

The NOVA SCOTIAN SURVEYOR



MARCH 1968

NOTICE

**TO ALL HOLDERS OF PROVINCIAL LAND SURVEYOR'S LICENSES
OF NOVA SCOTIA**

The 18th Annual Meeting Of The Association

NOVEMBER 1 and 2, 1968

AT THE CITADEL INN

HALIFAX, NOVA SCOTIA

**PLAN NOW TO ATTEND THIS MEETING. BY ATTENDING YOU MAY SEE
HOW THE ASSOCIATION CAN HELP YOU TO HELP THEM.**

The NOVA SCOTIAN SURVEYOR

Published four times a year by

The Association of Provincial Land Surveyors of Nova Scotia Incorporated

John S. Pope
President

Edward P. Rice
Secretary-Treasurer

R. E. MILLARD
Editor

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R. E. Millard, P.L.S.

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MINUTES OF COUNCIL MEETING HELD ON DEC. 9th, 1967 AT THE CITADEL INN, HALIFAX, N. S.

Members Present: — President, John Pope, Vice-President, Roy Dunbrack, Secretary-Treasurer, Ed Rice.

Councillors: — Mr. M. Rafuse, Mr. J. Ryan, Mr. D. Clark, Mr. E. Keen, Mr. E. Millard, Mr. L. Gray, Mr. R. Hunt, Mr. D. Campbell, Col. G. Streb, Mr. R. Feetham

Past President: — Mr. G. Bates.

Guests Present: — Prof A. F. Chisholm, Mr. J. E. R. March.

The meeting was called to order at 1:00 p. m. by the President and the minutes of the previous meeting were read. It was moved by R. Feetham and seconded by Mr. Bates that the minutes be approved as read. Motion carried

Business arising from the minutes:—

It was pointed out that Dr. Creighton in the past has appointed Mr. H. B. Robertson to represent him on the Board of Examiners. A discussion followed as to what steps should be taken as Mr. Robertson was also appointed to represent the Association. The Secretary mentioned that Mr. Robertson had been notified of his appointment and to date no reply had been received. The matter is to be left until a reply is received from Mr. Robertson.

Mr. Bates circulated a symbol for a rubber stamp and a new crest for the Association. These symbols and design were based on the condition that the name of the Association will be changed. Further action will be taken on these items following passing of the Bill to amend the Act.

The Secretary circulated a financial report of the 17th Annual Meeting which showed a net loss of \$276.09, as compared to a net loss of \$580.81 at the 16th Annual Meeting.

The Secretary reported for the 18th Annual Meeting Committee on the investigation of transferring the Annual Meeting to the Holiday Inn in Dartmouth or to the Nova Scotian Hotel in Halifax. A discussion followed and then it was moved by Col. Streb and seconded by Mr. Bates that the 18th Annual Meeting be held in Dartmouth at the Holiday Inn. The motion was defeated 5 for the motion, 7 against and 1 abstention. It was moved by Mr. Dunbrack and seconded by Mr. Feetham that the 18th Annual Meeting be held at the Citadel Inn again next year. Motion carried 8 for, 3 against, and 2 abstentions.

Reports from Councillors on Registry Offices in their areas:

Mr. E. Millard, Liverpool, Queens Co.; Anything can be registered as long as it is

clean and reasonably legible and that it refers to a parcel of land. It does not matter who it is drawn by or if it is signed.

Col. G. Streb, Annapolis Co.; Nothing required to be registered and anything may be registered (deeds or plans) with or without signature so long as it purports to describe a property and appears to do so.

Mr. D. Campbell; Inverness and Port Hood; Will accept anything, same as Annapolis Co.

Mr. Feetham, Halifax Co.; The Registrar does not accept any plans associated with property subdivision unless it has been certified by a Provincial Land Surveyor and duly approved by the Halifax County Planning Board. Compiled property plans will be accepted by the Registry Office without a certification of any sort. Any size of plan will be accepted, contrary to the wishes of the Planning Board who at one time tried to enforce standard plan sizes on the surveyors. Halifax County appears to be the most strict but only because of the existence of the County Planning Board.

Mr. B. Wolfe, Digby Co., (read by the Secretary) The registrar informed him that no definite plan sizes were required for filing and that there were only a few cases where plans were filed at all. Two plans ready for filing at the time, one bore a P. L. S. signature, the other, no signature at all.

Yarmouth Co., The registry office does not require that a plan be signed by a land Surveyor or that any particular size of plan be used. The town of Yarmouth has a planning board which regulates the subdivision of land in new areas but does not enforce regulations on the older pieces of land being surveyed.

Mr. D. Clark, Cumberland Co., 1) Plans of subdivision in town of Amherst must be approved by the "zoning officer." 2) Does not know about County. 3) Size of a plan does not matter at the present time. 4) They are not interested in whether plans of survey are signed by a P. L. S.

Colchester Co., 1) All plans of subdivision must be approved by County Planning Board in County. 2) However, plans of land more than five acres in area or 500 feet from a Highway need not be signed by a P. L. S. 3) Size of plan does not matter. 4) Registrar suspects that it's possible to register plan without it being signed by P.L.S.

Mr. E. Keen, Hants Co., Registrar indicated that they cannot refuse to accept a plan with or without a signature.

Mr. L. Gray, Queens Co. and Bridgewater; Reported that his findings were the same as Mr. E. Millard.

Mr. J. Pope, Victoria and Richmond Co.; will accept anything with or without signature.

Cape Breton County; Somewhat stricter and the Registrar will give all support he can in making better regulations.

A discussion followed on what should be done with the information gathered and this led to the fact that the Registry Act had never been fully proclaimed.

It was moved by Mr. Dunbrack and seconded by Mr. E. Millard that the Secretary write to the Attorney General's Department and ask why the Registry Act has not been fully proclaimed and ask if it may be expected to be proclaimed. Motion carried.

Mr. Bates moved and Mr. Dunbrack seconded that the Councillors meet with the Registrars in their areas. to advise the registrars that we are seeking to get the Registry Act fully proclaimed. Motion Carried.

Mr. Feetham reported on the highway problem, that nothing more had been done other than to check that the Department is keeping its word. Mr. Pope reported that the plans are being registered in Cape Breton County.

Mr. Rice reported for the Legislative Committee, that the Resolution to amend the Act was being processed and also the amendment to the By-Laws, with regard to

dues. Mr. Rice reported that due to the Steel Mill problem in Cape Breton no action was being taken at present.

New Business

Mr. Rice circulated a copy of the Engineering Report published in the Halifax papers on Engineering in Nova Scotia. He then mentioned that he had been in contact with the Halifax Herald Limited and that the same thing was possible for the Surveyors, as the size depended on the amount of advertising received and that the percentage was 2/3rds advertising and 1/3rd editorial. This publication is to be timed so as to coincide with the Changing of the name of the Association.

