"If now the disputing parties call in a surveyor, it is not likely that any one summoned would doubt or question that his duty was to find, if possible, the place of the original stakes, which determined the boundary line between the proprietors. However erroneous may have been the original survey, the monuments that were set must nevertheless govern, even though the effect be to make one quarter-section ninety acres and the one adjoining but seventy; for parties buy or are supposed to buy in reference to those monuments, and are entitled to what is within their lines, and no more, be it more or less. (McIver v. Walker, 4 Wheaton's Reports, 444; Land Co. v. Saunders, 103 U.S. Reports, 316; Cottingham v. Parr, 93 Ill. Reports, 223; Bunton v. Cardwell, 53 Texas Reports, 408; Watson v. Fones, 85 Penn. Reports, 117.)

"While the witness trees remain there can generally be no difficulty in determining the locality of the stakes. When the witness trees are gone, so that there is no longer record evidence of the monumnts it is remarkable how many there are who mistake altogether the duty that now devolves upon the surveyor. It is by no means uncommon that we find men who theoretical education is supposed to make them experts who think that when the monuments are gone, the only thing to be done is to place new monuments where the old ones should have been, and where they would have been if placed correctly. This is a serious mistake. The problem is

now the same that it was before: to ascertain, by the best light of which the case admits, where the original lines were.

"It will probably be admitted that no man loses title to his land or any part thereof merely because the evidences become lost or uncertain. It may become more difficult for him to establish it as against an adverse claimant, but theoretically the right remains; and it remains as a potential fact so long as he can present better evidence than any other person. And it may often happen that, notwithstanding the loss of all trace of a section corner or quarter stake, there will be evidence from which any surveyor will be able to determine with almost absolute certainty where the original boundary was between the government subdivisions.

"There are two senses in which the word extinct may be used in this connection: one the sense of physical disappearance; the other the sense of loss of all reliable evidence. If the statute speaks of extinct corners in the former sense, it is plain that a serious mistake was made in supposing that surveyors could be clothed with authority to establish new corners by an arbitrary rule in such cases. As well might the statute declare that if a man lose his deed he shall lose his land together.

"But if by extinct corner is meant one in respect to the actual location of which all reliable evidence is lost, then the following remarks are pertinent:

1. There would undoubtedly be a presumption in such case that the corner was correctly fixed by the government surveyor where the field-notes indicated it to be.

2. But this is only a presumption, and may be overcome by any satisfactory evidence showing that in fact it was placed elsewhere.

3. No statute can confer upon a county surveyor the power to 'establish' corners, and thereby bind the parties concerned. Nor is this a question merely of conflict between State and Federal law; it is a question of property right. The original surveys must govern, and the laws under which they were made must govern; because land was bought in reference to them; and any legislation, whether State or Federal, that should have the effect to change these, would be inoperative, because disturbing vested rights.

4. In any case of disputed lines, unless the parties concerned settle the controversy by agreement, the determination of it is necessarily a judicial act, and it must proceed upon evidence, and give full opportunity for a hearing. No arbitrary rules of survey or of evidence can be laid down whereby it can be adjudged.

"The general duty of a surveyor in such a case is plain enough. He is not to assume that a monument is lost until after he has thoroughly sifted the evidence and found himself unable to trace it. Even then he should hesitate long before doing anything to the disturbance of settled possessions. Occupation especially if long continued, often affords very satisfactory evidence of the original boundary when no other is attainable; and the surveyor should inquire when it originated, how, and why the lines were then located as they were, and whether a claim of title has always accompanied the possession, and give all the facts due force as evidence. Unfortunately, it is known that surveyors sometimes, in supposed obedience to the State statute, disregard all evidence of occupation and claim of titles, and plunge whole neighborhoods into quarrels and litigation by assuming to 'establish' corners as points with which the previous occupation cannot harmonize. It is often the case that where one or more corners are found to be extinct, all parties concerned have acquiesced in lines which were traced by the guidance of some other corner or landmark, which may or may not have been trustworthy; but to bring these lines into discredit when the people concerned do not question them not only breeds trouble in the neighborhood, but it must often subject the surveyor himself to annoyance and perhaps discredit, since in a legal controversy the law as well as common-sense must declare that a supposed boundary line long acquiesced in is better evidence of where the real line should be than any survey made after the original monuments have disappeared. (Sterward v. Carleton, 31

Mich. Reports, 270; Diehl v. Zanger, 39 Mich. Reports, 601; Dupont v. Starring, 42 Mich. Reports, 492.) And county surveyors, no more than any others, can conclude parties by their surveys.

