

Food for Thought Concerning Education in Surveying

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During the last four years of assisting in and actually teaching the several phases of surveying and mapping work at Purdue, I have formed some rather definite ideas and opinions on the subject on which I should like to elaborate. Perhaps you will agree with some of them; perhaps you will disagree. One shouldn't expect complete agreement, especially on a subject dealing with education. Nevertheless, there is nearly always a continual need for improvement regardless of one's field of endeavor and I believe that is certainly true in our field of surveying and mapping education.

I am limiting my discussion entirely to surveying and mapping. Your position in the county organization is more one of "civil engineer" rather than "surveyor" as your title might indicate. However, surveying is the basis of most of your work, depending upon the geographical and topographical location of the county, and, of course, is the stock-in-trade of the land surveyor. I wish to point out that I am thinking in terms of the field of surveying and mapping as it applies, not only to the county surveyor, but also to the private surveyor, the civil engineer, the city engineer, the government employee, the educator and the many others who are a part of the field.

As I see it, there are four areas in which we should focus our attention from the standpoint of education. These are:

1. To the semi- or sub-professional technician,
2. To the professional civil engineer,
3. To the specialized professional civil engineer, and
4. Engineering extension service to all groups.

In discussing the place of our educational institutions in teaching surveying and mapping, we must keep in mind the many and varied job opportunities available, as well as the numerous legal handicaps which exist in various states. We must make provisions for the necessary training of professional civil engineers who desire

a general training and experience, along with the occasional ones interested in more advanced specialized training and experience in geodesy, photogrammetry, cartography or professional land surveying. We should make provision for the training of those interested in semi- or sub-professional work such as chainman, rodman, instrumentman, draftsman, mapper, computer and the like.

The elected office of county surveyor in 90 Indiana counties was occupied, in 1950, by 53 registered professional engineers or land surveyors, while the remaining 37 were unlicensed officials. Just what role should the educational institution play in helping to train the unregistered official who is probably lacking in surveying and technical knowledge? Certainly there must be something Purdue could offer.

Finally, and perhaps most important, is the work with all individuals who are participating or who are interested in the field of surveying and mapping. Continual effort must be made to encourage professional improvement and development, to stimulate interest, to establish equitable fee schedules and standardized practices, and to practice professional ethics.

PROFESSIONAL CIVIL ENGINEERING

At present the surveying and mapping instruction at Purdue is devoted almost entirely to basic work with embryo engineers. All engineering students are required to take a course in elementary surveying during their first year. Civil engineering students follow this up with Summer Surveying Camp instruction, consisting of courses in topographic surveying and route surveying. This concludes the surveying instruction of the civil engineer, unless he elects to take additional elective courses as a senior. At that time he can elect courses in land surveying, geodetic surveying, or photogrammetry and we hope soon to offer an additional one in cartography. The course in land surveying is rather popular and has been elected by many students. The other courses are usually chosen by a fewer number who desire to make a career in some phase of surveying and mapping. Therefore, in that phase of the program dealing with the professional training of the civil engineer, Purdue seems to be up-to-date and adequate.

SUB-PROFESSIONAL TECHNICIAN

There has been increasing need for trained personnel to supplement the work of the professional engineer. Purdue established the

Division of Technical Institutes in order to meet this demand for engineering aides and technicians. Specialized intensive two-year courses are designed to emphasize the applied and practical, rather than professional and theoretical study. The content and purpose differ from those of the vocational school on one hand and those of the engineering college on the other.

The Engineer's Council for Professional Development has defined the purposes and characteristics of Technical Institutes as follows:

1. The purpose is to prepare individuals for various technical positions or lines of activity encompassed within the field of engineering, but the scope of the programs is more limited than that required to prepare a person for a career as a professional engineer.
2. Curricula are essentially technological in nature, based upon principles of science, require the use of mathematics beyond high school and emphasize rational processes rather than rules of practice.
3. Programs of instruction are briefer and usually more completely technical in content than professional curricula, though they are concerned with the same general fields of industry and engineering. They do not lead to the baccalaureate degree in engineering. Such designations as Engineering Aide, Technical Associate in Engineering, and Engineering Associate are appropriate designations to be conferred upon the graduates of programs of technical institute type.