Mr. Pope at this time asked the Vice-President, Mr. Dunbrack to take over the chair.

Mr. Pope reported on the meeting of Surveyors in the Sydney area on December 7th. Mr. Pope mentioned that it was his intention to call meetings in various parts of the Province to meet the surveyors.

As a result of this report, it was moved by Mr. Feetham and seconded by Mr. Pope that a draft letter be prepared by the Discipline Committee to be considered at the next Council Meeting, which will be sent to persons conducting surveys without a proper licence. Motion carried.

It was moved by Mr. Pope and seconded by Mr. Ryan that a letter be sent to all members asking them to supply any names of people conducting surveys without proper licence by February 29, 1968 and that the information obtained will be kept in strict confidence by the Council. Motion carried.

Mr. Pope departed for Sydney.

The Secretary read the letter received from Mr. Bensted, secretary County Board of Health. It was suggested that the Secretary acknowledge receipt of the letter, and then write to the Board of Examiners and ask why the students were not being examined on all subjects called for in the Regulations. Those present concurred with the above.

The next Council Meeting is scheduled for Friday the 22nd of March.

Mr. E. Millard moved and Mr. Keen seconded that the meeting be adjourned. Motion carried.

Respectfully submitted,
E. P. Rice,
Secretary - Treasurer.

THE ASSOCIATION OF PROVINCIAL LAND SURVEYORS OF NOVA SCOTIA **Notice Of Council Meeting**

To All Council Members:

This is to report that a Council Meeting of the Association was held on **Friday, March 22, 1968** at the hour of 12:30 p. m. in Salon 'A' at the **Citadel Inn, Halifax, N. S.** This was a dinner meeting.

The agenda was as follows:

- 1) 12:30 p. m. Dinner was served in Salon "A".
- 2) 1:15 p. m. Address on the Halifax Branch of the Canadian Institute of Surveying by Mr. Larry Murdock, Chairman.
- 3) 1:25 p. m. Report on bringing the C. I. S. Convention to Halifax in 1970 by Mr. J. E. R. March, Committee Chairman.
- 4) 1:35 p. m. Reading of the minutes of Dec. 9, 1967 Council Meeting and of the Special Council Meeting held on January 26, 1968.
- 5) 1:45 p. m. Business arising out of minutes.
 - a) Appointment of a representative to the Board of Examiners to replace Mr. H. B. Robertson.
 - b) Report on possibility of having Registry Act fully Proclaimed.

- c) Report on Highway Problem — Mr. Robert Feetham.
- d) Report of Legislative Committee — Secretary Treasurer.
- e) Report of having a Special Feature run in the Halifax Herald and Mail Star on the Association — Sec. Treas.
- f) Report on Percolation Test Committee — Sec. Treas.
- g) Report of progress made in stopping unqualified surveyors from establishing boundary lines. — Sec. Treas.
- 6) 3:00 p. m. Reception and considerations of applications for membership. — Secretary -Treasurer.
- 7) 3:10 p. m. New Business:—
 - a) Report on C. I. S. Annual Meeting — President J. Pope
 - b) Form a Committee to investigate the possibility of forming an Association of Certified Survey Technicians.
 - c) Other items Councillors may wish to bring up.
- 8) 4:30 p. m. Meeting to Adjourn at conclusion of business.

E. P. Rice
Secretary-Treasurer

**THE CANADIAN INSTITUTE OF SURVEYING
NOVA SCOTIA BRANCH**

173 Crichton Avenue
Dartmouth, N. S.
March 15, 1968

Report of Meeting

A meeting of the local branch of The Canadian Institute of Surveying was held on Friday, March 22, at 7:30 p. m., in the Conference Room, Bedford Institute of Oceanography, Dartmouth, Nova Scotia.

Business Agenda

1. Minutes of the February 23rd., meeting
2. Business arising from the minutes
3. Treasurer's Report
4. Membership Chairman's report
5. Appointment of the following Committee Chairmen:
Left to Executives to bring in a list of names willing to act.
 - a. Social Committee
 - b. Public Relations Committee
 - c. Program Committee

Program

"Urban Renewal," an illustrated talk by Mr. Don Bayers, Assistant to the Director of Planning, City of Dartmouth.

Coffee was served in the cafeteria

Larry P. Murdock
Chairman

(Miss) Eva E. Duncan
Secretary

REPORT ON THE C. I. S. CONVENTION

This year it was my privilege to attend the Annual Meeting of the Canadian Institute of Surveying, which was held in Edmonton, Alberta. Nova Scotia was well represented by seven delegates. They were John Pope, Roy Dunbrack, George Bates, Al Daykin, Walter Servant, Ronald Chisholm and myself.

This was the first time I attended the Convention and I was truly amazed at the magnitude of the C. I. S. and its Annual Meeting. I hope that I will be able to apply a few of the ideas I received in Edmonton to our Annual Meeting in November.

The main thing that impressed me was the calibre of the technical papers that were presented and the educational qualifications of the persons who read these papers. A list of the technical papers presented at this Convention will be found on another page of this issue. I have been promised a copy of each of these papers and will have them printed in the Nova Scotian Surveyor as space permits.

The Convention opened with the introduction of the guests and welcome messages from the Mayor of Edmonton and the Minister of Lands and Forests for Alberta. The first business session took place on Wednesday morning, January 31, followed by the official opening of the exhibits. For the remainder of Wednesday, all day Thursday and Friday morning, a total of fifteen technical Papers were given. Intermingled with these technical papers were eight social functions, which added greatly to the enjoyment of the meeting.

I found three social events especially impressive. One was the informal reception held on the night prior to the Annual Meeting and sponsored by the Association of Alberta Land Surveyors. It was at this reception that the Nova Scotia delegation retrieved the Baffin Bell after apprehending Klondike Kate.

The second outstanding social event was the Calgary Chuck-Wagon Breakfast. This was a well organized event, which began at six o'clock in the morning, with the awakening of all delegates in the hotel and ended at 9 o'clock after a hearty breakfast. This was sponsored by the Calgary Branch of the C. I. S.

The third event, which I particularly enjoyed, was the annual dinner and dance, which was sponsored by the City of Edmonton, with a Klondike gold rush theme. The majority of the delegates wore Klondike costumes with the City of Edmonton providing Klondike Kate and bar girls to round out the theme of this event.

While in Edmonton, I spent two hours with Mr. Bob Baker, Secretary-Treasurer of the Association of Alberta Land Surveyors. During our informal meeting we discussed mutual problems and business. One thing which interested me was the new legislation which they propose for this year for the certification of Survey Technicians and Technologists. I have been promised a copy of the proposed legislation and I intend to present it to Council for study.