"The mischiefs of overlooking the facts of possession must often appear in cities and villages. In towns the block and lot stakes soon disappear; there are no witness trees and no monuments to govern except such as have been put in their places or where their places were supposed to be. The streets are likely to be soon marked off by fences, and the lots in a block will be measured off from these, without looking farther. Now it may perhaps be known in a particular case that a certain monument still remaining was the starting-point in the original survey of the town plat; or a surveyor settling in the town may take some central point as the point of departure in his surveys, and assuming the original plat to be accurate, he will then undertake to find all streets and all lots by course and distance according to the plat, measuring and estimating from his point of departure. This procedure might unsettle every line and every monument existing by acquiescence in the town; it would be very likely to change the lines of streets, and raise controversies everywhere. Yet this is what is sometimes done; the surveyor himself being the first person to raise the disturbing questions.

"Suppose, for example a particular village street has been located by acquiescence and use for many years, and the proprietors in a certain block have laid off their lots in reference to this practical location. Two lot-owners quarrel, and one of them calls in a surveyor that he may be sure that his neighbor shall not get an inch of land from him. This surveyor undertakes to make his survey accurate, whether the original was, or not, and the first result is, he notifies the lot-owners that there is error in the street line, and that all fences should be moved, say a foot to the east. Perhaps he goes on to drive stakes through the block according to this conclusion. Of course, if he is right in doing this, all lines in the village will be unsettled; but we will limit our attention to the single block. It is not likely that the lot-owners generally will allow the new survey to unsettle their possessions, but there is always a probability of finding some one disposed to do so. We shall then have a lawsuit; and with what result?

"Of course nothing in what has been said can require a surveyor to conceal his own judgment, or to report the facts one way when he believes them to be another. He has no right to mislead, and he may rightfully express his opinion that an original monument was at one place, when at the same time he is satisfied that acquiescence has fixed the rights of parties as if it were at another. But he would do mischief if he were to attempt to 'establish' monuments which he knew would tend to disturb settled rights; the farthest he has a right to go, as an officer of the law, is to express his opinion where the monument should be, at the same time that he imparts the information to those who employ him, and who might otherwise be misled, that the same authority that makes him an officer and entrust him to make surveys, also allows parties to settle their own boundary lines, and considers acquiescence in a particular line or monument, for any considerable period, as strong, if not conclusive, evidence of such settlement. The peace of the community absolutely requires this rule.

"From the foregoing it will appear that the duty of the surveyor where boundaries are in dispute must be varied by the circumstances. He is to search for original monuments, or for the places where they were originally located, and allow these to control if he finds them, unless he has reason to believe that agreements of the parties, express or implied, have rendered them unimportant.

"It is merely idle for any State statute to direct a surveyor to locate or 'establish' a corner, as the place of the original monument, according to some inflexible rule. The surveyor on the other hand must inquire into all the facts; giving due prominence to the acts of parties concerned, and always keeping in mind, first, that neither his opinion nor his survey can be conclusive upon parties concerned; second, that courts and juries may be required to follow after the surveyor over the same ground, and that it is exceedingly desirable that he govern his

action by the same lights and rules that will govern theirs. On town plats if a surplus or deficiency appears in a block, when the actual boundaries are compared with the original figures, and there is no evidence to fix the exact location of the stakes which marked the division into lots, the rule of common-sense and of law is that the surplus or deficiency is to be apportioned between the lots, on an assumption that the error extended alike to all parts of the block."

DUTIES OF A SURVEYOR TO CLIENT

Following one of the important principles laid down by Justice Cooly, a surveyor should, in re-defining boundaries, conduct his search for evidence and assess it in the same manner as it might be assessed in a court.

Clearly, therefore one of the important duties of a surveyor is to search for evidence, and that means all the evidence available of the particular boundaries or limits he may be called upon to re-define.

Whereas the majority of surveyors appear to understand very well that all the evidence of a client's property may not be contained in his deed alone, there are a great many surveyors who feel, if a client or his lawyer hands them a deed with the simple instruction to "survey it and report any encroachments", their duty to the client is satisfied if they adhere strictly to, and monument, the limits therein described, showing the various encroachments.

