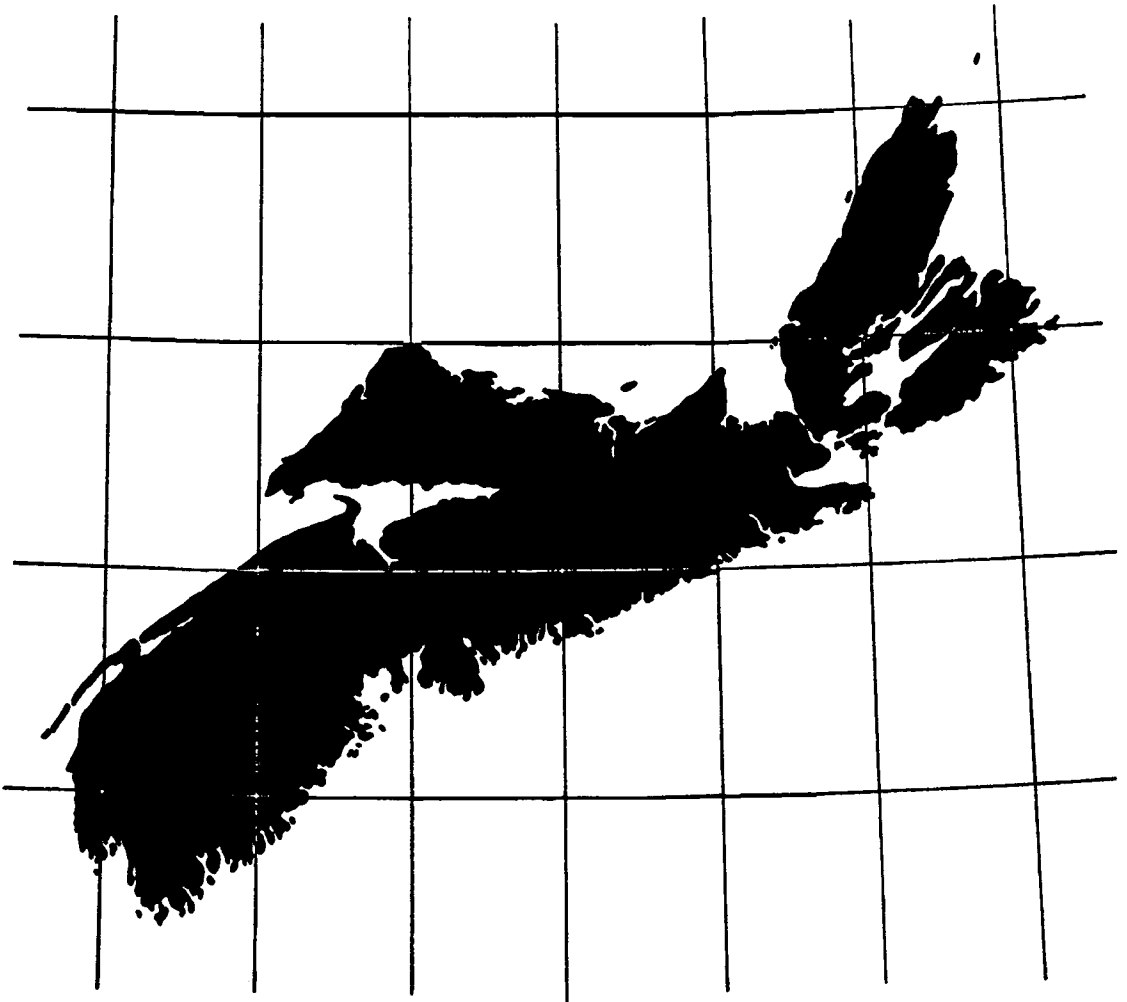


The NOVA SCOTIAN SURVEYOR



*Published by
The Association of Provincial Land Surveyors
of Nova Scotia*

Founded 1951
Volume 10

R. E. Millard, P.L.S., Managing Editor
DECEMBER 1960

Incorporated 1955
Number 25

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*Published four times a year by
The Association of Provincial Land Surveyors of Nova Scotia Incorporated*

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The Tenth Annual Meeting

The tenth annual meeting of the Association of Provincial Land Surveyors of Nova Scotia was held at the Lord Nelson Hotel, Halifax, Nova Scotia on the 21st and 22nd of November, 1960.

The attendance was up to the usual good standard and included a number of visitors and special guests, prominent among whom were the following:

General Lester Higbee, President of the Gurley Company;

Mr. A. D. G. Currie, president of the Association of Provincial Land Surveyors of Ontario.

Mr. and Mrs. Marcel St Marie, President of the Association of Land Surveyors of Quebec

Mr. Brenton Schofield, Vice-President of the Association of Land Surveyors and C. E. of Massachusetts.

Mr. Willis Roberts, Director of Surveys, Department of Lands and Mines, New Brunswick.

Dr. G. Konecing, University of New Brunswick.

The lounge was quite fully occupied by the most attractive displays of exhibits, which appeared to be somewhat more extensive than usual and created considerable interest.

The morning of the 21st was taken up with the usual registration followed by the opening of the session, introduction of guests, and some business.

The afternoon of the 21st was given to a general discussion of the by-laws and code of ethics. Considerable discussion ensued and resulted in approval with minor changes.

The annual reception and dinner were held in the ballroom on the evening of the 21st, followed by dancing till midnight. This event proved to be as popular as in previous years and the room was filled to capacity.

Tuesday the 22nd of November was devoted to the reports of committees, papers, installation of officers and a final business meeting.

The papers presented were as follows:

Major J. A. H. Church: An appreciation of the Problems affecting the Nova Scotia Land Surveyor.

Mr. A. C. T Tuttle: Visit to the meeting of the International Society of Photogrammetry, London, England.

Mr. Willis Roberts: The New Brunswick Grid.

Dr. G. Konecing: The new Degree Course at U. N. B. in Survey Engineering.

The general interest and participation in discussion gave evidence of increasing awareness of the importance of the Association in the work and life of the Nova Scotia Land Surveyor and augurs well for the future of the organization.

In closing it should be noticed that, in Mr. Don Eldridge, a worthy successor was found to Mr. Servant, as president of the association and as a running mate, our sterling secretary was reelected and will help us out for at least another year. The slate of officers was a fair representation of the cross section of the Association and will give strong support to its new president.

It would appear that 1961 will be a year of significant progress.

PART III

The Universities Views

ON SURVEY EDUCATION from *The Canadian Surveyor*

Volume XV, January 1960, No. 1

No papers were presented at this part of the meetings, which was chaired by Professor Thompson. The chairman first called on the representatives of the universities to discuss survey education from the point of view of their respective departments and later asked representatives of other organizations who had not yet had an opportunity to do so to give their views, after which the meeting was again opened for general discussion. The ensuing statements and discussion here follow.

Prof. Jackson: I should like to state some facts regarding the teaching of surveying and photogrammetry at the University of Toronto in the past and to offer some personal opinions pertaining to possible future developments.

Surveying and geodesy have been taught in the Department of Civil Engineering since the days of Prof. Louis B. Stewart. Professor Marshall is now in charge of this work and will speak of it for himself.