A total of 75 exhibitors were registered for the Convention. These included the companies which exhibit at our own Annual Meeting, computer exhibitors, Shell Oil, and the Alberta Government Telephone Company. Since my return, I have approached three computer exhibitors and I hope that I will succeed in getting at least one of them to exhibit at our next Annual Meeting.

A highlight of the three day Convention came on Thursday noon during the Annual Luncheon, when the Nova Scotia delegation demonstrated in order to bring the C. I. S. Convention to Halifax in 1970. The idea was well received by the delegates and I had many people from the Western Provinces tell me personally, that they are looking forward to coming to Nova Scotia, should the Convention be held here. Throughout the entire meeting the Nova Scotia delegation made its presence known, under the capable direction of George Bates and Al Daykin.

In addition to the Nova Scotia delegates at the Convention, I met two other members of our Association. They were David Crandall from Winnipeg, Manitoba and Murray Banks from Schefferville, Quebec.

Attending this Convention was a memorable experience for me and I am looking forward to having the Convention come to Nova Scotia in 1970.

Respectfully submitted,
Edward P. Rice,
Secretary - Treasurer.

**LIST OF TECHNICAL PAPERS PRESENTED AT THE
SIXTY-FIRST ANNUAL MEETING OF THE C. I. S.**

Mapping from Space Photography — Frederick J. Doyle, Chief Scientist, Autometric Operation, Raytheon Company, Alexandria, Va., U. S. A.

From Pythagoras to the Modified Mercury Datum — Irene Fischer, Chief, Geoid Branch, Department of Geodesy, Army Map Service, Washington, D. C.

Natural Resources Exploration and Exploitation Problems, Canadian Arctic Islands — Dr. J. C. Sproule, Engineering and Geological Consultant, Calgary, Alberta.

The Role of Photographic Interpretation in Northern Route and Site Survey — Dr. J. D. Mollard, P. Eng., Photo Interpretation Consultant, Regina, Saskatchewan.

Reference Systems for Surveying and Mapping in the Era of Automation — Brigadier L. H. Harris, C. B. E. Consultant to the Director, Surveys and Mapping Branch, Dept. of Energy, Mines and Resources, Ottawa, Canada.

Offshore Surveying Techniques — A. Hittel, Senior Surveyor, Shell Canada Limited, Edmonton, Alberta.

Canada, — Challenge to the Surveyor — M. Sice, Q. L. S., Longueuil, Quebec.

Mapping to Meet Urgent Needs — Charles S. Spooner Jr., Director of Marketing for the Autometric Operation, Raytheon Company, Alexandria, Va., U. S. A.

Data Storage and Retrieval — John I. Weldon, Chief, General Survey Systems, Sampling and Survey Research Staff, Dominion Bureau of Statistics, Ottawa, Ontario.

Charts and Maps in Digital Form — Dr. A. R. Boyle, University of Saskatchewan, Saskatoon, Sask.

Future Trends in Survey Education in Canada (and elsewhere) — Dr. R. M. Hardy, Dean of Engineering, University of Alberta, Edmonton, Alberta.

Some Problems in the Evaluation of Lunar Orbiter Photography — Dr. G. Konecny, Professor and Head of the Department of Surveying Engineering, University of New Brunswick, Fredericton, N. B.

Some Graphic Devices for Developing and Visualizing Geographic Concepts — Dr. George F. Jenks, Professor of Geography, University of Kansas, Lawrence, Kansas.

THE CANADIAN INSTITUTE OF SURVEYING is a voluntary association of professional and technical people, who are united by a common interest in the professions of surveying and mapping.

Since its beginning in 1882, the C. I. S. has grown and now has about 1800 members throughout Canada, the U. S. A., and some 20 countries around the world. Founded originally as an association of Dominion Land Surveyors, the Institute has gradually expanded to include all surveyors, including land, sea and aerial surveyors, as well as cartographers, photo interpreters, and others interested or allied to the fields of surveying and mapping.

The role of the Institute is to enhance the usefulness of the profession to the public, and to further the professional knowledge of its members. This is done through *The Canadian Surveyor*, a technical publication, which has won world wide acclaim, and is published five times annually. Through Branches established across Canada, at the C. I. S. Annual Meetings, and by means of symposiums at different locations in Canada, many technical papers are presented on a variety of survey subjects to help keep surveyors abreast of current developments. (*The Canadian Surveyor* has 333 subscribers in 44 countries around the world.

The second role of the Institute is to represent Canada at National and International Meetings. The Institute is affiliated with the International Society of Photogrammetry and the Federation International Geometric. The C. I. S. has close working relations with the American Congress of Surveying and Mapping and the American Society of Photogrammetry, and has representatives attending the Pan American Institute of Geography and History.

Membership in the Canadian Institute of Surveying is divided into three categories. A full MEMBER holds a commission as a land surveyor, or is an engineering graduate engaged in surveying, or is engaged in surveying and has attained professional status through experience and leadership, the fee for which is ten dollars per year. A JUNIOR MEMBER is less than 30 years of age, is occupied full time in a junior capacity in survey work of a technical nature, or is enrolled as an engineering student at a recognized university or in a course of studies leading to a commission as a land surveyor, the fee for which is five dollars per year. An ASSOCIATE MEMBER must be over 25 years of age, is employed or has an interest in the profession of surveying, but does not qualify as a member or junior member, the fee for which is ten dollars per year.

Here in Nova Scotia we have some 50 members, about 35 of whom are Provincial Land Surveyors — only about 8½ percent of the registered land surveyors in this Province. There are at least as many members scattered throughout about 20 other countries throughout the world, excluding the U. S. A. members who number about 100. No doubt holding the C. I. S. Annual Meeting here in 1970 will stimulate interest—in Alberta, for example, some 20 new members have joined this year out of 67 applications accepted. In the meantime, however, anything this Council can do to promote C. I. S. membership within the Association will be of benefit to all concerned.

by A. L. Lapkin

Notes From The Secretary's Desk

By E. P. Rice Secretary-Treasurer

Beginning with this issue and in subsequent issues, I hope to inform all members in a general way of the affairs of the Association. This will also tell you what your executive and council is doing from one Annual Meeting to the next.

So if you are interested in knowing what we are doing, look for this column in the future.

Since the last Annual Meeting, steps have been taken to try and stop unlicensed persons from establishing boundaries in Nova Scotia. In January of this year a letter was sent to all members in Nova Scotia requesting that they submit the names of persons they knew were practising surveying illegally. To date only three names were submitted and these persons were advised to cease such illegal practises.

This matter is still being pursued and we hope to have some results in the future.

The Resolutions passed at our last Annual Meeting to amend our act are now a reality. Our solicitor received a letter from Legislative Clerk saying that Bill Number 18 to amend the Provincial Land Surveyors Act was given assent on March 19, 1968.