I do not know how or where this conception came into being, but I can speak with considerably authority on the deplorable results of such practice.

Let us try to examine this situation in a logical manner. Each and every property line, limit, boundary, etc., separating one ownership from another is or should be a matter of interest to both owners. In effect, all properties have adjoiners and the lines separating properties are not the exclusive responsibility of any one owner. Theoretically therefore, all deeds should reflect this condition of contiguity and if this were so there would be no overlaps of paper title.

In fact of course contiguity of title is not as common as it might be, owing to faulty descriptions, physical loss of evidence, erroneous surveys and poor conveyancing practice. It is a rule of law, which I will discuss later, that the limits of land described in a deed may under certain circumstances be varied by extrinsic evidence, and in surveying land described in a particular deed it must be realized that a lead to the existence of further evidence may be found in adjoining deeds.

The duty of a surveyor therefore is not merely to lay out his clients land, but lies more in the direction of determining from all the evidence available that land to which his client is entitled, no more and no less, and in so doing the surveyor is bound to consider the rights of adjoiners.

The necessity then for searching adjoining titles devolves upon someone. The question is, upon whom? Should a boundary prove to have been erroneously redefined owing to failure to search adjoining titles, then in the lawyer's opinion the surveyor was negligent, and in the surveyor's opinion the lawyer was negligent in not providing him with searches of adjoining lands.

It seems to me that the answer must be sought in the respective training and interests of the two professions. In conveying land, a lawyer, in accordance with the best practice, is interested in giving a good paper title. He concerns himself with tracing ownership back through a 40-year period and thus establishing a good chain of title. Such things as mortgages, liens, easements and other rights and interests are exclusively in his province. He is also interested in the physical extent of ownership but in this connection he relies upon the surveyor who is trained to detect in a deed any references to natural or artificial features which will most likely still exist on the ground and which frequently are all-important in defining the limits of the property.

The surveyor with his training in the science of measurement of distance and bearings, his familiarity with the survey status, etc., is in a far better position to deal with the various governing factors in descriptions. His interest therefore in searching titles is very specialized and quite different from those of a lawyer.

With this in mind, and in view of the fact that the surveyor signs the plan, I think a good case is made for the surveyor to do his own searching.

PART THREE: EVIDENCE

It would be sheer presumption on my part were I to attempt to cover this vast and important field in the comparatively short space of time available. A useful purpose may be served, however, if I recapitulate the important principles and rules of the subject and briefly explain those that in my opinion are the most important in your specialized field.

ADMISSIBILITY OF EVIDENCE

We often hear the expressions materiality and admissibility in relation to evidence and so I shall give a brief explanation of these terms.

The use of the word materiality is now predicated upon propositions of fact, that is, an issue or "point", rather than the evidence supporting such issue or point, as a proper part of a litigant's case. Admissibility, on the other hand, is a term predicated of an evidentiary fact offered to prove a proposition of fact (issue or point) material to a case. To put it in simple language, if the fact is not material, evidence to establish it is not admissable. On this point I prefer to say, as do modern authorities, that rulings on these two subjects are rules of substantive law or law of procedure, rather than rules of evidence.

With regard to admissibility the main principle is that "all facts and circumstances which afford a fair presumption or inference as to questions in dispute and may fairly and reasonably aid in arriving at the true conclusion" are admissible. The trend is therefore to extend rather than restrict admissibility unless such admission is obnoxious to an exclusionary rule, such as: heresay evidence (the old English decision was that evidence is not admissible through the mouth of one witness to show what a third person said for the purpose of proving the truth of what the third person said; it is also not an oath, nor can cross examination be afforded); character evidence when the character of a party to an action has no bearing on the issues, or opinion evidence when the person giving the opinion as evidence is not an expert on the subject. However, experienced draughtsmen and surveyors may state their opinions as to the meanings of lines or shading on a plan since, being experienced in such things they could authoritatively state what they mean in common practice and interpretation.

Written statements made by public officers in the discharge of their official duties and recorded in public documents are admitted by way of exceptions to the exclusionary rule. Surveys made by official surveyors of Crown Lands have been admitted. Field notes of provincial land surveys prepared and filed in pursuance of statutory duty in that behalf are admissible, but field notes not prepared or filed under a statutory duty are not admissible, even if made by a provincial land surveyor. Instructions given to an official land surveyor by the Surveyor General in respect to township surveys have been admitted.

