

THE SURVEYOR OF THE FUTURE

or, "What's wrong with Surveying"

by Ralph Moore Berry\*

Serious thought should be devoted, with great regularity and intense application, to consideration of the future course and destiny of the profession we today know as "surveying". I wish I could share the pleasure of my colleague, Professor Welch, (1) when he views a great future for surveyors because of the relief from the drudgery of arithmetic, drafting, and taping to be brought about by the plethora of new "hardware" and "software" that is even currently being developed and made available to anyone who wants to use it. But the plain facts still remain that all these "wares" only provide relief from drudgery and free the mind for greater application to the professional facets of practice. This is the point which must be constantly in mind. This new gadgetry cannot think. It can only do exactly what it is "told" to do (although better and without blunder). Therefore, it cannot do "professional" work - only relieve the professional practitioner from the great burden of sub-professional details that are inseparable from the complete practice as we know it. However, if the practitioner does not rise above the morass of sub-professional endeavor, and apply himself to the more challenging professional aspects of his practice, he will find that his practice will remain in the morass, the sub-professional will take over all the technical aspects of the operations (which, in our modern industrial society, will inevitably come within the jurisdiction of the labor unions) and the principal in the practice will find that he is only a broker, dealing in time-sheets, and capital depreciation, to which he cannot, by any stretch of definition, advertising, or public relations, affix the label of profession. There is no profession of administration, or salesmanship. (2)

The point of the preceding remarks is based on the assumption that surveyors consider themselves as "professionals" and desire to be so considered by other professions and the public with whom they are in daily contact as they practice. It is believed that this assumption is statistically valid. However, the point must be belabored that neither self-consideration nor desire are sufficiently strong means to accomplish this establishment of status. In fact it almost seems as if - like the oft-cited lady - we protest too much! The mere application of an adjective in a title - such as "The NNN State Society of PROFESSIONAL Land Surveyors" neither creates nor establishes professionalism. It merely makes people ask why we put the adjective in. It smacks of whistling in the dark. Are we really admitting that there is more than one kind? (3)

What is meant by "profession", other than a word to wave around as a hoped-for excuse to charge a high fee. A long debated and well-presented report concerning our own field (American Society of Civil Engineers, Final Report of the Task Committee on Status of Surveying and Mapping, Surveying and Mapping Division) has indicated the following commonly-accepted criteria for the definition of a profession: (4)

(a) High intellectual nature; (b) exercise of judgment; (c) important social need; (d) body of advanced knowledge (science) and skill (art); (e) preparation on the university level in specialized intellectual technique; (f) motive of service, relations of confidence, and individual responsibility; and (g) social recognition, and professional regulation.

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It is not necessary here to develop these individual items completely, but all should be considered by those who are seriously concerned with or about the destiny of the surveyor.

It is essential, however, even in a short discussion of this subject to consider some of these points here. Items a, d, and e should probably be considered together. It is difficult to imagine a constructive operation of a "high intellectual nature" unless its operating procedure is involved with a "body of advanced knowledge" which can, except under most unusual circumstances, become available to the practitioner only through "preparation on the university level". These three points are mutually complementary. Together they define a clearly-understood concept. Is this concept valid? It has been similarly defined by a number of eminent authorities. Have we any serious grounds to dispute it? To answer a question with a question - how can we have a profession without it? Do the professions that are so-recognized without question, conform to this concept? It seems apparent that the classic professions of law and medicine come within it; and likewise social work and architecture. All require a deep familiarity with a broad body of advanced knowledge, generally applicable to the specific field, this familiarity being, without exception in current practice, acquired by pursuit of a full-term academic program at university level. It might be of passing interest to note that of the professions cited, the academic part of the medical program proceeds to the doctorate, the good student completing the law program is awarded the juris doctor degree, the social worker requires a two-year master's program beyond the basic bachelor's degree, and the bachelor's program in architecture requires five full years. There is simply no other route to practice in these professions. These are requirements established by the professions themselves.

Now let's examine our current practice of surveying and its status within this concept. Do we deal with a "body of advanced knowledge" of a "high intellectual nature"? At my institution of "higher learning", I am twitted about my program in "applied trigonometry". I know that is not an accurate description of my particular body of advanced knowledge, but the personal contact of many of my colleagues with the actual state of practice of surveying has given them valid grounds for their opinion. I would not like to have an actual count of the number of times I have been asked by a practicing surveyor, "Why do you bother to teach calculus to your students? I have never used it in all my years of practice." Where, then, is this body of knowledge? If I may speak plainly, I must say that our present practice implies that it is non-existent! If trigonometry is the sum total of it, or even if it is augmented by a skill in the setting up and reading of a transit, then obviously it is impossible to maintain that it is of a high intellectual level. Some surveyors (perhaps the same ones that made the remarks, above, about calculus) have said to me, "I have no use for graduates in your university program. They're too expensive, and, besides, they're not expert with a transit. I can teach any high school boy all he needs to know, by a year's on-the-job training." Does this constitute communication of the broad concepts of a "body of advanced knowledge" at a high intellectual level? Or is it rote training in the rudimentary skills of a trade? There we have our dilemma - if the height of our knowledge can be communicated to a high school boy through a little on-the-job training, our body of knowledge is neither sufficiently extensive nor at a sufficiently high intellectual level to come within the definition of a profession; and if the required skills can be satisfactorily required through the apprentice system, then let's acknowledge the fact, join the Teamsters Union, and make a lot more money! (2) But will we