Photographic Surveying became a subject in the Department of Engineering Physics and Photography in 1912. The Department's name was changed to Applied Physics in 1934 and the subject's name to Photogrammetry about the same time. My predecessor, Prof. G. R. Anderson, acquired a Zeiss photo-theodolite and stereocomparator before the first World War and, using this equipment, we compiled a survey of Thirty-one Mile Lake in conjunction with the Geodetic Survey in the summer of 1920. It was considered at that time that the "new science" of stereo-photo topography required the support of the laboratories in Optics, Photography and Photometry of this Department. The subject and its teaching have benefited by this collaboration ever since.

The Department has acquired and developed equipment and carried out extensive research in this field. A report on the latest piece of such research appears in October issue of *The Canadian Surveyor*.

Present courses in photogrammetry include a twelve-hour lecture course to third-year civil engineers, a hundred-hour lecture and laboratory course to the surveying option in fourth-year civil engineering, a seventy-five hour lecture and laboratory course to second-year foresters, and a graduate course in photogrammetry in the School of Graduate Studies.

My own personal opinion regarding the best means of developing highly qualified survey science engineers (who must not only cope with modern ramification, but must also have the basic training in mathematics and physics in order to initiate further progress) is to establish survey science options in Engineering Physics. This course has higher entrance qualifications than the other courses in engineering and is designed to prepare its students for post-graduate study through its various options. Its curriculum, in content and pace, is designed to keep the good student "stretched" and places emphasis on mathematics and physics in the first two years and increasing degrees of specialization in various fields in the third and fourth years.

It is also my opinion that photogrammetry should be taught in the department with facilities for teaching and research in the associated fields of optics, photography, photogrammetry and electronic instrumentation.

Prof. Marshall: We have been doing some preliminary thinking at Toronto about instituting an option in advanced surveying that would be open to engineering physics students at the beginning of their third year. There would be some difficulty with instrumentation, but this is not insurmountable.

For some years now we have had an option in advanced surveying at the fourth year in the Civil Engineering Department. In my opinion this option does not satisfy the requirements of this new science; the students have a rather inadequate background in mathematics and physics.

Attempts have been made to define what the land surveyor is. For one thing, he is the fellow recognized by the legislation as a professional surveyor. Perhaps our technical and scientific requirements are not quite as high as for those who would go into the various government services, but they are improving. I think the time is coming when the qualifications of the land surveyor in the field of mathematics and science will have to be raised.

About two-thirds of the practising surveyors in Ontario get their licences through a four-year apprenticeship and two sets of examinations. Others obtain a degree in civil or mining engineering or forestry — these are the courses that have a reasonable content of survey — and then serve two years' apprenticeship and write the same two sets of examinations.

The engineering graduates need very little preparation for the first set of examinations, but must learn the provincial laws regarding surveys in preparation for the final examinations.

Men with this minimum background in education and experience become members of the Association of Ontario Land Surveyors. As such they are recognized in the statutes of the Province and by the general public as professional surveyors. The technical and scientific background, especially for those who come up through the apprenticeship system, is likely to be inadequate, even for present needs. For the future, those whose educational qualifications go beyond every day needs are more likely to develop improved procedures and thus raise the tone of the whole profession. Also, there is some indication that we are approaching the time when boundary surveys will be tied to a co-ordinate system based on some type of map projection. When this happens, the surveyor will need a reasonable background in geodesy to understand the system.

Consideration of an effective means of holding the present high regard of the public for the profession of Land Surveying, and certainly any improvement in professional status, indicates that entrance requirements in this profession should include some education in depth such as we find in a university course. General acceptance of this idea will take time, but in the long term it seems logical to answer the problem of education for land surveyors by bringing the educational requirements more nearly into line with those of other professions. Discussion of details is not timely here, but in principal it would appear that any such university course would have so much in common with certain courses in engineering that it should be set up within a faculty of engineering.

Prof. Thompson: While it is right to sound our general opinion in the profession, I think the universities should have the courage of their convictions and do what they think is right.

Prof. Doyle: Our programme at Ohio comes under the department of geology in the college of arts and sciences, not the college of engineering. This, however, is mostly for administrative purposes and we have a free hand with the content of our courses and are able to specify a heavy dose of mathematics and physics before taking up photogrammetry and cartography. It is only in the third year that we get geodesy or photogrammetry or cartography into the programme. We have not a very heavy demand for our undergraduate programme but the demand for graduate work is great. This is because of the peculiar organization of Ohio State which provides a battery of courses for the undergraduate majoring in one of the surveying sciences. Last year we had 112 people in the programme, about 80% of whom were supported in one way or another by one of the government agencies. There were only about 25 or 30 who had come purely on their own to make this their career. We have found that the most effective people are those who come to us with a bachelor's degree and a good background in mathe-

matics and physics. Most of our graduates have gone into organizations with a rather high scientific level. We have had only one man go into a commercial firm. Unfortunately, we do not turn out a land surveyor at all, and this is partly due to the general disrepute the land surveyor has in the U.S. and partly to inadequacies in our undergraduate programme. I think that a programme of education for the surveyor scientist is as definitely needed in the States as here.

Prof. Thompson: It seems that the first three years of Prof. Doyle's course is general background. Do his students have to make their final choice of a specialty in the next two years?

Prof. Doyle: The undergraduate programme is four years. The student is required to declare a major at the end of the second year, although he may do so earlier if he has a strong inclination. The major as we understand it involves a minimum of 45 hours within one department and all his credits must be accepted by the advisers as being fitting or of sufficient cognate interest to contribute to the man's specialization within that department.

Dr. Ruptash: I must, first, admit that I am not very familiar with the many problems that must be resolved in survey education. Indeed, my comments at the present will be based on a review of your current papers. If my understanding of your problem is correct, it appears that your efforts must be placed on the availability of a suitable curriculum beyond the third year of a university programme of studies. I would like to recommend that the members of this group consider the possibility of forming an Institute of Surveying. The first general goal of this Institute would be to provide research facilities for graduate level work in surveying. The Institute would, of course, be affiliated with an appropriately located university. Eventually a large percentage of Canadian research and advanced level teaching in surveying may be centered with the Institute. An advanced programme of studies would be made available to students who have completed the third year of a programme in mathematics, physics, or engineering. I have in mind an Institute of Surveying whose development and functions in surveying would be analagous to the development and functions of the Institute of Aerophysics in Fluid Dynamics at the University of Toronto. It is my personal feeling that the excellent development of the Institute of Aerophysics under the very capable leadership of Dr. Patterson is an admirable goal for the Institute of Surveying. The development of the Institute of Aerophysics has warranted the expenditure of well over a million and a half dollars during the past ten years. I mention this, not because I think that the initial development of the Institute of Surveying would require such a large sum — indeed, even if such sums were available, it would be inadvisable to start the development on such a large scale — but because the Institute of Aerophysics is an excellent example of the concept of an institute. Its formation, purpose, and development was to a large extent due to the inspiration and leadership of one man, a man who was deeply interested in a particular field of science which was not adequately provided in any Canadian university. The million and a half was quoted to indicate that on a Canadian university campus the concept of an institute was started with a very small investment in capital and staff and within a period of ten years the development of facilities and staff has warranted the expenditure of such a large sum.

Prof. Thompson: It is clear that not every university can provide the kind of instruction we want, either on the departmental basis or through an affiliated institute. For this reason the course should be divided into two portions — a general preparatory period and a following period of specialization. We could then have the students doing their preparatory work at universities all over the country and coming to the specialized school for their final degrees.