But let us remember that any document or plan prepared and sworn to by a surveyor as correct with reference to any survey performed by him may be filed in the appropriate registry or land titles office, "subject to be produced thereafter in evidence in any courts." Likewise evidence taken under oath by such surveyor concerning any boundary of any township lot or tract of land which he is employed to survey is admissible.

It should be noted that boards of arbitration and administrative tribunals are not strictly bound by the rules of evidence.

ADMISSIBILITY vs WEIGHT

A distinction has to be made between admissibility and weight of evidence. The former is decided by the judge, the latter by the jury. A jury is the constitutinonal judge of the facts; that is, if the evidence is admitted the jury decides contraverted facts on the basis of the weight or perponderance of the evidence, pro and con, and thus decides upon its effect.

JUDICIAL NOTICE

Whenever a fact is so generally known that every ordinary person may reasonably be presumed to be aware of it, the court "notices" it, either simpliciter, if it is once satisfied of the fact without more information or after such information as it considers reliable and necessary in order to eliminate any reasonable doubt.

The essential basis for judicial notice is that the fact should be of a class that is so generally known as to give to the presumption that all persons are aware of it. Let me emphasize, however, that this excludes from the operation of judicial notice what are not general but particular facts. Let me give an example to illustrate. In 1702 Chief Justice Holt said: "We are to take judicial knowledge who reigns over us, and whom we owe allegiance to: and though it be decent to take notice of the demise of the King, yet it is not of necessity."

Over the time of three centuries some facts judicially noticed are:

1. "A pint of liquor is less than five gallons or one dozen bottles."
2. "An endorser has lent his name to enable the maker of a promissory note to use the note in a monetary market."
3. "The Township of Thurlow is in the southern part of the County of Hastings."

Under the Canada Evidence Act judicial notice must be taken of all public acts of the Parliament of Canada and all ordinances made by the Governor in Council or the Lieutenant Governors in Council of the Provinces.

The Court will take judicial notice of the local divisions, such as counties, municipalities and polling sections, in which the county is divided for the purposes of political government. But it has been ruled that it cannot be known judicially that a certain town has a population more than a certain number.

EXPERT EVIDENCE

The Ontario Evidence Act* provides that not more than three witnesses "entitled according to our practise to give opinion evidence" may be called by either side without leave of the judge or other person presiding. Though not stipulating "experts", the section is headed "expert evidence" and the view is taken that it includes opinion evidence founded in part or in whole on some special knowledge or qualification not possessed by the ordinary witness. Hence "expert" is inferred.

The Attorney General's Administration of Justice Committee of which I am a member, is considering an expansion of the rule to permit more than three witness to be called to give opinion evidence, but only by leave of the court, given before any are called.

PREFERENTIAL RULES

Best Evidence Rule

In 1700 Chief Justice Hall said, "The best proof that the nature of the thing will afford is only required . . ." He later said, "The law requires the best evidence that can be had."

Now with rules of evidence so well developed, such a maxim affords but little guidance and is but roughly descriptive of two or three rules that have their own reasons for existence apart from this alleged main rule.

Real Evidence

This is evidence afforded by production of chattels or other physical objects for inspection by the Court, for example documentary originals, view of the scene of an accident, photographs (if not objectionable).

Secondary Evidence

Evidence from copies of documents, lost, destroyed or unavailable, is secondary evidence.

One famous judge said in England in the late 1700's, "If a foundation can be laid that a record or deed existed and was afterwards lost, it may be supplied by the next best evidence to be had."

*** Only one other province has such a rule.**

Conclusive Evidence

In some cases certain testimony when produced is taken as final and error cannot be shown by other testimony. Examples are, a written document of the parties, judgment of a court, official certificates when authorized by statute.

BURDEN OF PROOF

This phrase may be used in the following two different senses:

1. The burden of establishing any proposition of fact according to the substantive law and law of pleading necessary for a party to establish in order to succeed in his case, which may be simply called "risk of non-persuasion of a jury".

2. The burden of producing evidence, or further evidence, during a trial in order to avoid an adverse ruling of the presiding judge or simply "the duty of producing evidence to the judge."