On July 1st, 1968 the following changes become effective.

1) a. The name of the Association changes from its present name to the Association of Nova Scotia Land Surveyors.

b) Persons holding the title of Provincial Land Surveyor will now have the title Nova Scotia Land Surveyor.

2) The surveyor in training must serve his nine months of field practise "in Nova Scotia."

3) Examinations will be held in "May" instead of "April."

I will arrange to have Bill No. 18 published in the next issue of the Surveyor.

During the last Council Meeting it was unanimously voted to give full support to

the Committee which has been formed to bring the 1970 C. I. S. Annual Meeting to Halifax. You will read more on this in future issues.

The 1968 Roll of Members is at the printers at the time of this writing. This year the list has been separated into Practising, Non-Practising and Associate Members. This list of members will be distributed to all Registry Offices, Government Departments, etc. between April 25 and May 15, 1968.

At the last Council Meeting, approval was given for the design of a rubber stamp to be used by members of the Association. These stamps will be available through the Secretary only and we hope that all members of the Association will obtain their stamp to be used on all survey plans. This stamp will have the Surveyors Registration Number. I will advise later as to when they will be available and also the cost.

This year our President, John Pope, has requested that the councillors hold meetings with the surveyors in their respective areas. To date two meetings have been held in Sydney with Mr. Bernie Campbell being appointed Secretary of the group. Mr. Pope has indicated that the meetings have been successful.

Mr. Robert Hunt, councillor for western Nova Scotia, called a meeting at the home of Mr. Reg Dickie, in Brooklyn. This group decided to hold four meetings a year and, as in Sydney, this meeting was very successful.

It is hoped that such meetings will continue and the councillors will bring the ideas and requests of their local groups to the Council Meetings.

A donation of \$25.00 was received from Mr. Peter Boutilier of Yarmouth, N. S. Mr. Boutilier is an Honorary Life Member.

Special guest at our last Council Meeting was Mr. Brian Potter, Secretary-Treasurer of the newly formed Association of Prince Edward Island Land Surveyors. Mr. Potter is a graduate of the Nova Scotia Land Survey Institute and resides in Charlottetown, where he is in Private Practise.

Mr. Pope extended best wishes and success to Mr. Potter and the new Association he represents.

In order to make our Nova Scotian Surveyor more interesting, we are looking for articles? Please feel free to send in an article, no matter how long or short.

EDITORIAL — R. E. Millard, PLS Number 6

To all members of the Association of Provincial Land Surveyors of Nova Scotia.

The Canadian Institute of Surveying.

What is it? What has it done for me? What have I gotten out of it?

As I see it today; It is a gathering of men. Yes! Many of us work for the Government of Canada and there are many who work for themselves. These men have been meeting in Ottawa for 60 years. To pool their common knowledge of Surveying throughout the World.

Ottawa is the Capital of Canada and it's a long way from the Atlantic Ocean; it is also a much longer way from the Pacific Ocean.

It costs money to go to Ottawa no matter where you live in Canada. Each year for the past 20 years I had planned to go to a C. I. S. Meeting but that money always seemed to go for necessities as the time for the meeting drew near. Finally in January, 1967, I borrowed the money and went to the Annual C. I. S. Meeting at the Chateau Laurier, Ottawa. I can say now that, that meeting was worth every cent it cost me. There I met the men, some of whom we have met at our Annual Meetings in Halifax, who make The Canadian Institute of Surveying really tick and who are trying to raise the standards for Surveyors in Canada, so that young Surveyors will be ready for tomorrow and its challenges and believe me, tomorrow's problems will be a challenge to you if you can face them. These men came from all across Canada, the United States and from Europe to present papers on various phases of Surveying, showing new methods of using old equipment and the new equipment that will be used tomorrow. Sure the papers were heavy, but when you sit in a room with 150 to

200 men from all walks of life and could hear only breathing while a paper was presented for ¾ of an hour or more and when the speaker finishes you wonder where the time has gone. You realized that these men were dedicated to their profession. Many of us here have passed the top of the grade and are coasting down hill in more ways than we like to admit. You young men have a long way to go to reach the top. I think we all have an appreciation for a fine garden we have planted and enjoy watching it grow and develop. Would it look so nice if you had ploughed the ground, fertilized it, drilled it, then not put in the seeds? As corny as it may sound, you are that piece of ground. Ready for planting, but unless you become active in your Surveying Associations, you will produce no more than that piece of ground. You will just be another name on a page.

At the Annual Meeting in 1967 at Ottawa, a determined delegation from Edmonton, Alberta, made a bid for the 1968 C. I. S. Meeting in their town, they laid their cards on the table and took the pot. In 1969 the meeting will again be held in Ottawa. Now here comes the rub. A group in the Maritime Provinces are about to lay their cards on the table in a bid to have the Annual Meeting of the Canadian Institute of Surveying in the Maritimes and a group in Nova Scotia are betting that they can carry it in Halifax. Why Halifax? Quite simple, Halifax has the room, bed-wise, to accommodate this gathering, and the Institute of Oceanography. Now is the time to stand up and be counted. The Committee has been able to start planning this year for 1970, in fact, this month. Do not be surprised if you receive a letter from this Committee asking you to participate in some way. Even if it is only to empty ash trays.

You often hear the press listing the things we in Nova Scotia "have not" but very seldom, if ever, do they list the things "we have" and export in large quantities. "Brains and Guts". When Western Canada was laid out for settlement many of the Surveyors were Maritimers, some from Nova Scotia. When they designed the Welland Ship Canal, many of the top Engineers were from the Maritimes, some from Nova Scotia. When they built it many of the top performance Contractors were Maritimers and some from Nova Scotia, and also many of the men who did the physical work were from Nova Scotia.

Now the nucleus of a C. I. S. group in Nova Scotia have a chance to prove that we Nova Scotians, having built up Canada west of New Brunswick, still have plenty of Brain and Guts left to put on a C. I. S. Annual Meeting in 1970 that will always be known for its accomplishment from start to finish. If you think this is amateurish you are right, but its tops, unless you can put forth a better reason for backing Canadian Institute of Surveying than I have laid out above. In fact, we will, in doing this, separate the men from the boys and those "who take" from "those who work", Where will you stand when you are asked to help?

FLASH

**AS WE GO TO PRESS WE LEARN THAT IN 1970 THE CANADIAN INSTITUTE
OF SURVEYING 63rd ANNUAL MEETING WILL BE HELD IN HALIFAX,
NOVA SCOTIA
YOU WILL HEAR MORE OF THE DETAILS AS TIME PASSES**

**CONTROL SURVEYS
DEPARTMENT OF HIGHWAYS**

By

S. Foreman, Chief Inspector Of Surveys For Ontario

"Control Surveys" form the basic horizontal co-ordinate control for mapping, using photogrammetric procedures, and provide basic control for land surveys, engineering design and construction.