Prof. Arcand: Mr. Gamble has said that one of the objectives of this colloquium is to carefully examine the training now being given at Canadian universities in order to determine whether Canadian undergraduates are being provided with the fundamental knowledge required to effectively pursue the survey pro-

profession. At McGill we are not trying to make surveyors. We are trying to teach engineers as much knowledge of surveying as is necessary for them to do their jobs as engineers, and for this reason we do not give much of the higher type of instruction that is being discussed here. It is true that we, like some universities in the United States referred to by Prof. McNair, have had to cut down on survey instruction because of pressure from new developments in other fields but we do teach some useful amounts of surveying. This is shown by the fact that many of our engineering graduates go on into surveying; they do not have much difficulty in passing the examination in Ontario or Quebec and are accepted as licensed land surveyors after a greatly reduced period of articles.

Prof. Thompson: My view is that surveying should not be included as one of the disciplines in the undergraduate course for civil engineers at all. It should be taught merely as a qualifying technique, like reading a blueprint.

Prof. Beattie: At the present time, the major source of professional persons for the federal survey services seems to be the civil engineering graduate. In New Brunswick very few such persons at present enter the land survey field, partly because of other job opportunities and the required apprenticeship, and partly because the Provincial Department of Lands and Mines can better be supplied by graduates in forestry.

Eight years ago the Department of Civil Engineering of the University of New Brunswick added photogrammetry and expanded somewhat the coverage of the established fields of surveying. Two years ago we realized that we were not filling the needs of the engineer going into surveying. After some study we felt that it would be impossible to properly prepare all civil engineers for specialized surveying.

We decided that the first step was to obtain the services of a qualified surveying engineer to upgrade our present courses and to guide us in setting up a specialized curriculum. We now have such a person on our staff.

Our President and Dean are sympathetic in principal to the idea of higher education in surveying. A group of our graduates and others in the profession have encouraged us. We feel, therefore, that the time is near when we may introduce survey education at a more advanced level. We believe that the needs of the Land Survey Association can also be met by this proposed curriculum. This branch of surveying within New Brunswick has many well qualified men among its ranks, several of whom are graduate foresters or engineers. However, there are phases of cadastral surveying which will require men with special knowledge in growing numbers. The associations will, I am sure, welcome such trained men with open arms.

Prof. Gads: The University of Alberta rejects the contention that it is the university's job to provide practical experience. We teach basic principles and expect the student to get his experience elsewhere. We do not attempt to turn out a competent surveyor from our surveying courses any more than we turn out a polished draftsman from our drafting course. Contrary to usual policy, we do teach surveying in the first year, but this we did because the only jobs our students have been able to get for some years past have been in construction or surveying. We wished to give them enough surveying technique so that they could go out and earn money to continue their courses. We have also found that this surveying course acts as a valuable selection procedure — it weeds out some of the undesirables.

As a step towards more advanced education for surveyors the faculty of engineering might be willing to drop some of our conventional courses in the fourth year, provided we can substitute some more advanced courses in surveying, preferably photogrammetry or town planning, and provided there are enough people wanting the courses. Our greatest difficulty in this will be finding suitable teachers. I am interested in Dr. Ruptash's suggestion regarding a survey institute, particularly as a means of providing teachers.

Prof. Thompson: I entirely agree with Prof. Gads regarding teaching at the University of Alberta. The medical profession, which invites our jealousy in regard to financial rewards, provides a parallel for this. The medical student does most of his specialization in a hospital and his university instruction is largely non-medical.

Mr. Tweddell: We apparently devote more time to astronomy (at the University of Saskatchewan) than most of the other universities. We differ from most other universities in that we teach no surveying in the first year. In the second year we teach surveying to all students except those in chemical engineering. In the third year about two-thirds of our surveying course for civil engineers is devoted to spherical trigonometry and astronomy, the remainder to irrigation and highway design problems.

We have a survey camp after both second and third year, the first of twenty days' duration and the second sixteen days.

A total of twelve lectures and thirty-six hours of laboratory time originally devoted to the third year surveying has been given over to an introduction course in photogrammetry.

We are faced with a problem in connection with our third year surveying course, in that, while the emphasis is on astronomy, probably no more than two of our sixty-five graduates in civil engineering this year will make use of it after graduation. On the other hand, possibly one-third of our graduates will find employment with various highways departments. Because of this, thought is being given to the possibility of replacing our astronomy course with one in highway design.

After listening to the discussion here I would say that we are taking one step in the right direction: we are increasing the mathematics content of the course by one and a half classes for the students in special civil engineering. Another move that is under discussion is the setting up of a class covering errors, significant figures, least squares, weights, and similar problems, which are of importance not only in surveying but in other classes as well.

Prof. Larson: There seems to be a tendency in surveying and engineering education to change the emphasis from applied science to pure science. At the University of Manitoba surveying courses have not been affected by this trend. Basic surveying instruction is given in the first two years of engineering. An advanced course is given to civil engineering students in the senior year.

The inclusion of surveying courses in the engineering curriculum is justified by the fact that they provide preparatory training for certain engineering courses. For example, instruction in grade, curvature, and earthwork computations given in surveying classes enables a student to deal with problems in highway and municipal engineering.

Prof. Thompson: It has not been suggested that no surveying should be taught to those who are going to specialize in civil engineering, but such surveying as is taught to civil engineers is in fact of a very elementary nature. As far as minor problems such as road improvements in a city are concerned, I think the contractor with his own surveying staff would be capable of doing this with the use of modern methods, but when it comes to a job of serious road construction the tendency today is to leave the surveying to a specialist, including the earthwork computations and the making of a topographical map.

Prof. Larson: The selection of a route that is well located with respect to topography, as shown on a map supplied by a surveyor, requires that the engineer should have a knowledge of grades and curvatures, which is supplied by a course in surveying.

Prof. Thompson: Of course the engineer has to understand grades and curvatures, but this does not make him a surveyor. What he wants is the ability to read the map, not to make it.

Prof. Konecny: Discussion so far has indicated that basically two different types of surveyor are wanted. The first group is needed for advanced survey projects as executed by the Federal Government and the second is needed in the provinces as land surveyors or on surveys for construction purposes.

It has been suggested that the specialized education of the first group could best be undertaken at one specialized centre in the country. This is of course not a matter for all universities. However, many, or at least some, universities in the provinces can contribute to the solution of the problem by setting up an undergraduate course that will make it possible either to branch off into graduate geodetic studies at a specialized institute or to go directly into land and construction surveying. Even if the future geodesist should not be as thoroughly prepared in mathematics and physics as the engineering physics graduate would be, there would be a great advantage in this education in that land surveyors, topographic surveyors and geodesists would have a common background which would help them to meet on the same level to supplement each other. It should be worthwhile for each university to investigate whether the establishment of such a curriculum is possible, and, if so, to try to set it up. By so doing the demands for better education in all branches of surveying throughout the nation would be met.

Mr. Roberts: Who is going to grab hold of this tail and set up such a course? Don't jump too far ahead. It is better to have the undergraduates and build a course around them. Then send the better students to Ohio State or London University and they will come back as instructors and assist in building up the profession. The small number needed for research can be found from this course.

Prof. Thompson: As a visitor to this country I am surprised at your lack of vision. If ever a country from a purely mercenary point of view ought to regard mapping as important, it is this country. The whole of your northern resources are waiting to be exploited and it cannot be done without maps. The cost of an institute such as Dr. Ruptash has suggested would be paid for many times over. This building in which we are standing — an absolute monument to someone's foresight at a time that could hardly be called a boom period — is proof of the value of such investments.