It is estimated that three to five men are needed on the technical institute level for each man needed on the professional level. The technical institute level of college work is due for considerable expansion within the United States. Purdue now offers six such two-year curricula programs. These programs are:

1. Production Planning Technology
2. Drafting and Mechanical Technology
3. Electrical Technology
4. Industrial Technology
5. Chemical and Metallurgical Technology
6. Building Construction Technology

It appears to me that there might be a need for an additional technical program in what might be called "Surveying and Mapping Technology." Such curricula, giving the student training in surveying, mapping and computing, would qualify him for employment

as a mapper, computer, draftsman, instrumentman or the like. Included in this instruction would be courses in plane surveying, topographic surveying, route surveying, land or property surveying, drafting, courses in related technical subjects such as mathematics, mechanics, shop practice, construction materials, geology, introduction to engineering along with additional courses in the humanities. Upon the successful completion of such a two-year program a student would receive a diploma as an Associate Technical Aide and would fill a need for individuals so trained.

The Department of Engineering at City College of San Francisco a few years ago initiated a surveying and map drafting curriculum as one of its two-year terminal programs. Graduates of this type of semi-professional school have been in great demand. Perhaps there is a place for this type of instruction in Purdue's overall program.

ENGINEERING EXTENSION SERVICE

It is my belief, as well as the belief of many others, that the time has come for the development of Engineering Extension Service in the field of surveying and mapping by the land-grant colleges of our nation. These engineering colleges could do a great deal if they were to step forward and provide the leadership that is so sorely needed. They have failed to perform one of their natural functions which should have been developed many years ago. The agriculturists, for instance, have their county agents, home demonstration agents and high school agriculture teachers who form the field workers for a competent, efficient and powerful group. I think we could profitably take a lesson from our agricultural friends.

The work of our own Professor Ben Petty in extension work with road men in highway engineering is something of which he should be proud, for many now recognize Purdue's leadership in this field.

Of course, we in engineering are in a somewhat different position from those in agriculture for we must work mostly through private or elected officials while they work directly with agents hired by the extension service. Nevertheless, there is a wide open field available in the interests of surveying and mapping and I think it could be accomplished at moderate cost.

In discussing such an extension service, some of the following might be considered to be a part of the work:

1. Conduct short-courses for surveyors to teach computations, the drawing of plats, the writing of deed descriptions, legal

- problems, the use of the State Plane Coordinate System, etc.
2. Sponsor annual conferences on surveying and mapping for those who make and use surveys and maps.
 3. Print and distribute a monthly newsletter of surveying and mapping news.
 4. Gather and preserve survey and map information that may be of service to surveyors, engineers and others, and to make this information readily available to those who need it.
 5. Place a card index in every county courthouse of all the control points in that particular county so that those who have use for the information can get it without delay.
 6. Administer the State Coordinate System and perhaps check all surveys before they are connected to it.
 7. Prepare standard specifications and procedures for the various classes of surveys, including the requirements for connecting surveys to the State Coordinate System.
 8. Assist private surveyors in improving their surveys and their economic status.
 9. Assist municipalities in establishing control systems, in planning sub-divisions, the use of plane coordinates and the planning of aerial surveys and maps.
 10. Prepare and publish information on the following subjects:
 - a. Complete specifications and procedures for various classes of surveys.
 - b. Procedures for the use of the State Plane Coordinate System.
 - c. Cardinal points of law in boundary surveying.
 - d. Legal responsibilities of land surveyors.
 11. Encourage the joining and the organizing of a state chapter of the American Congress on Surveying and Mapping or an Indiana society or association for Registered Land Surveyors.

In undertaking to sell this extension service we will need your help and cooperation if it is to become a reality. We will need individuals with vision, imagination, enthusiasm and leadership qualities. Many believe that one of the ultimate goals is the establishment of State Bureau of Surveys and Maps, perhaps in connection with the engineering colleges since the work of the bureau and the instruction in geodetic surveying and photogrammetry could be closely coordinated.

Several states and their engineering colleges have for some time engaged in some of these extension services. Virginia Military Institute conducted its second five-day refresher course in surveying this past January. The course consisted of classes and lectures in calculation problems, aerial photography and the ethical and legal aspects of surveying. The content was determined largely from the requests of surveyors.

The University of Florida has recently sponsored its third annual surveying and mapping conference. Participating in the program were 290 consulting engineers, land surveyors, educators and representatives of federal and state agencies. Twenty-nine Wisconsin land surveyors attended a three-day Surveyor's Institute at Madison last November conducted by the University of Wisconsin. The University of Illinois sponsors an annual conference on surveying and mapping and the eighth one is scheduled for May or June of this year. Rutgers University in New Jersey and Texas A. and M. have sponsored occasional surveying conferences.

