Report of The Geodetic Committee

Report on the ramifications of Reports 1 and 2 of the task force on geographical referencing.

The Geodetic Committee has been assigned several tasks for the current year. Heading this list is the job of preparing "a Report for Council on the ramifications of Report 1 and 2 of the Task Force on Geographical Referencing".

The Task Force on Geographical Referencing was set up in 1974 within the Surveys and Mapping Branch of the Ministry of Natural Resources. Under the chairmanship of Mr. Robert G. Code, Surveyor General this task force studied the question of geographical referencing in Ontario and produced two reports for limited publication. A third report has been prepared for internal ministerial use.

The reports contain recommendations on basic mapping for Ontario and deal with such topics as map scales, map coverage, projection, grid and co-ordinates, map format, map index system and map revision. Although at first reading this list of topics might appear to hold little interest for a professional body charged primarily with the creation and maintenance of the legal boundary framework in this province, the Geodetic Committee believes that these reports have significant and potentially far-reaching ramifications for the Association of Ontario Land Surveyors.

The committee believes that these ramifications flow in a logical and inevitable sequence from the definition of geographical referencing given in Report No. 2. In this report "geographical referencing" is defined as "A common system for locating items on the earth's surface to be used in referencing or correlating ground-related data. Any position may be defined by co-ordinates."

Given the welcome reality of our Canadian system of private land ownership virtually all forms of ground-related data must be correlated with the land boundary framework before they can assume real meaning or value. This notion is consistent with the concept of the modern cadastre, in which the legal boundary framework is held to be the basic underlying reality. The land boundary framework and any technical system of geographical referencing are inextricably bound together. Thus any government report dealing with geographical referencing as defined above is of real interest to the Association of Ontario Land Surveyors, charged as it is with maintenance of the land boundary framework in this province.

Prior to the advent of modern electronic technology the land boundary system formed the basic framework for most forms of mapping of ground-related data. Some examples of such mapping are maps relating to land use planning, natural resources, engineering, land title records, municipal assessment etc. Under such a regime the status of the Ontario Land Surveyor was deservedly high and was protected by his government-granted monopoly in the area of the definition and maintenance of land boundaries. Legal surveys carried out by Ontario Land Surveyors provided the base for mapping of most ground-related data. Unfortunately the legal boundary framework in Ontario, with its variety of township survey systems and subdivision arrangements, does not provide a suitable mapping base for data processing systems based on modern computer technology. What such modern data processing systems do require as a geographical referencing base is a universal rectangular co-ordinate system. Since it appears inevitable that a modern co-ordinate system will replace the legal survey framework as the primary mapping base in Ontario, the Ontario Land Surveyor finds himself faced with a choice with far-reaching implications. Will he seek from the legislature professional responsibility for this co-ordinate system, with all the difficulties, challenges and potential for professional enhancement associated with that responsibility, or will he merely join the list of users of the system?

When considering the question of geographical referencing it is inevitable that the concept of integrated surveying comes to mind. Indeed it can be said that the two terms refer to the same thing, with integrated surveying being the technical means and geographical referencing being the end result provided to the users.

Integrated surveying consists of a system of surveys, cadastral, topographic and hydrographic, with all of their elements being precisely correlated through the medium of a universal horizontal and vertical control network. The creation, maintenance and management of such integrated surveying system constitute a professional task of a very high order, requiring a high level of academic knowledge and technical expertise. The Geodetic Committee believes that the public interest would be well served by the implementation of such a system, and that the Association of Ontario Land Surveyors is the logical professional body for that task.

The Committee's belief that the Association of Ontario Land Surveyors is best suited for this very large professional responsibility is well founded, and is manifested by the high level of leadership in this area shown over the years by the Association and by many individual Ontario Land Surveyors. The following are a small sample of some of the items of evidence of that leadership:

1. In 1961 a brief was presented by the A.O.L.S. to the Ontario government requesting the establishment of a provincial co-ordinate system;

2. In 1972, largely as a result of A.O.L.S. initiative, a degree course in surveying was instituted at the Erindale College campus of the University of Toronto, in order that future Ontario Land Surveyors would be well prepared academically for the complexities of modern integrated surveying;

3. Many individual Ontario Land Surveyors, both in public and private practice, have shown leadership through the initiation of integrated surveying systems in various communities throughout Ontario.

Unfortunately, with its recent narrow rejection of the white paper on restructuring, the A.O.L.S. membership has stopped short of a formal adoption of the principles of integrated surveying. This rejection might well be looked upon by influential elements within the public and the provincial government as a failure on the part of the Association to meet its broad responsibility to the public through its reluctance to adopt the whole field of professional land surveying within its professional purview.