Dr. Howlett: I would like to ask Dr. Ruptash exactly why it is thought that there is a special significance in calling the group that he suggests establishing at some university an 'institute' instead of a 'department'.

Dr. Ruptash: The initial purpose of such an organization would be to provide research facilities, not teaching facilities. I would gradually expand into teaching as staff and equipment were built up, following the interest aroused by the research. If you have just another department in a university there is nothing special to attract students. But if you have one dedicated man doing something important because he wants to do it, not because the university wants him to do it, word of what is happening will spread around and serious students will be attracted to work with that man. The only significance of the name is that 'Institute' is more likely to attract attention to this kind of activity than is 'Department'.

Dr. Howlett: It doesn't seem to be particularly important what the teaching group is called — institute or department — so long as it is directed by a man of vision and competence. Nor do I think that the expense for the establishment of a new course is anywhere near as great as has been suggested in some of these discussions. Some equipment will be needed to give practical experience in some of the tools just as in any other course but the emphasis in the course should be on principles rather than on their detailed realization. It must be an academic kind of training and not a trade school. It is for this reason that the quality of those performing the task must be of the very highest. If this is the case a very moderate amount of costly equipment will be required to support their teaching of the fundamental principles.

Prof. McNair: I should like to comment on Prof. Konecny's division between the land surveyor and the surveyor in government service. I think there is a third

group whose numbers are even larger than these and who require even more training and who are more likely to elevate the status of the surveyor. This group is composed of the men who go into the large commercial organizations such as RCA or General Electric, those who are working on obtaining information from scanning devices for making of maps, those who are extracting information from satellites and guided missiles, those who are concerned with warning systems for defence purposes. There is a considerable demand for this type of person and he must have training in surveying that includes photogrammetry, geodesy — the whole range of specialized survey subjects. In the United States, in the last few years, the number of such men has been larger than the number going into government service.

A division has been made between the men who make the maps and those engaged in highway location. I personally feel that these cannot be separated. Every engineer should be able to read an air photograph and air photography is tied in with surveying through photogrammetry.

We must bear in mind that there is a difference between Canada and the United States in the background and initial training that entering students must have. In Canada they usually have thirteen years of school whereas in the United States they have only twelve. Admission requirements also vary widely, particularly in mathematics and physics for entering engineering students. Higher entrance requirements mean that subsequent courses can be taught at progressively higher levels. Furthermore, quite a few engineering schools now require five years of schooling for the first degree. This is a professional requirement which colleges of arts and sciences cannot adopt.

Regarding the relation between engineering and surveying, I cannot see that the surveyor is going to be fully equipped as such unless he has some engineering background. He should know something about elementary hydraulics, and about electric engineering, including electronics. I do not mean that the surveyor should be able to design an electronic system, but he should be able to talk intelligently to the electronics engineer about their common problems. New problems connected with surveying are coming in sight all the time — for example, plotting the ocean depths, making a survey connection between North America and Europe — and these problems will certainly involve fields not now generally included in the surveyor's education. Our schools should be educating ten or twenty years ahead.

Prof. Thompson: Regarding the question of interpretation of air photographs, I have not suggested that civil engineers should not be able to read a map or use a photograph, but I do not see that this requires that a surveyor should know about road location. In my opinion, interpretation of air photographs is not a branch of surveying. The surveyor needs to be able to interpret air photographs for his own purpose and it is simple to teach the civil engineer enough about photographs to do the same for his purpose. To say otherwise is like suggesting that it is easier to teach geology to a blacksmith, who is an expert with a hammer, than to teach a geologist to use a hammer.

Mr. Kendall. It has been suggested that to set up a survey institute such as Dr. Ruptash has suggested would be very expensive, but I think that whatever the cost we should have the courage to go after these things, and I feel that industry as well as government would support any such project.

I would like to comment on the type of people needed by the survey industry. There are really three types — technician, civil engineers, and survey specialists. The technicians, who represent the bulk, should come from technical schools; the civil engineers need to be exposed to modern survey techniques, not so that they can practise them, but rather so that they will know their capabilities and be able to apply and procure them; the survey specialists are the key men in government and industry who will plan, direct and develop surveys in the future, and they need to be highly qualified university men.

Mr. Blachut: I do not think that the cost of setting up an institute such as Dr. Ruptash suggested would be a great obstacle, and this is not the most important point. He stressed the fact that such a project would arouse enthusiasm for the profession, and I believe that in this way it would be something worthwhile for the field of education.

Mr. Ewing: Mr. Chairman, considerable material has been presented on behalf of the survey profession and a few cautious responses have been made on the part of the universities. I should like to put in a word for the customer or client, and offer a few personal opinions, as an engineer, on the situation as I see it today.

First, I think we would all agree that proper surveys are fundamental to a country's orderly progress and in a country the size of Canada with its peculiar problems, this is no light undertaking. In fact, we might even be excused if we were to say that we really haven't done too badly, everything considered. Indeed, we have been singularly blessed in men like Dr. Deville, who was able to avert chaos in the west by pushing his systems of survey along with the tide of settlers, and Dr. King, who began the Geodetic Survey on a firm basis, and other dedicated people in the profession with vision and perseverance.

Unhappily, this early promise hasn't been fulfilled. What we have today just isn't good enough. I suggest that the quality and quantity of work is not good enough. I suggest that standards expected of our surveyors are not good enough and that the client isn't getting value for his money. With the economy of the country expanding at an ever faster tempo, the demands made of the surveyor will be increasingly stringent, with the elements of time and cost coming so important that many practices will no longer be tolerated. The amount of litigation arising from past surveys is an augury we cannot afford to ignore.

It is possible to recite a staggering list of shortcomings — carelessness, ignorance, wasted effort, poor, or poorly referenced, monuments and, my pet peeve, inaccurately located or lost monuments — that appear time and time again. Although I myself am not at present directly connected with field surveys I have in the past seen a great many survey students employed during summer months on various kinds of survey work — control surveys, airports, canals, and other construction jobs — where there has been need of men who could take a certain amount of responsibility, and it has been almost impossible to get them to take this responsibility. They have had to be trained right from scratch in basic survey work. This, I think, is a very great lack in their survey training, a lack which seems not to have been remedied to a sufficient extent in the later training of the students. A little generality is a dangerous thing and these criticisms are not solely symptomatic of the survey profession. Similarly there are many who do give faithful service, even hampered as they are by the existing system.

However, I would point to the fact that at one time surveying had an important place in civil engineering but has deteriorated greatly. In my view, the other fields of civil engineering have, in the past few years, expanded and progressed enormously in research and practice, while surveying would appear to have withdrawn into an enclave of its own making. While vitally important contributions are being made in instrumentation, technique and theory, these are not forcibly brought to the attention of the engineering profession as a whole. Consider the science of soil mechanics. After a very modest beginning a few years ago, this field is now flourishing. The fundamental research and application in this field is at an exciting pitch and recruits flock to this discipline. Surely surveying is not less important. Modesty may be very becoming in some cases but this is neither the time nor the place, and the surveyor should cease being an ostrich and demonstrate his ability and determination to take the respected position in the framework of the applied science which is rightfully his. I don't suggest that the surveyor become a Madison Avenue type but I do suggest that something in the order of a selling job is required.