Much work is also accomplished by some very active state societies of registered land surveyors. This includes that of Michigan, Georgia, Arizona, Texas, Tennessee and New Jersey. Mr. Camp and I have recently returned from the Tenth Annual Michigan Conference of Registered Land Surveyors at Ann Arbor. This day and a half conference was in cooperation with the University of Michigan Extension Service and was very successful. At the recent Florida Surveying Conference, 45 registered Florida land surveyors adopted a constitution setting up a state-wide organization of land surveyors in that state.

I think that before long you can anticipate some leadership from Purdue in conducting surveying conferences and short-courses, together with a sincere effort to help in organizing a state-wide organization for all active practicing land surveyors. There are many in our state who are practicing this age-old profession and have no opportunities to get together and discuss their problems. At first, the number participating might be small, but I am confident interest will grow when the professional benefits become known. This is apparent by the success achieved by other states.

Certainly the recent passage of a bill in the Indiana legislature which permits the use of the Indiana Coordinate System in legal land descriptions, effective January 1, 1952, will require the distribution of information to practicing surveyors throughout the state within the next several months. You can definitely look forward to receiving information on both of these items in the near future.

AMERICAN CONGRESS ON SURVEYING AND MAPPING

For many years the surveying and mapping profession in this country had no organization. There was no medium of expression for surveying as there was for many other special branches of engineering with a magazine as a mouthpiece for the gathering and dissemination of news. There seemed to be a great interest and need for such an organization. In 1941, just 10 years ago, interested persons founded and organized the American Congress on Surveying and Mapping. It started out with a membership of about 100, but has grown rapidly and now has 1,500 members.

The thing that strikes me is the lack of participation in this organization by engineers and surveyors of the state of Indiana. Out of the present membership, only 11 are from Indiana. This is a pitifully poor representation from our state. Certainly we of Indiana are not disinterested to that extent. I know that several of you are already one of these 11 members. Could a reason be the lack of information and knowledge of the existence of the organization?

Just what is the purpose of the organization? What are its aims and its goals? Of what good will it be to me? For this I quote from the organization's constitution regarding its purpose and aims: "The American Congress on Surveying and Mapping is a non-profit association organized to advance the sciences of surveying and mapping in their several branches, in furtherance of the public welfare, and in the interests of both those who use maps and surveys and those who make them. It aims to establish a central source of reference and union for its members, to contribute to public education in the use of surveys and maps, and to encourage the prosecution of basic surveying and mapping programs, especially those programs which are paid for, in whole or in part, with public funds." The central source of reference referred to is the quarterly journal or magazine.

SURVEYING AND MAPPING

There are five technical divisions in which one can be enrolled as a participant. These are Cartography, Control Surveys, Property Surveys, Surveying Instruments and Topography. Probably the division on Property Surveys would be of most interest to you. Through this division, better methods of procedure are promoted and standards of practice and ethics have been set which are elevating the plane of the profession. Have you read the reports of this divi-

sion dealing with technical standards, equitable fees, accuracy or legal aspects of property surveying? Many interesting articles have been written and presented dealing with property surveys.

The United States Bureau of the Census officially notified the surveying profession a year ago of an elevation of status from that of a "semi-professional worker" to that of "professional, technical, and kindred worker." This was of considerable importance to the profession in that, under the previous classification, some governmental agencies felt required to demand competitive bids for survey work and otherwise to treat surveyors in a non-professional manner. This change was accomplished by a campaign over a period of years by the American Congress of Surveying and Mapping.

If you are interested in the future of surveying and mapping, fill in the membership blank and mail it to the national office. The Congress is not limited to experts in their respective fields, nor to those actively engaged in some phase of surveying and mapping, but its membership is open to all who are interested in the existence of a medium through which effective expression can be given to matters of vital concern to the profession of which you are a part.

It is the only organization in the United States devoted exclusively to the interests of the surveying and mapping profession. Members represent all branches of the profession—teachers and educators, instrument manufacturers, professional cartographers and geographers, commercial photogrammetrists, private surveyors, city and county surveyors and government-employed surveyors and mappers.

In summarizing, I would like to leave three thoughts with you for your consideration.

1. There is, perhaps, a place in our educational program for the training of some sub-professional technicians in surveying.
2. There is a need for a better dissemination of surveying information through an active engineering extension service in surveying and mapping.
3. There is a benefit to be derived from joining and participating in the American Congress on Surveying and Mapping and from organizing a state organization of land surveyors.