Faced with an ever increasing traffic flow and complex highway construction, the need for precise co-ordinate control surveys became apparent to the Department of Highways several years ago.

A network of co-ordinated control stations on major construction projects, such as Highway 401 in Metropolitan Toronto, permits the Department to stage construction resulting in a minimum of disruption to traffic and also provides a constant control of the overall project. The use of a network, with control stations on either side of the detoured traffic flow, has eliminated the dangerous crossings formerly required of engineering and surveying crews and has provided a basic control to enable the engineering staff to establish complex structure positions by intersection methods. Because of their value to engineering, control stations are protected as much as possible during construction.

Systems

Due to the sparse network of Geodetic stations in Ontario, the Department initially established co-ordinate control, using a Local Grid System. Under this system, assumed plane co-ordinates were given to the reference station. The grid system is such that the Easting lines are geometrically parallel to the meridian through the reference station and Northing lines are at right angles to the Easting lines. The Northing and Easting values of the reference station are sufficiently large to avoid negative quantities throughout the extent of the project. It can be seen that although this system is satisfactory for one small project, it results in a number of separate grids with different origins when used for adjacent projects.

The problem facing the Department, was to find a plane co-ordinate reference system which would be uniform over a sizeable area, or zone, and suitable for extension throughout the province. The Universal Transverse Mercator projection, which was developed shortly after World War II and which is the basis of the grid shown on Militia Maps, permitted using a system with zones 6° of longitude in width (approximately 300 miles at this latitude). However, the scale error is 1:2500 at the Central Meridian of each zone. Scale error is the result of distortion caused when converting to the plane of the projection from the spheroid, which is the mathematical figure representing the earth. Because of the magnitude of the scale error in the U. T. M. system, a scale factor must be applied to each distance to obtain the degree of accuracy required for engineering and surveying purposes. For this reason, the U. T. M. system does not fulfill the needs of the Department.

The break-through came with the introduction of the 3° Modified Transverse Mercator Projection, employed by Topographical Surveys, Ottawa, to establish control stations for municipalities, such as Metropolitan Toronto. Under this system a Zone is 3° of longitude in width, being 1°30' either side of a defined Central Meridian. It is proposed that this system be known in Ontario as the "Ontario Co-ordinate System." Zones in Ontario are numbered 8 to 16 inclusive.

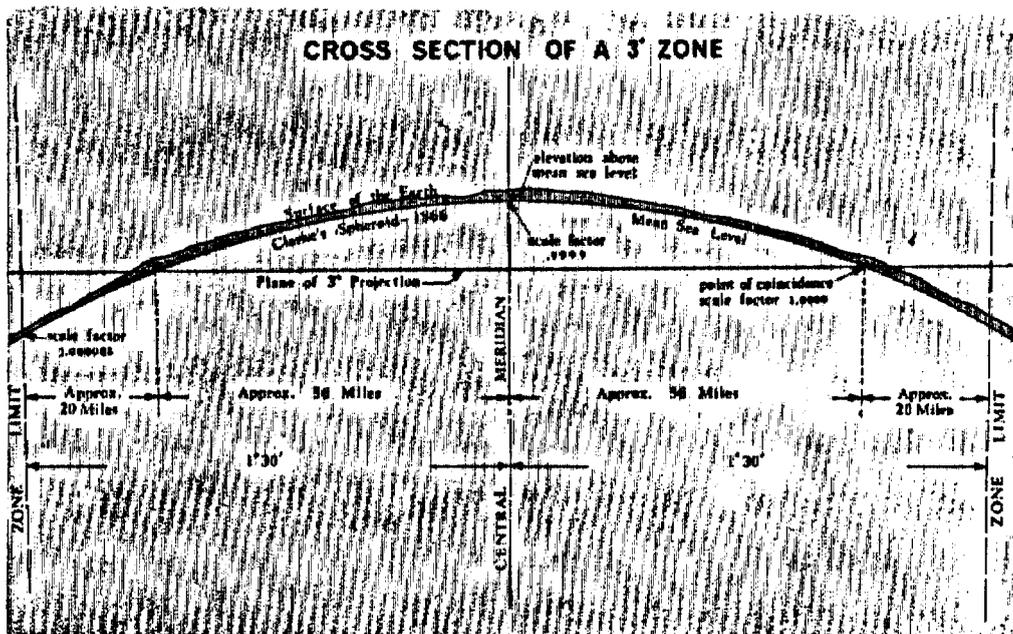


Figure No. 1

The plane of the projection is a secant, rather than tangent, to the spheroid, Fig. No. 1. A scale factor of 0.9999 is introduced at the Central Meridian, with co-incidence occurring approximately 56 miles east and west of the Central Meridian. The system is directly related to a mathematical spheroid known as Clark's Spheroid, 1866. The origin of the Northings is the Equator, with a Northing value of 0 feet. The Central Meridian has an Easting value of 1,000,000 feet, permitting positive values throughout the Zone, which is approximately 150 miles in width at this latitude. Under this system an accuracy of 1 in 10,000 may be obtained without correcting each distance for scale factor. Thus the system can be used on projects by Highway Engineers, without the application of tedious corrections. Scale factor and elevation corrections are, of course, made when computing co-ordinate values for all control stations. Fig. No. 2.