be socially and intellectually satisfied with that?) The saving argument to confound this sentence of damnation is to point out that there are, indeed professional surveyors, and that these people have a great need for skilled sub-professional technicians to execute their designs. But, for some reason or other, this distinction is obscured. To cite an example, within the ranks of our brethren, the civil engineer depends greatly on the skill of the "cat-skinner" or the structural steel worker, but never feels the need to acquire personal skill in operating a bulldozer or a welding torch. Neither is there ever any vagueness in his relationships. The cat-skinner is not considered to have a foot on the ladder of professionalism

Another point in the definition of professional is that he exercise judgment, in complicated situations where no standardized set of rules exists to be applied. The judgment must be applied to make decisions through concepts developed in the light of the professional body of knowledge, but correlated and coordinated by the factors of professional experience in application to specific situations. This, in a way, refers back to the first points considered - body of knowledge, high intellectual level. It has even been said that one definition of professional involves the making of decisions dealing with the subject matter so abstruse that the client cannot even judge for himself whether a proper decision has been made. Now, consider the present practice of surveying within this frame. Is professionalism truly applied when a surveyor sends out four field parties, each with a list of several jobs involving the retracement and marking of boundaries, each party in charge of a person who came up "through the ranks", who will visit the site, collect and consider the evidence, make the decisions, mark the points, and report the job done? What contribution has the "professional" made to this assignment? He didn't even see the evidence much less make the decision. Has he considered the "body of knowledge", or has he just been a broker, dealing in time-sheets and making a profit by a "mark-up" on the payroll costs?

On two points in the definition of a profession, there is no need for discussion. To have a knowledge of boundaries, and of the topography, and to have systematic regard for the engineering aesthetic, and sociological facets of land use and community development is to fulfill an outstanding social need. Practitioners in these areas usually, at least outwardly, assume relations of confidence, and accept individual responsibility. There remains, under this heading, the requirement for a motive of service, which overlaps, to some extent, the acceptance of individual responsibility. It is beyond question that the current practice of surveying embraces some motive of service to the client, so as to retain his good will and continued patronage. But, is our professionalism so ingrained that it will require us to engage in further expensive operations, against our own financial benefit, when unforeseen circumstances make them necessary for proper consideration of all available evidence pertaining to a boundary? Or, because we put a low price on the job so as to retain our competitive position, will we just drive a stake in the fence corner and call it good? Will we also consider our obligation of service to the community, rather than retain in an undying allegiance to our client's selfish interest? How many of us turn down a subdivision job because the client insists on a type of development that we consider not to be in the best interest of the community?

Now, consider the point of social recognition. Social recognition (acceptance as a profession) will not be forthcoming as a result of publicity campaigns and public relations efforts. It will only come after we conform, without reservation, to the general norms outlined herein, and have so conformed for a sufficient length of time

that our professional attitudes and intent have been made unmistakably clear. The public, the courts, and the legal profession will take a long time to forget the large body of case law that has been built up over a long period of time, just to deal with situations that arose because surveyors committed stupid blunders or unconscionable inaccuracies. Public officials will take a long time to forget the crude subdivisions and the planning blunders that we committed in blind deference to our clients' demands. This is largely the reason for our present subjection to the format dictates and technical specifications of the Auditor General (5) and our lack of voice in decisions of community planning agencies today. This would never have happened if we had had a proper professional attitude a generation ago. Now it is almost too late to regain this ground.

The last point in the definition of professionalism is the matter of professional regulation. An old cliché states that the purpose of professional regulation is to protect the public against incompetent practitioners (known as "quacks" in one venerable profession). The correlative of this statement is the principle that professional regulation is NOT for the purpose of restricting the number of persons admitted to practice, nor for the enforcement of a uniform fee schedule. These latter are admittedly hard to segregate from efforts to protect the public by prescribing rules of procedures, which inescapably, influence prices of services. However, the main procedure of regulation is to examine the qualifications of a person desiring to practice a particular profession and to restrict such practice only to those who, as a result of the examination, have demonstrated their technical capabilities and familiarity with the "body of knowledge" pertinent to the profession. It is the hope and expectation that passage of this examination and inquiry into qualifications, and subsequent "professional registration" will, by indoctrination and persuasion, induce the practitioner to conform to the moral and social requirements of professional practice, and further provide, by threat of revocation of registration, abstention from gross technical malpractices. These procedures can be quite successful but only to the extent that the profession itself contributes to and influences the effort.