It is the opinion of the Geodetic Committee that the economic and technical benefits associated with integrated surveying are such that its implementation is virtually inevitable. The only matter in doubt is the question of the identity of the professional or government group which will deliver this valuable professional service to the public of Ontario.

Although the funds necessary for the implementation of a fully integrated surveying system in Ontario have not yet been made available there is strong evidence that the provincial government is very much interested in such a system. The sections of the Ontario Law Reform Commission reports dealing with land registration and the Ministry of Natural Resources reports on geographical referencing are two examples of such evidence. Another example is the recent enquiry by the Surveyor General of Ontario, directed to both the surveying and engineering professions with respect to

their capacity to carry out large scale horizontal and vertical control surveys.

The opinions of the Geodetic Committee with respect to integrated surveying and the ramifications of the two provincial government reports on geographical referencing might be summarised as follows:

1. The combined fields of integrated surveying and geographical referencing represent a splendid opportunity for the professional group which seizes it;

2. The Association of Ontario Land Surveyors should be that group;

3. Unless the A.O.L.S. provides convincing evidence of its intention to embrace the total field of professional surveying the non-cadastral elements might well be taken over by some competing group. This would result in denial to the public of many of the potential advantages of modern integrated surveying together with a diminution in the status of the Association of Ontario Land Surveyors as a result of its failure to effectively face this challenge.

Association of Ontario Land Surveyors Geodetic Committee

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Angels On A Pin

FROM "THE LIGHTNING EMPIRICIST", DEDHAM, MASS.

BY ALEXANDER CALANDRA

SUBMITTED BY GREN ROGERS

Some time ago I received a call from a colleague who asked if I would be the referee on the grading of an examination question. He was about to give a student a zero for his answer to a physics question, while the student claimed he should receive a perfect score and would if the system were not set up against the student. The instructor and the student agreed to an impartial arbiter, and I was selected.

I went to my colleague's office and read the examination question: "Show how it is possible to determine the height of a tall building with the aid of a barometer."

The student has answered: "Take the barometer to the top of the building, attach a long rope to it, lower the barometer to the street, and then bring it up measuring the length of rope. The length of rope is the height of the building."

I pointed out that the student really had a strong case for full credit since he had really answered the question completely and correctly. On the other hand, if full credit were given, it could well contribute to a high grade for the student in his physics course. A high grade is supposed to certify competence in physics, but the answer did not confirm this. I suggested that the student have another try at answering the question. I was not surprised that my colleague agreed, but I was surprised that the student did.

I gave the student six minutes to answer the question with the warning that this answer should show some knowledge of physics. At the end of five minutes, he had not written anything. I asked if he wished to give up, but he said no. He had many answers to this problem; he was just thinking of the best one. I excused myself for interrupting him and asked him to please go on. In the next minute he dashed off his answer which read:

"Take the barometer to the top of the building and lean over the edge of the roof. Drop the barometer, timing its fall with a stopwatch. Then using the formula $S = \frac{1}{2}$ at ^{2} calculate the height of the building."

At this point, I asked my colleague if he would give up. He conceded, and gave the student almost full credit.

In leaving my colleague's office, I recalled that the student had said he had other answers to the problem, so I asked him what they were, "Oh, yes," said the student. "There are many ways of getting the height of a tall building with the aid of a barometer. For example, you could take the barometer out on a sunny day and measure the height of the barometer, the length of its shadow, and the length of the shadow of the building, and by the use of simple proportion, determine the height of the building."

"Fine," I said, "and the others?"

"Yes," said the student, "There is a very basic measurement method that you will like. In this method, you take the barometer and begin to walk up the stairs. As you climb the stairs, you mark off the length of the barometer along the wall. You then count the number of marks, and this will give you the height of the building in barometer units. A very direct method.

"Of course, if you want a more sophisticated method, you can tie the barometer to the end of a string, swing it as a pendulum, and determine the value of "g" at the street level and at the top of the building. From the difference between the two values of "g" the height of the building can, in principle, be calculated.

"Finally," he concluded," there are many other ways of solving the problem. Probably the best," he said," is to take the barometer to the basement and knock on the superintendent's door. When the superintendent answers, you speak to him as follows: 'Mr. Superintendent, here I have a fine barometer. If you will tell me the height of this building, I will give you this barometer.' "

At this point, I asked the student if he really did not know the conventional answer to this question. He admitted that he did, but said that he was fed up with high school and college instructors trying to teach him how to think, to use the "scientific method," and to explore the deep inner logic of the subject in a pedantic way, as is often done in the new mathematics, rather than teaching him the structure of the subject. With this in mind, he decided to revive scholasticism as an academic lark to challenge the Sputnik-panicked classrooms of America.

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