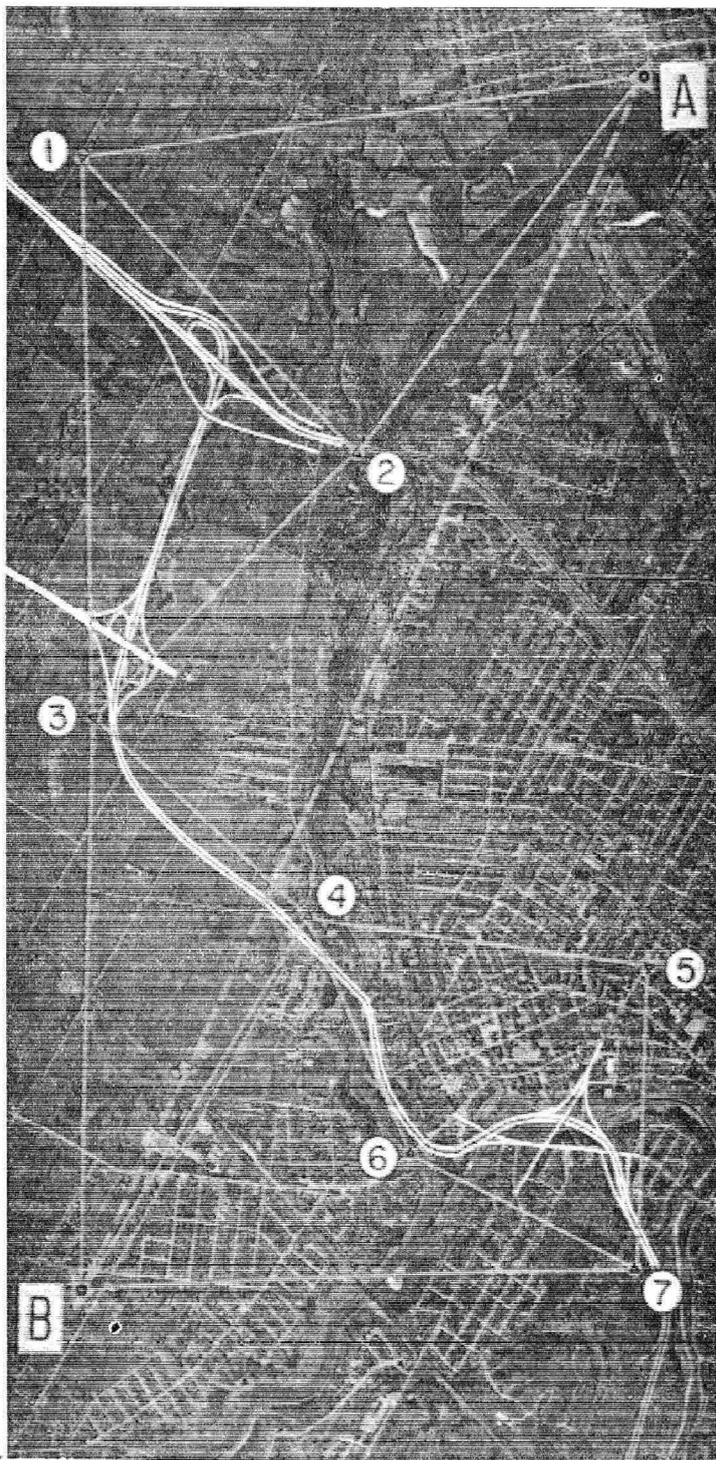
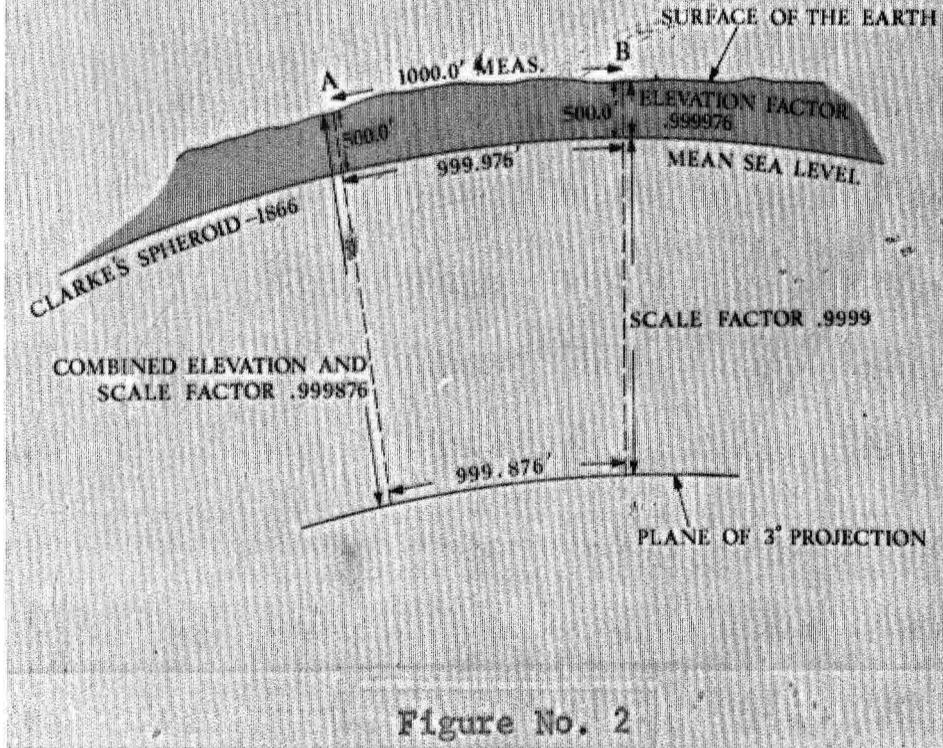


Figure No. 4

**CROSS SECTION SHOWING MEASUREMENT
TAKEN ALONG THE CENTRAL MERIDIAN**



Although the Zones in Ontario are mathematically 3° in width, it is proposed to set the Zone boundaries by Regulation to adhere to existing county and district boundaries and thus simplify in which Zone the co-ordinate values must be computed.

Requirement

In the photo, a proposed highway alignment is shown in Fig. No. 3.

It was necessary to establish horizontal control for Photogrammetry Section to prepare plans at 200 feet to 1 inch overall and 40 feet to 1 inch at interchange areas. For construction purposes additional stations were also required in the interchange areas.

It was necessary to place stations 1 to 2 miles apart for mapping at 200 feet to 1 inch and stations 800 feet to 1,000 feet apart for mapping at 40 feet to 1 inch and for construction.

Geodetic Stations

Contact with Department of Mines and Technical Surveys, Ottawa, provided information in respect to Geodetic Primary stations at points "A" and "B". Geodetic field work in this area was done by using towers from 60 feet to 90 feet in height. The bottom of the tower is temporarily fenced and a sign on the fence advises as to the purpose of the tower. The towers were erected by Geodetic Surveys personnel, who specialize in tower construction and monumentation. Positions were marked by monuments built in 2 sections. The lower section, 2½ feet square, 2 feet deep, is fitted with a bronze tablet and set 4½ feet below ground level. The upper section is 2½ feet square at the base, 4½ feet long, tapering to 1½ ft. square at the top and is seated on the lower section so that the top is flush with ground level. A bronze tablet is fitted in the top and numbered.

Field Work

Initially, the D. H. O. Control Survey Supervisor, with a member of his 6 man crew, carried out the reconnaissance for the 2nd Order stations. He chose monument sites approximately 1 mile apart, intervisible with at least 2 other stations and in positions where loss due to construction was unlikely. Reinforced concrete monuments, 5 feet long and 10 inches in diameter were poured at each site. A numbered brass control survey cap was placed in the top of each monument during the pouring operation. In some circumstances, especially when the Highway alignment is indefinite and construction may destroy the monument, the Department uses a monument consisting of a drilled and tapped 1 inch square iron bar, 4 feet long, to which a numbered brass cap is fastened by a screw connector.

Wooden stakes, 2 inches square, 4 feet long, or steel posts, were placed as markers beside each monument.