There would appear to be a considerable feeling that surveying should be divorced from the civil engineering field, apparently because it is being treated as a fifth magnitude star, and presumably would like to be a fifth magnitude star in some other firmament such as mathematics and physics. I don't agree. To me, engineering is synonymous with applied science and I feel surveying is, by and large, a fundamental applied science. Applied science is applied science, and it is a mere exercise in semantics to worry over whether we call a portion of it civil engineering or something else, even though I do wonder if a surveyor isn't doing civil engineering, what is he doing? He has quite an impact on the civil population.

If the surveying profession wants to be a first-magnitude star, then it must depart from its present inertial orbit in a vacuum and, as a united body, make its voice heard and its presence felt. As a fundamental science, it should occupy a leading place and not be sitting like a maiden aunt hoping wistfully that someone will drop in and help out.

I am even more alarmed at Professor Thompson's argument that the surveyor should have minimum engineering training, on the grounds apparently, that the surveyor should only be concerned with the practice of his art. It has been suggested that the engineer is responsible for so briefing the surveyor that he need only go out to do the mechanical work required. I take great exception to this. I feel this is simply another withdrawal, an abandoning of a basic responsibility. As an engineer, I have often found it very difficult to get across just what I require, and then to get what I require. What of the more innocent client, the farmer, the cottage owner, and so so, who seek guidance and counsel as well as mere technical proficiency. I believe the surveyor would profit, as would his client, if more general engineering training were given. The engineer may choose to be ignorant of surveying techniques but the surveyor cannot afford, if he is to fulfill his function, to be ignorant of the fields covered by Mr. Hamilton's ingenious diagram. In fact, he should make it his business to know as much about developments in these fields as possible, for only thus can he properly serve his client.

What is going to be done about it? The fact that this colloquium has been organized shows that some are acutely aware of the situation and anxious to make a fresh start towards a high professional level. I feel, however, that simply to put the matter up to the universities and hope for the best is not sufficient. We have heard comments from various faculty members to the effect, in the spirit of Spencer and Mill, that the university is concerned with general basic education and not specialties. As Dr. Howlett has pointed out, we shall soon see radical changes in engineering education, with a trend back to basic fundamentals. I believe this trend is inevitable; the undergraduate course will require so much more basic work that little time will be left for specialization. This is all to the good. By the same token, it should make recruiting for surveying much easier, providing that the whole body of surveyors takes determined action to make the profession attractive and rewarding. The University can give a man the training required of a good surveyor but they can't make him one. Only the actions of the profession can create such an atmosphere that this man will want to become a surveyor. Is public confidence going to be restored or will the feeling continue that the less one has to do with a surveyor the better? Will comparable standards, across the country, be set up as to training, ethics, reward, etc., or will the present variations prevail? Will surveyors cooperate with government agencies and each other in a determined effort to establish reliability of monuments, etc., or will work continue to be duplicated and wasted, at the client's expense?

I sincerely trust that the material of this colloquium will be made available by the various associations to as wide a field as possible, in the hope that a concerted effort will be made to achieve an environment compelling respect, thus attracting the inquiring mind and pioneering spirit. Possibly we may see text books written suitable to our needs and drawn from the excellent but localized funds of knowledge already at our disposal. Possibly scholarships or bursaries may evolve to assist in the pioneering spirit of new techniques.

Opportunity is knocking and, if the study of surveying is not to be relegated to the university classics department with the other dead languages, the profession must get cracking now. We have all the ingredients and need only the will to fashion a profession that would be the envy of the world. I believe it is worth the effort and I believe that the clients of the future would be grateful.

Prof. Thompson: It has been my experience that it is the engineer who does not know what his requirements are. Surely he should be able to tell the surveyor what accuracy he wants, not the other way round.

Prof. deJong: In view of Mr. Ewing's criticisms of surveyors and of students employed during the summer months, I should like to say a word in defense of students and the universities. The student, hired before he has graduated, is not mature. The surveying profession and employers of students must face up to this. At the universities we must instruct in fundamentals and to a degree help the students along in some of the practical aspects of engineering, or else we must resort to technical training. We cannot do both; we can only do one in the time we have.

At this point it is appropriate to read a quotation by Mr. J. R. White, President of Imperial Oil, Ltd., from a speech made to an audience at the University of Western Ontario.

"The problem is not that of getting skilled help in the old-fashioned sense. We want people who understand the philosophy as well as the mechanics of their particular occupation . . . If they are to go to the top it is clear that their university experience should include a lot more than the mere techniques of their trade, important though these are."

The editorial from which this was extracted goes on to say:

"Industry has found that generally it can train an educated man for a job, but it cannot necessarily educate the trained man. Many parents and students have not yet realized this. To them the training phase of education is all important."

I wanted to read this paper because of its particular pertinence. I want the land surveyors to realize that it is no use to expect a man to be mature while he is still young and has had no chance to get maturing experience. The mistake of expecting maturity in the young is a common one, and it is only recently that land surveyors have stopped to think twice before making the statement that the university student is no good to them because he cannot run his instruments. The universities are not here to train instrument men and if they do it they are not going to train thinking men.

Some other details are worth mentioning. Several sources of people for the kind of work of which we are speaking are available. For surveying, men coming up through mathematics and physics, engineering physics, civil engineering, and other curricula make excellent potential material. The civil engineering graduates from the usual course, as well as the others, need additional — or, better still, optional — subject matter. The University of Toronto has an optional course that can provide candidates who, with a suitable term of experience will become the desired kind of land surveyors and surveyors for engineering construction. Graduates of this course need the right kind of encouragement to go into these callings. In any event, whatever be the educational process accepted or instituted, do not expect the product to be all things to all men on the day of graduation.

Mr. Pierce: I do hope the educators will return with two things at least. Certainly our country needs education on a very high plane for many reasons. With that I have no quarrel I am very glad to see, however, some support for us "dirt surveyors". Mr. Ewing says he is "alarmed". We in Ontario are more than alarmed and we feel our education has been too long neglected. Perhaps in some ways we should point an accusing finger at the educators. At our last council meeting, of sixteen items on our agenda, eight dealt with complaints coming in

from the public about surveyors and their work. We are looking for help and we hope that you educators will assist in improving matters. Any university course containing only advanced studies will certainly take a long, long time before its benefits would get back to us 'grass roots' surveyors and hence to the general public. We must find a quicker solution than that to assist us. We are caught in between; we are not on the upper planes, but we need a training better than we can give ourselves. We are part technical, but we must be taught to think clearly, for our work is complicated by complexities of law and a scarcity of reliable framework from which to operate.

Mr. Tweddell: I should like to ask Mr. Pierce how many of the eight cases he referred to were due to carelessness rather than lack of training. Speaking for my own Association, I would say that many such problems are due to carelessness rather than lack of technical ability. It is just that they will not take time to do the job properly.

Mr. Pierce: I don't recall exactly, but I think two were caused by carelessness and two by faulty knowledge or training. Most, however, stemmed from wrong attitude. The importance of a proper attitude among surveyors themselves or between themselves and the public is something which must be built into the surveying profession.

Colonel Smith: I put this forward with some diffidence because it concerns land surveyors and is thus outside my field of competence. I do think that before we say too much to the universities about the need for university training for surveyors we should settle the problem of whether land surveyors are going to recognize universities. Most of the provincial examining boards do so and do not presume to re-examine university graduates on subjects which they have covered in the university or even on those subjects which they have completed in high school. However, this is unhappily not the case in one or two provinces nor with the DLS and I would suggest something be done about it.