Here we need not discuss the shifting of onus from proponent to opponent in the course of a trial which may frequently happen. I might, however state here in simple language that, if the plaintiff does get so far with his evidence that this evidence if unanswered, would justify men of ordinary reason and fairness in affirming the proposition that the plaintiff is bound to maintain, then the burden passes to the defendant, who must adduce other evidence, either contradicting the plaintiff's or proving other facts that leave the question in real doubt.

This can perhaps be reduced to the even simpler statement that **the burden of proof at any stage of the progress of the trial is upon the party who would fail if no evidence or no further evidence were given.**

Presumptions

Under this heading we must discuss Presumptions and Prima Facie Evidence.

Presumptions

An example of presumption is found in acceptance of proof of death in certain circumstances. In the event of the absence of an involved party for seven years, during which time no one likely to hear from him has heard, there is presumption of death.

Prima Facie Evidence

In the first sense this expression means that a plaintiff has submitted enough evidence to entitle him to have the question left to a jury. Or, it may represent the stage where the proponent plaintiff has by a mass of strong evidence entitled himself to a ruling that his opponent should fail if he does nothing more in the way of producing evidence.

The expression Prima Facie Evidence is frequently used in statutes being found in The Partnership Act, the Ontario Evidence Act, The Canada Evidence Act, The Criminal Code, The Bankruptcy Act, the Bank Act, The Bills of Exchange Act, and many others. What constitutes it is usually spelled out as for example in the Partnership Act: "The receipt by a person of a share of the profits of a business is prima facie evidence that he is a partner in the business, but the receipt of such a share or payment . . . does not of itself make him a partner."

THE PAROLE EVIDENCE RULE

This is also part of the substantive law rather than of evidence. It is not a single rule but a group of rules, and it deals primarily with when and when not oral evidence may be received to cut down or defeat the efficacy of a written document which upon proof of its actual existence is presumed to give effect to its terms. Innumerable examples of this may be found in the cases of contract, consideration, delivery of a deed, agency, warranty, suretyship.

In the field that is particularly applicable to the survey profession there is a legal maxim, namely, Falsa Demonstratio Non Nocet, which means, False description does not vitiate.

In construing a description contained in a deed, extrinsic evidence of monuments and actual boundary marks found on the ground but not referred to in the deed was held inadmissible to control the deed, but if in the deed reference is made to such monuments and boundaries they govern, although they may call

for courses, distances or computed contents that do not agree with those stated in the deed. 1

If all the terms in a description fit some particular property, you cannot enlarge them by extrinsic evidence. But if they do not fit with accuracy the whole thing must be looked at fairly to see what are the leading words of description and what is the subordinate matter, and for this purpose extrinsic evidence is admissible.

SIGNIFICANCE RESPECTING BOUNDARIES

Having discussed the various facets of evidence, we should now observe the significance that the courts attach to the different types of evidence of boundaries.

Consider the following extracts:

1. In order to prove the proper location of a boundary line between adjoining property, one must first prove the original boundary, for example by a monument, such as a post planted thereon; but in the absence of some such evidence, possession may be proved, and in the absence of both of these one may resort to measurements. 2

2. Per Graham, C. J. "In Diehl v. Zanger, 39 Mich. 601, Colley, J. said, 'As between old boundary fences and any survey made after the monuments have disappeared, the fences are by far the best evidence of what the lines of a lot actually are. . . .' ". 3

3. Where original posts or monuments are not in existence to prove the location of a boundary line between lots on a subdivision. resort must be had to lines made at a time when the original posts or monuments were presumably in existence and probably well known, such as long established fencelines. 4

The above cases are a good cross-section of a plethora of such, indicating in definite terms that a surveyor shall, when re-defining boundaries, rely on the following evidence in the order named:

(a) Natural boundaries;

(b) Original monuments;

(c) Fences or possession which can reasonably be related back to the time of the original survey;

(d) Measurements.

Some comments on (c) and (d) are necessary.

Very few plans that I have seen show, or attempt to show, the age of fencelines. This is of course particularly important, for several reasons. Firstly, the establishment of 10 years of occupation, laid own by the Statute of Limitations, may turn upon the age of a fence. Secondly, when a surveyor, lacking primary evidence of a boundary, seeks to establish whether a fence is or is not the best evidence of the original location of a lost boundary, he must attempt to establish that the fence existed at, or reasonably near to, the time when the original monuments were in existence. Such evidence of age may be obtained in affidavit form and sometimes perhaps by the very nature of the physical construction of the fence itself.