The line between Geodetic stations "A" and "B" was used for Azimuth control. The 2nd Order stations established are numbered 1 to 7 inclusive. To close the circuits, stations 1 and 2 were tied to Geodetic Station "A" and Stations 3, 4 and 7 were tied to Geodetic Station "B".

All stations were occupied and angles read to 1 second of arc using a Wild T2 Theodolite, which is a direct reading instrument.

To obtain the required precision, Wild targets and target expanders were sighted.

Sights across vineyards and over parked cars were made using 7 foot tripods.

Angular measurements were taken to conform to Topographical Surveys 2nd Order Geodetic Standards.

All angles were read at ground level with the exception of the sights from the Geodetic Stations "A" and "B", where 40 foot towers were erected.

The Department purchased sufficient components to construct 80 feet of aluminum tower. As this equipment is in 10 foot sections it is possible to construct 2 towers of varying heights, provided the combined height does not exceed 80 feet. A survey tower consists of an instrument tower within a personnel tower. The 10 foot sections of the instrument tower have sides 1 foot wide and are welded together so that the ends form an equilateral triangle. The 3 sides of the personnel tower are 3 feet wide and in 10 foot sections, which are erected one upon the other. The 10 foot sections of either tower are locked together by a sleeve and bolted. The instrument tower and personnel tower are independently guyed. A platform is attached to the personnel tower.

The transit or electronic measuring equipment is mounted directly on the instrument

tower and plumbed over the monument below. The Wild ZNL — Zenith and Nadir optical plummet has proved extremely accurate for this plumbing operation.

When using a Geodetic Survey Tower, the optical plummet may be mounted on a tripod below the tower, plumbed over the monument and then used to plumb the instrument on the tower above.

Because of the width of our towers, it is necessary to use the optical plummet directly on the instrument tower and plumb over the monument below.

A special trailer to transport the tower equipment was designed and built by our Equipment Section. The trailer is hauled by either a 1 ton vehicle or a 5 man express. The 1 ton vehicle is equipped with 4 wheel drive and power winch. The 5 man express is equipped with specially designed compartments to carry the various survey equipment. In addition to one of these vehicles, the Supervisor has, at his disposal, a standard station wagon.

Because of the poor visibility caused by smog and heat waves, targets were located in daylight and all angles were read at night. Normal lighting equipment for the Wild T2 was unsatisfactory at these ranges. However, after considerable testing, the light chosen proved very effective. A 12 volt spot light fitted with a flasher and placed behind the target gives good results up to several miles. The light without the target is visible at distances up to 20 miles. If the light is too intense at short range the intensity is readily reduced by placing a red flag over the target.

All distances between the 2nd Order stations were determined using a Model 6 Geodimeter. With this instrument a modulated light beam is projected from the optical transmitting system to a passive reflector and returned to the source. Phase comparison readings on different and specifically spaced frequencies are recorded and the distance computed. This instrument has a range of from 50 feet to approximately 2 miles in daylight and 10 miles at night. A mercury lamp attachment appreciably increases these ranges. Distances are measured to an accuracy of 0.03 of a foot, plus or minus 2 parts per million.

Contact between stations was maintained by radio receivers.

Distances from Geodetic Station "A" to Stations 1 and 2 and from Geodetic Station "B" to Stations 3, 4 and 7 were determined in daylight using a Model M. R. A. 3 Tellurometer. This instrument consists of 2 portable, interchangeable master and remote units with built in radio telephone system. The instrument operates using high frequency radio waves and presents a read out directly in metres. These read outs are meaned and corrected to give horizontal distance. This model Tellurometer has a range of from 100 feet to 50 miles, with an accuracy of 0.03 of a foot, plus or minus 3 parts per million.