With regard to the question of whether surveyors should be engineers or not; I agree very much with the general opinion that what is needed is a somewhat greater concentration on physics and mathematics than is apparently feasible in an engineering course. However, I don't think we should entirely lose sight of the realities of the situation and I would point out that, as long as we stay in the engineering fold, there is not the same problem in establishing what our graduate in surveying is worth in the matter of salary. I have particularly in mind the case of the Civil Service Commission but this applies to industry as well. For this reason I would be loth to support the setting up of a course completely outside the engineering faculty.

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Hydrographic Surveying

THE WAY AHEAD

Presented at the 53rd Annual Meeting of the Canadian Institute of Surveying, Ottawa, February 1960, by Rear Admiral K. St. B. Collins, C.B., O.B.E., D.S.C., Hydrographer of the Royal Navy from

The Canadian Surveyor

Volume XV, March 1960, No. 2

When the story of the Royal Navy Surveying Service and the Hydrographic Department of the Admiralty comes to be written, which I hope will not now be long delayed, a considerable part of the hydrographic history of the world will be unfolded. It is perhaps not too much of an exaggeration to say that up to the beginning of this century the charting of the seas was concentrated in the hands of the larger maritime nations. Now there are but few nations without a Hydrographic Service.

In Great Britain the early history of chart making is the history of exploration. Colonisation and trade followed the discoveries of new lands, and in their wake followed the Navy to convoy and protect the merchantmen, and the surveyors to chart the harbours and anchorages. And so it came about that the early hydrographic surveyors were naval officers who carried out these duties as part of their service work. In this way alone it would have followed logically that hydrography was incorporated in the naval service. But furthermore the fleets required sheltered anchorages, to provision and refit, at strategic points on the trade routes, and the charts so provided were jealously guarded from rivals, for obvious reasons.

Gradually there accumulated in the Admiralty a considerable collection of charts and log books, and in 1795 an office was set up to put this mass of detail in order, and to issue to the fleet the best possible charts that could be compiled from the information at hand. As the work proceeded it became desirable to commission ships whose particular duty it was to carry out surveys to fill the gaps in our knowledge and to resurvey those areas that were of particular importance to the fleet, and those where the data in the Department was old or unreliable. So came into being the Surveying Service in the Royal Navy.

It is an unfortunate fact that the cost of running a ship is such that it is most unlikely that the sale of charts and publications can ever meet the expenses involved in a hydrographic organisation. The same is probably true in the oceanographical field. It is probably essential, if the utmost use is to be made of the employment of a ship, that the sea time be shared by a number of interests, although the vessel may be run and managed by one. In any case a research ship is not a commercial enterprise and it follows that it is almost certain to be incorporated in a government department. Hydrographic ships, by the nature of their work, are usually run by a defence ministry.

As the Maritime countries of the world settled their differences and freedom of the high seas became a generally accepted principle, attention was focussed on the charting needs of those who use the seas for commerce or private reasons rather than on the particular needs of the fleets. In fact it is now an accepted principle that the supply of charts to the merchant marine is a duty imposed on the State; and since hydrography serves the country in a number of ways besides its defence needs, it is no business of the State to attempt to balance its accounts at the expense of those who buy the charts.

It was only a step, but regrettably a long-delayed one, to the foundation of an international organisation to encourage the interchange of hydrographic information between maritime nations and to promote hydrographic work where none existed. The International Hydrographic Bureau, housed in the little harbour of Monaco, was born at a conference of 24 nations in London, in 1919. As it exists today it is perhaps unique among international bodies, and its record of achieve-

ment in uniting the charting authorities of the world for the benefit of mariners is an example of what can be done by trust between nations and a common determination to find a solution, however difficult the problem.

So far so good. We have now reached the stage where hydrographic services have in the main discharged their tasks of ensuring the safety of navigation, by employing their resources within the regions of shallow water where dangers may exist. There is still much to be done to perfect existing surveys and to keep abreast of seabed trends in unstable areas, but yearly this work gets more nearly complete. The modern chart is a monument to the hydrographers who have overcome the disability of not being able to see the seabed they are examining and to the cartographers who have made the information available to the seaman.

Now, however, hydrography enters a new phase in its history. The days of national efforts on the shelves of the continents, within national boundaries, are over and we must go forward by international enterprise into the deep seas and oceans of the world. Still we must continue to meet the needs, the ever-changing needs, of navigation, of underwater as well as surface craft, but hand-in-hand with this is now the growing need of the oceanographer, the physicist, and others, to open up the vast resources of the seas for the benefit of mankind. We are on the threshold of intensive deep-sea research.

This is a challenge to the hydrographic services of the world. To reach out to these new horizons we need to throw off the fetters of our single-handed ways and join together in common effort. It has been written that "trust between nations cannot be established by proclamation but by experience in co-operative work towards common aims." This the International Hydrographic Bureau has achieved in the limited hydrographic field of the past and it is with its experience and all-embracing membership of maritime nations that we should be able to look forward to achieving the needs of the future.

One has only to glance at the vast water areas of the world to realize that results can only be achieved if all nations participate in the work, in international ships with international crews, hydrographers, and scientists, and particularly if all nations can make use of the data collected, according to their needs.

An advance can and should be made here and now. The national hydrographic services should be closely allied with the national oceanographic organisations. In the first instance hydrographic ships should be prepared to carry oceanographers, and oceanographic research ships to carry surveyors. The needs of both should be co-ordinated to their mutual benefit. This co-ordination might extend to the administration so that the utmost benefit may be derived from the experience of both fields of work and the best use made of the ships available. The scientific training of the oceanographer should be allied to the practical training of the surveyor, to the extent that they understand each other's needs and difficulties and are enabled to make the utmost of their separate opportunities when the ships are at sea. National programmes would be dovetailed into the international plans in the bordering seas. It would imperceptibly follow that the national efforts merge into the international effort and the scientists and sailors would virtually become part of an international team, with the prospects of a more assured and varied future than is always possible in the limited scope of a national institute.

It would be unrealistic to expect that the older existing organisations could combine without considerable disruption, but in some instances the more modern are so closely integrated that co-ordination between hydrography and oceanography is already a fact. There would be difficulty where the two sciences are controlled by different government ministers, and particularly where one is under the administration of a service ministry and the other an independent scientific or university body. The new British Minister for Science has himself written "Perhaps all British Science is at the moment too parochially minded, too departmentalised and lacking in the broader vision." Perhaps Great Britain is not the only country where it is the privilege of the senior members of any organisation to

consider themselves more disinterested, intelligent, and far-sighted than their juniors, and it is therefore their responsibility also to be more forward-looking and alive to the internationalism of the future. The impetus must come from above.

In the field of training of personnel, in international standardisation of instruments and techniques, much could be done now. Especially is there need for method in training the hydrographic surveyor, as is already recognised in the case of the land surveyor whatever his specialisation may be. Too long, in so many services, it has been maintained that only at sea can he learn his business. In the old days when the sextant and the compass were the only means of fixing position and the lead and line the only method of sounding, this was true, but in these days of electronics and radar the hydrographic surveyor must be a mechanic, an electrician, a mathematician, and much else, as well as a seaman. Survey doctrine, geodesy, the instrumental techniques, and much else he can best learn alongside his brother surveyor ashore; and a standardisation in these matters would add to the efficiency and to the quality of the work produced. Such training would also permit the hydrographic surveyor to claim recognition by the professional bodies, which is by no means always the case at present, and afford him the professional standing to which he is entitled.