The subject of registration for engineers and land surveyors is perennial. However, repetition may serve as emphasis. A review of the history of engineer registration indicates the following general pattern: (6)

- a. A requirement of a combination of education plus professional-type experience, under professional supervision, as a preliminary requirement for permission to take the formal examination.
- b. Submission to a formal examination which usually is in two phases, taken separately.
- c. Issuance of a certificate of registration, which gives the right to practice.

Actually the engineer registration law usually sets up a total experience period as the entrance requirement and permits the applicant to submit up to four years in engineering education as a year-for-year substitute for experience. Education at university level in curricula other than engineering usually is permitted as a substitute on a year/half-year experience basis. However worded, the main intent is that the applicant

successfully accomplish a basic four-year engineering curriculum. The nature of the first-phase of the examination is such as practically to preclude a passing grade unless the applicant has been fully exposed to the mathematics and science of an engineering curriculum. The second-phase of the exam usually consists of design problems at a professional level. It is important to this discussion to note that the applicant takes a broad mathematics and science exam which is common for all fields of engineering, but is permitted in the second-phase to work on problems in his specific field of engineering. However, regardless of the field in which he was examined, the successful applicant is granted a license to practice "Professional Engineering". There is neither law nor regulation which confines his practice to the special field in which he was examined. There is, however, a very specific provision for revocation of his registration for gross malpractice. This effectively discourages, for example, a mechanical engineer from practicing civil engineering, except in areas in which he has developed a professional capability.

At this point, a discussion of education and registration for surveyors is in order. First, if we are to continue to hold out a professional status for surveyors, we must make a great effort toward organizing and making available the "body of advanced knowledge", "of a high intellectual nature" the possession of which has been noted as a necessity for a true "profession". We cannot continue without following the lead of our brother engineers. Possession of an appropriate university degree should be established as an almost inviolate requirement, tested by examination of a challenging nature, such as the first-phase of the engineering examination. A second, professional problem, exam after elapse of professional-training time should also be a broad challenge, not just an exercise in the legal provisions of the Plat Law. The current registration procedure for land surveyors is, to put it charitably, regressive. An applicant with a university degree gets no more professional credit than Harold Welch's "tenth-grade dropout". (1) In fact, the Michigan board seems to assume that he is a tenth-grade dropout and utterly (deliberately?) ignores the broad fields of science and mathematics in its examination. Furthermore, no attempt is made to challenge him in the later parts of the examination by proposing even any moderately sophisticated geometrical problem requiring a numerical solution, and the applicant is even prohibited from bringing a desk calculator into the examination room! How about that! Small wonder that many of the plats currently submitted won't close. (Incidentally, many of the Private Claim surveys (7) in Detroit, made by Aaron Greeley in about 1810, had misclosures better than 1:5000). There are no questions about the Michigan Coordinate System, dynamic and orthometric elevations, geodetic position, adjustments of even simple control surveys, etc., etc. This is largely because of the apprentice system of training.

Now, maybe its time to turn to curricula. I fear that I must publicly retreat from a previously well-prepared position. (8) In speaking of curricula for surveying, it now seems that the optimum results would obtain if a separate engineering degree program were available, including the basic mathematics and science courses common to all engineering, but, distinct from civil engineering, provide a general coverage of geodetic engineering, including basic construction layout (a minimum), land surveying, mapping, photogrammetry, geodesy, astronomy, and other applicable specialties like electronics, optics, advanced math, etc. This is not intended to be a complete curriculum, merely an indication of the trend. Note that, while distinct from civil engineering, it is still engineering. This, of course, can only be done if the profession demands it and a sufficient number of students can be challenged to take it (and the registration board to recognize it!).

Admitting all the foregoing, what about the surveyor of the future?

- a. He will take advantage of all the new hardware and software.
- b. Relieved of the tedium of arithmetic, etc., he will devote his energy to professional creativity.
- c. Since the apprentice system of training will have been abolished, he will be a graduate of a university curriculum in geodetic engineering, maybe a master of city planning.
- d. Since the apprentice system of training will have been abolished, he not be favored (or looked down upon) by the Registration Board, the separate (subordinate) Land Surveyor registration will have been abolished, and he will be a Registered Professional Engineer.
- e. Since he will have regained the confidence of the public, the professional regulation will be administered (as in Canada) by a corporation that is self-governing, not subject to political appointment, and responsive to the desires of the profession. (9) Such a corporation, like the Bar Association, will have a grievance committee, and will be able to mete out penalties for not adhering to the principles and ethics of a truly professional practice.
- f. This won't all happen by next year.