The reason measurements carry least weight is that a surveyor's intention, as expressed by courses on a plan and field notes, has in the past borne little, if any, resemblance to his intention as expressed by the monuments he has planted in the ground. The actual methods of reading angles and chaining lines (in title surveys) has shown little, if any, improvement in Canada during the last century, and it is only comparatively recently that survey agencies have been insisting on a more or less common standard of accuracy. Therefore it is not reasonable to expect that the courses on a plan and the monuments planted will universally bear a more accurate relationship to each other for some time to come yet.

Many countries have found it necessary to control their title surveys by networks of geodetic control in order to limit progressive accumulating errors and to prevent accidental errors to some degree, and it would be wise if efforts were to be made to do so in Canada as soon as possible.

(To continue in June Issue)

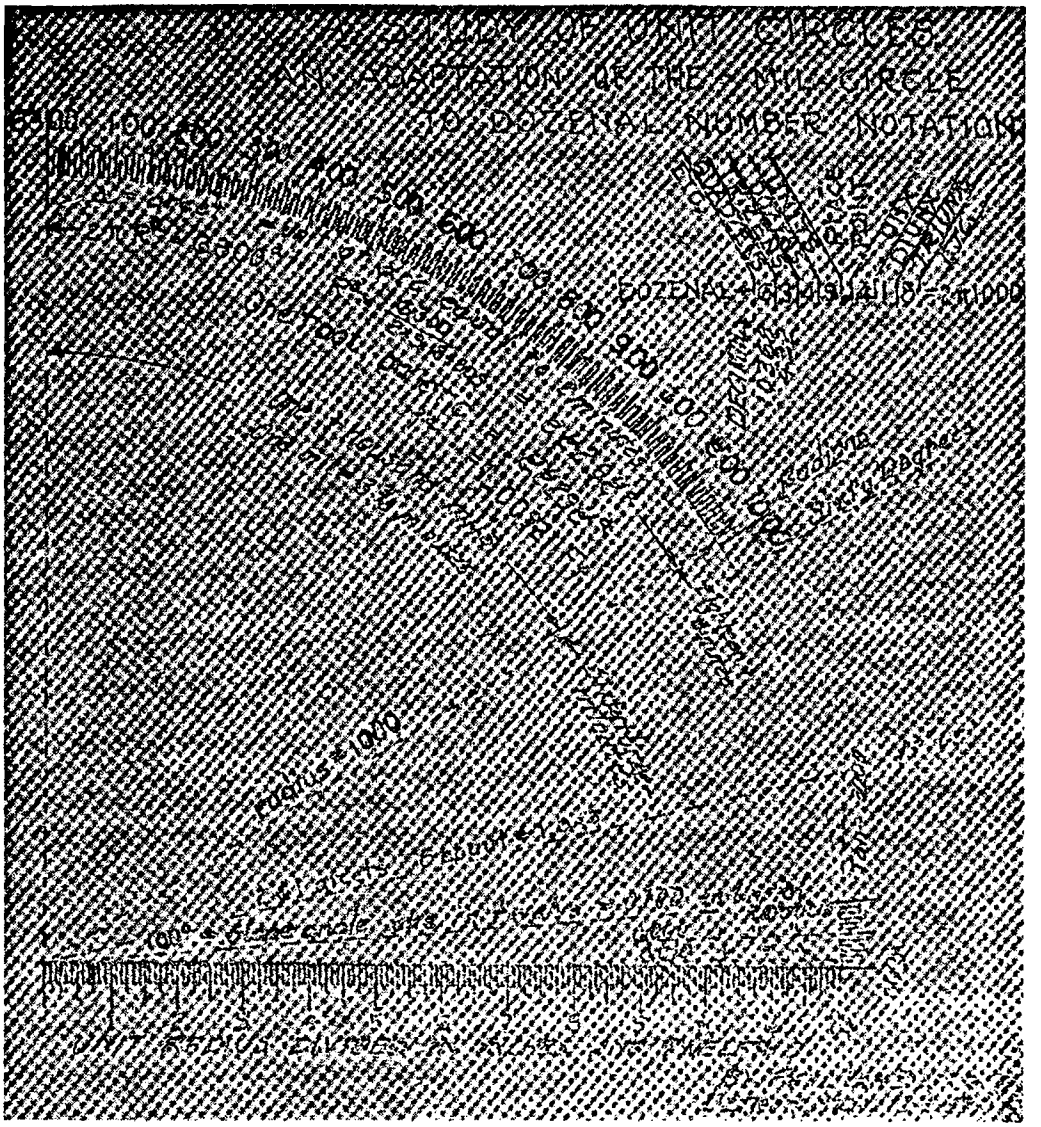
THE UNIT CIRCLE

By Paul VanBuskirk in *The Canadian Surveyor*

Our mathematical concept of the circle traces back to the Sumerian division of about 2500 B.C. It was the six part division by the radius used as a chord. The points were numbered from one through six.

The Babylonians expanded this division according to their habit of dividing units into 60 parts. The unit 1 still remained in the Sumerian order and the sixtieths were regarded as fractions. The circumference was known to be 6 17/60, which reduces to 6.2833 . . . instead of our 6.2832. The arc in the first sector was therefore 1 17/360 and the radian point fell at exactly 1. There is no evidence that they used the radian concept.

This circle passed to the Greek and Egyptian civilizations, but the 60th fractions came to be treated as 360ths of the whole circle. In time these fractions came



to be regarded as "units" of circular measure. Under the decimal notation, the Sumerian 1 was displaced by 60, and the circle lost its original "sixness."

During the Napoleonic era the circle was divided into 1,000 parts. The United States Army adopted this circle about the same time the chain of 100 feet came into use. Later the U. S. Artillery Corps developed the mil circle of 6,400 divisions, and it displaced the decimal circle for Army use. This was actually a return towards the original Sumerian concept, as its virtue lay in making the radian point close to the 1,000th graduation. This circle was in use almost a century, as the ordinary soldier could readily grasp the fact that one graduation meant a gun elevation of one yard at a range of 1,000 yards. This was only a close approximation, however, and modern demands for precision have tended to displace the mil circle.