In hydrography, as in all other surveying work, an international outlook means more than being prepared to place a national organisation at the service of an international programme. The larger nations must face up to their responsibility to assist the smaller ones who are unable to equip and run their own vessels to co-operate in the development of hydrography and oceanography. This means the expenditure of money, time, and effort, but is a concrete symbol of co-operation which is as urgent and as necessary as the employment of existing resources. For instance it is the duty of large, well equipped organisations to provide the testing ground for the study of scientific problems, the checks and trials of new ideas, and the perfecting of methods by whomsoever devised, which can then be turned to account by the smaller countries who are unable to do this work themselves.

This, however, raises the question of language, and the exact interpretation of the meaning of a scientific word. The difficulty of the translation of, say, an English word into the many languages of the International Hydrographic Bureau has to be overcome again and again. More and more is this becoming so as the number of languages in which reports and papers are written increases and new words are "invented", and yet this difficulty must be overcome if international co-operation is to be fully assured. Hydrographers should be aware of the immense amount of information and data now available in an increasing number of national magazines and journals, and the International Hydrographic Bureau is giving special thought to this important matter, and to publishing a bibliography of books and pamphlets from sources throughout the world.

The next few years will show significant advances in the instrumentation and techniques of surveying, particularly in the hydrographic field. Some of these will revolutionize the work of the hydrographer and extend the scope of his work beyond the limited field of his charting to include his share of the volume of scientific work which is increasing at such an enormous rate. In cartography, photography, aerial survey, and in reproduction work, there is a boundless field of research with which the hydrographic surveyor must be intimately associated and in much of which he must play his part. Particularly in the art of seamanship and the science of navigation he must indeed be the master of his trade.

The sea is a young man's calling, with all the thrills and dangers, and the compensation and rewards, that youth demands. Now that the consciousness of the world is alive to the immense potentialities of its seas and oceans, wherein it is said lies a contribution to the survival of man in his crowded future, the years ahead hold for the hydrographer a life of limitless possibility. The challenge is here and the hydrographic services must answer it. Indeed it is their duty to do so, to their utmost ability.

Surveyors Quest For Information

By R. E. Dickie, P.L.S., Chief Surveyor Bowaters Mersey Paper Co. Ltd.

As a prelude to the "Surveyors Quest For Information", it would seem appropriate to present some of the historical facts leading up to and the granting of lands in the Province of Nova Scotia.

Port Royal, now Annapolis Royal, was captured from the French in 1710, and by the Treaty of Utrecht in 1713 the whole of the Province of Nova Scotia, including a large part of New Brunswick, was ceded to the British. Conditions, however, during the succeeding years were in a very unstable condition due partly to the fact that the French had large settlements in the province, particularly along the Bay of Fundy shore, and also strong fortifications at Beausejour on the New Brunswick side; Louisburg on the Island of Cape Breton; and Quebec in Lower Canada.

By the middle of the century, although these unsettled conditions still persisted, the British realized the necessity of colonies and thus in 1749 founded Halifax. In 1775, the Expulsion of the Acadians took place, as well as the capture of Fort Beausejour on the New Brunswick Coast; Louisburg fell in 1758, and finally in 1759, Quebec was also captured by the British.

Although Canada as a whole was not ceded to the British by the French until the Treaty of Paris in 1763, yet after the fall of the French Strongholds and realizing the necessity of further colonization of the Country, they began in earnest to do so. Thus, in 1759 and 1760, many areas throughout the Province were granted for settlement purposes and known as Townships, such as, Onslow, Truro, Cornwallis, Liverpool, etc. These usually consisted of areas of approximately one hundred thousand acres situate along the seashore or along strategic rivers and streams, as at this time there were no roads in the Country and, therefore, water formed the only means of transportation for these earlier settlers.

Following these earlier settlements, the next great influx of immigration was during the American War of Independence in the early 1780's, at which time large numbers emigrated from the New England colonies to Nova Scotia. At this time the settlements of Guysborough Township, Shelburne, etc. took place.

Up until this time the trend was towards the collective unit but following this period the individual grant began to assert itself.

Up until about the years 1820 to 1830 the most of our lands were granted the settler for colonization purposes, although even in these early days lumbering was an important consideration, and naturally these lands were granted near the settlements, leaving the interior of our Province still ungranted.

From this time on, lumbering became of primary interest and thus the lumberman went further afield for his grants. This reached a climax in the period from 1860 to 1880, when in that twenty year period over eight thousand grants were given.

The granting of lands continued until the start of the present century when approximately twenty-one thousand grants had been issued, and as of today there are slightly over twenty-two thousand. At that time the Province began to realize the value of their Crown Lands and instigated in the place of the Grant, the Lease, which was generally given for a period of twenty years with an option of renewal for a further twenty.

The above number of Grants is based on the system of numbering starting in 1839. Previous to this date there were two other systems; First were Books one to twenty-one, ending about 1808, and secondly Books 'A' to 'Z' ending about 1840. Numbering here was not uniformly kept but would account for an additional several thousand grants, including many of our larger ones.

By about 1927 the Crown again changed its policy and instituted in the place of the grant and the lease the cutting license, whereby the licensee paid a certain stumpage value for the wood standing on the said licensed area.

Although the granting and leasing of land is not the policy of the Government of today, yet, in extenuating circumstances, both a grant or lease may still be obtained.

From this historical sketch leading up to the granting of lands, we now pass to the conveyancing of these lands, which may be listed as follows:

The Grant, the Allotment, the Lease, the Bequest or Will, the Deed, etc.

The **Grant**, of course, is actually a Deed from the Crown body to the individual and is the basis of all out titles, land holdings, and values.

The **Allotment** — In the early Townships the land, as a whole, was granted to many individuals, they to make their own divisions and conveyances. Under an Act of 1759 the members of a Township were empowered to select a Committee, generally consisting of three, with authority to apportion and convey these lands. However, shortly after the enactment of this Act, it was repealed and technically all these conveyances were illegal. However, as far as the Township of Liverpool was concerned, a further act was passed in 1908, confirming as legal the conveyancing of all former trustees. Again, in 1910, there was an Act passed respecting the Township of Guysborough, also confirming the work of the early Trustees.

The **Lease** — This is the conveyancing of certain rights in real estate, but with actual titles still vested in the grantor or the Crown, whichever the case might be.

The **Bequest or Will** — Where a person dies testate, or leaving a Will and devising his property to others.

The **Deed** — This might be in the following forms; that is, The Tax Deed, the Warranted and Defended Deed, the Quit Claim Deed, the Executors Deed, the Administrators Deed, the Sheriffs Deed, the Assignees Deed, The Trust Deed, etc.

The **Tax Deed** — As taxes are a first lien on all real estate and a liability to a governing body, all such property, after due process of law, can be sold by that Governing body to other parties.

The **Warranted and Defended Deed** — is simply that the Grantor guarantees to the Grantee all rights to the property involved. This may be either all inclusive or limited.

The **Quit Claim Deed** — in which the Grantor only conveys and right, title and interest which he might have in the real estate involved.

The **Executors Deed** — is where a person, having died testate or leaving a Will, empowers his Executors to sell his real estate.