*Editor's Note: The numbers in parenthesis in this article, refer to the following notes which Professor Berry has very kindly provided to your Editor. He says also, in explanation, "you must understand that this paper was prepared only with the intention of oral presentation before my associates in MSRLS with whom I have intimate personal friendship. There are frequent "in-group" references, the meanings of which are not obvious to persons not practicing in Michigan. I have marked some of these and offer the following notes of explanation, which you may use any way you desire:"*

1. *Professor Harold J. Welch, my associate at the University of Michigan, presented a paper earlier in the same session of MSRLS, on the subject of computers in general and with a demonstration of the use of a "Teletype" remote console.*
2. *In the United States, in urban industrial areas (California, Chicago, Detroit, for example) field surveying personnel have elected to associate themselves with construction-oriented labor unions, which action, I believe, contravenes any assertion of professional status. I do not, therefore, believe that there is any point in devoting significant effort, in a university course in surveying, to the development of detailed techniques and skills in the area of construction layout, transit operations, plumb-bob taping, etc.*
3. *This remark about use of the word "Professional" in the name of a state surveyor's association was made before the public suggestion to include it in the name of the Michigan society. I would prefer, rather, to drop the word "Registered" from the name of the Michigan society.*
4. *Just in case you are not familiar with the report, I enclose a copy of the much-debated report by the committee under Brother B. Austin Barry, which suggests that four types of surveying (including land surveying) fall within the professional field of civil engineering. (Editor's Note: This report was published in the July, 1959 issue of "THE ONTARIO LAND SURVEYOR".)*
5. *In Michigan, the State Auditor General is required by law to make a critical review, including computational check, on every subdivision plat submitted for recording. The state "Plat Law" requires that misclosure must not exceed 1 part in 3,000! Many of our Michigan surveyors will not agree with my complaint that the misclosures should not exceed insignificant round-off quantities. Adjustment of survey is considered by some as a dishonest form of notebook alteration. We are also in the midst of a row about passage of a state registration law for city planners.*

6. *United States practice usually registers engineers and land surveyors separately, with different standards, but under the same board, which may, or may not, have one land surveyor on it.*
7. *These "Private Claims" are also known as the "French Claims" because they are based on grants made by the French government when Detroit, and other parts of Michigan, were part of French Canada.*
8. *For many years, my publically-expressed attitude has been that expressed in Bro. Barry's report, that surveying, including land surveying, is part of civil engineering, that the practice of surveying is inextricably meshed with the practice of civil engineering, and that education for surveying, including land surveying, is an area of the responsibility of the civil engineering curriculum. Now, reluctantly, I am moving away from this attitude, toward the position expressed here. This change arises, in frustration, because the civil engineering faculties have continued on the trend, started over twenty years ago, and contrary to the Barry report of ASCE, of a continued erosion of the effort devoted toward surveying. This erosion has continued so far that, in many universities, the course in surveying is insignificant. We surveyors, therefore, have at present no place to turn to recruit academically-trained personnel for our profession.*
9. *Note our U.S. admiration for the Canadian system of professional regulation. This, of course, does not quite conform to my suggestion that surveying be included within the professional engineering complex, but separate from civil engineering.*

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## ASSOCIATION NOTES

### MINISTER OF EDUCATION ACKNOWLEDGES ACSTTO BRIEF

*Following is a copy of a letter received by the Secretary Treasurer from the Honourable William G. Davis, with reference to the brief for the Establishment of Courses Leading to the Certification of Survey Technicians and Technologists.*

ONTARIO

MINISTER OF EDUCATION

March 14, 1967

Dear Mr. Bradbury:

Officials of the Department of Education have studied the brief presented by the Association of Ontario Land Surveyors with considerable interest. We wish to commend the Association for the great amount of research which was obviously required in the preparation of such a thorough report. Since officials of the Applied Arts and Technology Branch have had an opportunity to work with the Association's Education Committee in developing suitable programs of study, it will be possible to implement the Association's recommendation in the Fall term of 1967.

We are pleased to be able to inform you that Ryerson Polytechnical Institute plans to offer the second-year program in Survey Technology in September 1967, drawing on those students who are completing the common first year technology program this Spring. If the demand is sufficient, the Survey Technology program can also be introduced into one or more Colleges of Applied Arts and Technology in the Fall of 1968.

The Survey Technician program will be offered in at least three centres in September 1967 -- Toronto, London, and Sault Ste. Marie. At the moment, these centres are listed as Ontario Vocational Centres. During the next year, they will be absorbed by the Colleges of Applied Arts and Technology for the respective areas.

The Department of Education will be following with keen interest the program