It is interesting to note the impact of the changing number concepts on this problem. When it is carried on in terms of the twelve-digit system, where "t" is the tenth "digit", "e" is the eleventh, and 10 stands for a dozen, 100 a dozen-dozen, etc., it is possible to restore the original "sixness" to the circle. The illustration uses this notation for whole numbers and "unical" fractions.

The dozenal number for 6.25 is 6.3, much nearer 6.2832 than was the 6.4 used as the mil-circle base. Expanding dozenal 6.3 by three places, we get a number that represents 10,800, which is ½ the number of minutes in the customary circle. Calling this 2-minute quantity an "arcet" and drawing the 12 arcet lines, we find that the 1,728th arcet line falls 18.2532 minutes beyond the radian boundary. In the mil circle the "unit" radius was treated as 1,000 yards and in the arcet circle it should be thought of as a dozen-dozen-dozen (quad-zen) feet. Therefore the arcet is almost exactly 1 foot in 1,728 feet, expressed as 0.001 slope angle on the lower part of the drawing.

The surveyor's chain increased from 66 feet to 100 feet during the last century. During this century it should increase from 100 feet to 144 feet, divided into inches and twelfths of inches, all in place value notation. Leveling rods and shop rules should be graduated in this pattern.

Then the table of arcet tangents would give rises directly, the secant table would give slope distances, and roof-truss plans could be made without 1/16 and 1/32 inch notations. Fabrication would proceed as now, with no change in drills, bolts, rivets, etc., as will be required if we stand still until forced into adoption of the metric system by pressures that are becoming more powerful each year.

This paper can not go into all the trains of thought aroused by the unit-circle concept. Is only the radius to be unity? In the 1,000 circle the circumference also was unity, but that did not seem popular, even with the metric people. Is a radian a unit? Is a degree a unit? Is the radian sector a better comparator figure than the whole circle?

ARE YOU INTERESTED?

The undernamed students of the Nova Scotia Land Survey Institute are interested in securing summer employment and may be contacted by inquiry through the Nova Scotia Land Survey Institute, P. O. Box 58, Lawrencetown, Annapolis County, N. S.

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