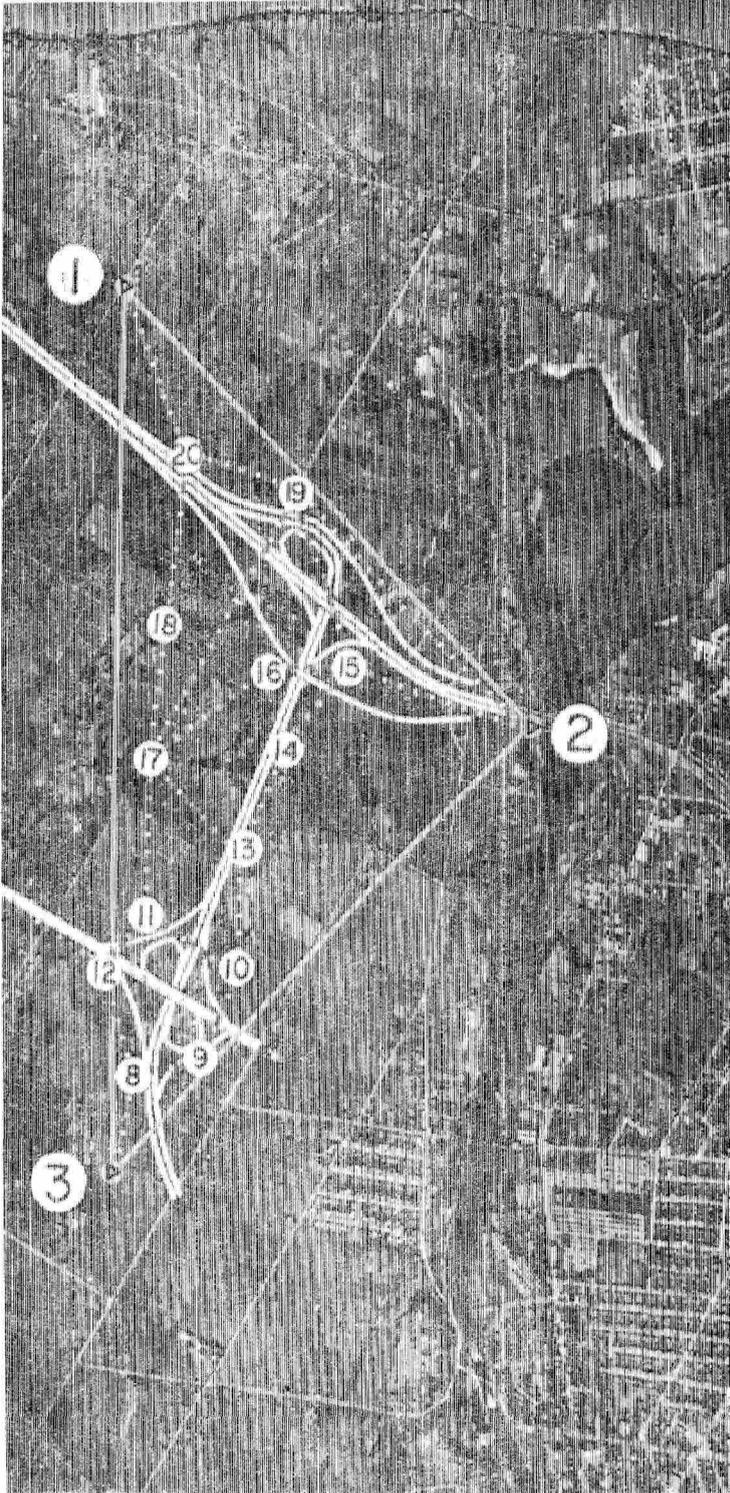


Figure No. 3

When the 2nd Order net was completed to the satisfaction of the Supervisor, the crew was moved in to do the field work at the interchange area between Stations 1, 2 and 3. Fig. No. 4. Reconnaissance of this area had been made by the Supervisor while the crew was reading the 2nd Order traverse. Station sites 8 to 20 had been chosen to meet construction needs and the requirements of Photogrammetry Section for the 40 feet to 1 inch mapping. Stations 8 to 20 were monumented using the drilled and tapped iron bars with numbered control caps. All angles were read with the Wild T2 Theodolite and distances measured using the Geodimeter.

All field work was checked by the Supervisor and field returns were submitted to the Drafting Room.

Drafting

The Drafting staff submitted all Geodimeter and Tellurometer readings to the Electronic Computing Branch for reduction.

The project was plotted and all angles and geometrical figures checked for accuracy and adherence to standards. Elevations to the nearest foot were calculated for the 2nd Order stations and distances between these stations reduced to mean sea level.

To expedite this operation these calculations were performed on an electronic desk calculator, capable of carrying out intricate continuous calculations and providing a visual answer to 24 decimal places — on a cathode tube screen.

Using the facilities of the Electronic Computing Branch, preliminary geographic values were calculated for each station. This information was evaluated and following the computer programs supplied by Topographical surveys, final geographic and 3° Modified Transverse Mercator values were determined for each station. Output sheets were also prepared for each station, showing the azimuths and distances to the stations sighted. The 3rd Order station values were balanced between the 2nd Order values and only 3° M. T. M. co-ordinates determined for each 3rd Order station.

A plot of the job, positions, sketches and co-ordinate values for all stations were submitted to Design Branch to permit completion of the engineering plans and to provide control points for construction.

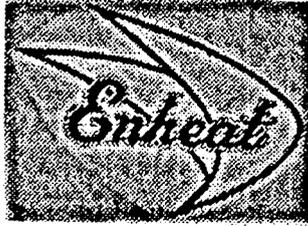
Files

Control station positions were plotted on Topographical Sheets as part of a graphic index. All information was checked and placed on file, where it will be available as part of the proposed "Ontario Co-ordinate System."

Conclusion

To establish second and third order stations, it is necessary to use specialized equipment, and to use an electronic computer to expedite the solution of the complex mathematical problems. However, when the system has been established, with stations to the required density, local surveys may be related to the system using conventional equipment and mathematical procedures.

In conclusion, a word of caution is in order. The benefits of the Ontario Co-ordinate System will not automatically become available to surveyors upon the passing of enabling legislation or the publication of 3° projection tables. As members of the surveying profession we must encourage and strive for establishment of first, second and third order stations to ensure extension of the system throughout the Province.



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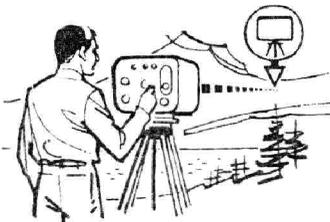
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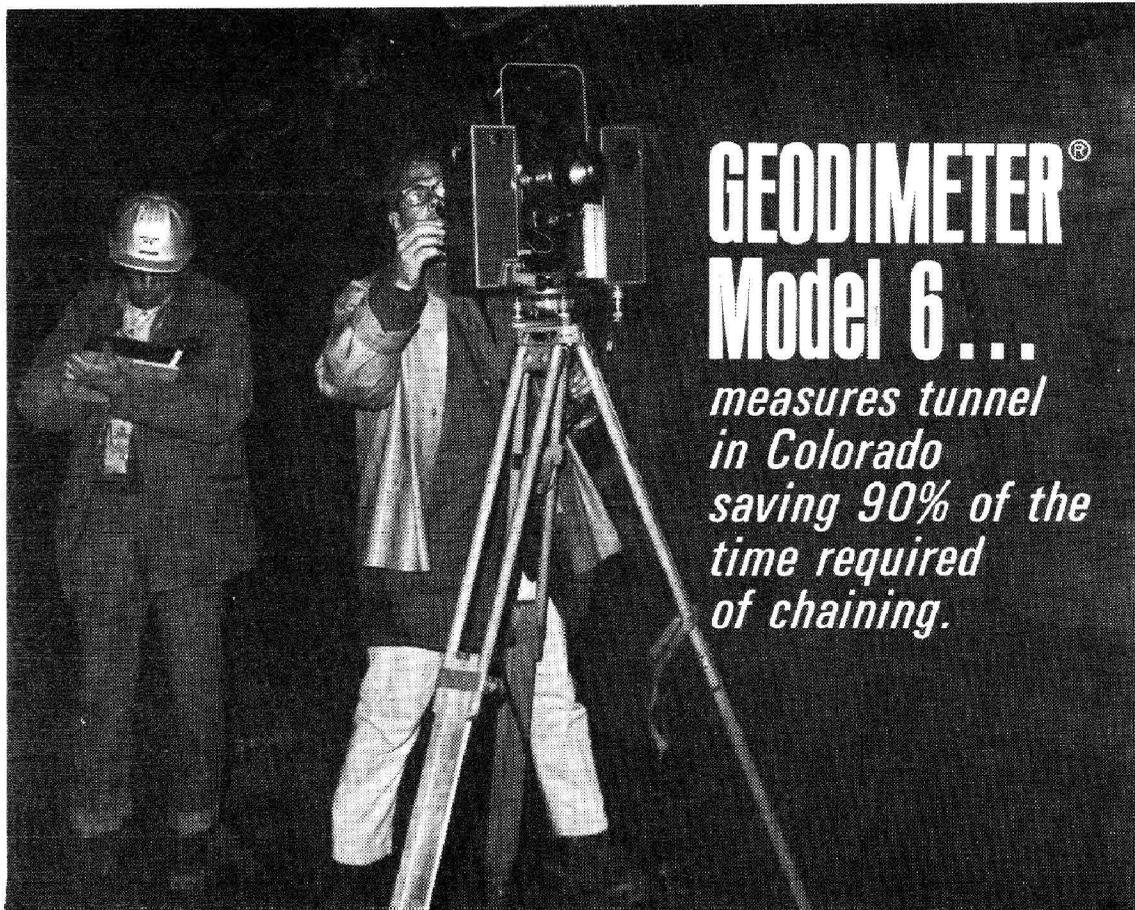
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