The **Administrators Deed** — is whereby a person dies intestate, that is, not leaving a Will, and at the request of his immediate heirs or the Courts, etc., Administrators are appointed to settle the estate and in the event of the sale of real estate, the Probate Court grants the Administrators a license to sell or power to sell and convey said estate.

The **Sheriffs Deed** — In the event of a mortgage, judgement or other lien on the property, after due process of law, the Sheriff is empowered to sell, for the benefit of the creditor, under authority of foreclosure of mortgage or writ of execution or judgement, etc.

The **Assignees Deed** — In the event of an individual or firm becoming bankrupt, they assign their assets to an assignee, duly appointed by the Courts, who is given authority to sell this real estate for the benefit of the creditors.

The **Trust Deed** — As it implies, this is where an individual or company conveys their real estate in trust for some specific purpose.

The various deeds referred to above present three distinct questions or problems which, in short, are "What", "Where", and "How"; that is "What" meaning "What is it?" or "What have you?" or, in other words, "Is the land described in the deed legally yours?" The next question is "Where is it?" which, of course, is essentially the question to be determined by the Land Surveyor. And thirdly "How" or "How much is it worth?", etc. This, of course, in one sense is of no interest to the land surveyor, but is rather a question for the forester or the appraiser to determine.

These three questions are all closely inter-related and would appear to be of value in the order in which they are given.

It may be argued that the land surveyor has no interest in the "What" or legal aspect of this Deed, but in the "Where". My contention is that he is deeply interested in both, particularly as the first may be a great source of information. After all, the lawyer is only interested in the title of the lot and not at all interested in the survey information which may well be of the utmost importance.

We have now examined the conveyances and the questions emanating therefrom. The next step is the gathering and preparation of information before going to the field.

It is considered by most people that the surveyor has a sixth sense and that all he has to do is to go to the locale of the survey, set up his instrument, and Presto! the position of the line is established. Such, however, is not the case, and generally there is more time-consuming effort in the preparation for a survey than in the actual survey itself.

I would now like to present some of the means whereby the surveyor gleans this information which, as I have already said, may well be of the utmost importance. I am now speaking, of course, primarily of the survey of forest and rural lands, although practically the same procedure will apply to the surveyors of urban areas as well.

Be it the survey of a grant or the subdivision thereof, the first requisite of course is the grant sketch and description of the grant or lot involved, as well as all surrounding grants. These should then be plotted as a working plan, and thus the surveyor will have a graphic picture of the lot itself, as well as the land surrounding it. He should, of course, at the same time obtain the name of the original surveyor whose idiosyncrasies, to some extent, may be divulged in the plotting of these various grants.

The next approach may be the investigation of the Return of Survey accompanying said grants, as in many instances the old-time land surveyor gave topographic as well as other ties, which may not have been included in the grant sketch itself.

From here we progress to the Petition files wherein the original petition is filed, as well as all subsequent matter or correspondence relative to the grant in question. This is often of great importance and as a follow up it may be well to go through the correspondence of James H. Austen, who was Commissioner of Crown Lands for many years and who kept a carbon copy of all his correspondence, which is now bound and on file in the Crown Lands Office in Halifax. I must say that I have often found this very helpful as it so often reveals the Crown Land Department's attitude in answer to correspondence in the said petition files.

Another great source of information is the Public Archives in Halifax. Here many of our old original plans are filed as well as much of the early correspondence relative to land matters and, for some reason, many of the first petitions and returns of survey are on file here and not in the Crown Lands Office.

As already stated, the search of title is of prime importance, both as to title and information relative to surveys. Many people, and that includes some sur-

veyors as well, argue that this is the prerogative of the lawyer alone, but in this I do not agree. His objective, of course, is solely the title to that particular lot and therefore quite often overlooks vital information helpful to the surveyor. As, for instance, there might be vital changes in the description, not affecting its generality as a whole, but which may be misleading when laying the lot out upon the ground.

In the Province of Nova Scotia, there are twenty-two Registry of Deeds Offices, or rather was, as several years ago the Office in Parrsboro was closed and amalgamated with that of Amherst. Besides this, there are eighteen Probate Offices — one for each county. I have at one time or another worked in all these Offices, with the exception of the Probate Office in Guysborough, as well as several in New Brunswick.

There are generally two approaches to a search of title; namely, working from the present grantee back towards the grant, or from the grant up to the present grantee. The most satisfactory way is working from the grant up as in this way you have a check on the mortgages, judgments, or other liens against the property, which may be overlooked by searching backwards. It may often be advisable to use one method and then check by the other. A search of title besides revealing alterations or discrepancies in the description may well uncover plans relative to the property that otherwise would never be found.

In many cases, there are seemingly breaks in title which may well be corrected by a further search in the Probate Office. This applies particularly where a testator devises his property in trust to his Executors or to married daughters by will, there is often to be found plans of the property so devised, or again in the inventory there may well be a reference to particular lots in which you are interested.

In your search a reference to past histories is very often of importance. Nearly every County has had, in the past, its own historian and quite often a very important part of that history is genealogy and in that way you can quite often connect an earlier grantee to that of a later grantor.

Another source of information is the church records, the old family Bibles, or the records of births, marriages and deaths. Some, if not all, of these mediums are generally available in every locality.

Perhaps the greatest source of information today is the aerial photograph, something relatively new in this field. From these photographs the surveyor gets a graphic picture of the whole surrounding country. Such as topographic features, cultivated field, cuttings — often denoting lines — and lines themselves as shown by fences, old hedge rows, stone walls, etc. Once the scale is determined — they are generally about twenty chains to an inch — and by the use of Scale, Protractor and Triangles a great deal of information can be obtained in a few minutes that formerly required a great deal of time.

Another great source of information is the old-time local resident. And here again, in nearly every locality, you will find some of the older people that have always taken a great interest in family matters or genealogy.

Our cemeteries also play quite a role in search of title, as in this way you pin-point a man's death and the name of his wife, which is often a determining factor in proving continuity of title.

Added to these is the old wooden box, bran bag, or some other receptacle, quite often found in the attics of old homes, wherein people in much earlier days had deposited old deeds, plans and correspondence. This source of information is rapidly fading away, as in so many cases people now-a-days are disposing of the so-called "trash" without any investigation as to its probable worth.

Another factor, which I cannot stress too highly, is a close study of the idiosyncrasies of the past or old-time surveyor as generally the work of the present day surveyor is the retracement of work done by others in the past. This, of course, comes from long-time experience, principally in the field, or from information gleaned from other surveyors who have had that necessary experience.

Generally, the most of our Counties were blessed by the good surveyor and cursed by the poor, as for instance, amongst the good is Crawley of Cape Breton, Fairbanks (I am not sure of that name) of Guysborough, H. R. MacKenzie, W. R. MacKenzie and James Davison of Halifax, Kerr of Annapolis, Alpheus Jones of Digby and Peter Lent Hatfield of Yarmouth, etc. Of the poor, and that can quite often be spelled with a capital "P" is Armstrong of Kings, the worst of them all, Moore, Freeman and Harlow of Queens, Hamilton of Shelburne and J. S. M. Jones of Digby, W. A. Hendry of Halifax, etc. Armstrong and Harlow finally lost their Commissions, but alas, at much too late a date.

Armed with this information, the surveyor is prepared to apply it to his survey on the ground and here again he is beset by many problems that are not evident during this period of preparation. This is a lengthy subject in itself and can best be shown by actual experiences.

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