Photogrammetric Brief

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The Land Surveyor and Photogrammetry

Is there a generation gap?

IF YOU MENTION "Photogrammetry" to a Land Surveyor you get a look back that tells you his loaf of bread has just been cut in half. Ever wonder why? A lack of understanding of photogrammetry's capabilities and limitations in the land surveying field is one good reason. The other is that the average land surveyor has never taken the time to discuss the subject in the open with those in the field. The land surveyor does not have the proper mental attitude or field "moxey" to do the type of surveying necessary to prepare an aerial map. I speak this way because I have been in both camps, as a Field Topographic Surveyor, and as a Land Surveyor.

For the land surveyor to continue to think this way is pure insanity. Of all the branches in surveying, the land or cadastral surveyor is the only one really secure in his position as such. Keep in mind that the field of surveying today is like medicine, dentistry, law, engineering, banking, advertising, and so on—there are specialists in each. The land surveyor is a specialist. To think, "There's a surveyor," or there goes a survey party," every time you see a transitman, or a contractor looking through a level, or a real estate man walking down the street with a funny looking wheel, is not always the right thinking. The surveying field is quite diversified. However, the land surveyor is the only one allowed by Illinois law to practice land surveying as defined in the Illinois statutes. In fact, he must be registered in Illinois by a written examination. Reciprocity is allowed in certain instances. The land surveyor pays dearly for his registration in sweat and tears, and perhaps that is why he is reluctant to trust a method of obtaining ground measurements and positions when he is not physically able to control the points personally.

Photogrammetry is a long way off from establishing a true property line in the field; settling a boundary dispute between neighbors in the heart of an urbanized area; distinguishing party wall responsibility, or pro-rating shortage and surplus in a residential subdivision. Photogrammetry is also a long way off from economic domination of the land surveying business. Like a doctor writes prescriptions to care for a sick person, so should the land surveyor rely on the service of photogrammetry. Photogrammetry is an allied service which depends on the knowledge of the land surveyor. Photogrammetry is a supplement—not a substitute for land surveying.

Photogrammetry is not going to fade away. If anything, it is becoming more recognized and adaptable to everyday use. What will happen when photogrammetry is recognized by State Deparments of Registration and Education, and the photogrammetrist becomes registered to practice? When that happens, photogrammetry as we know it will be recognized by the courts and the land surveyor will again be politely obliged to move one more step further down the ladder of the recognized professions. Why wait for that to happen? Why not begin now to become educated about this fascinating field. The land surveyor today is wasting a lot of his own time and his client's money by not making use of the services offered by photogrammetric firms.

Remember those old fashioned people who brought us the computer, the theodolite, the steel tape, the electronic measuring device, and talking pictures—these same silly people have been trying for years to get the land surveyor to use and work with photogrammetry. Their success is slow in coming, but they have a lot of *success* on their side. The old arguments of cost, accuracy, and speed don't really hold water. Photogrammetry is moving in on the land surveyor through the

back door, i.e., through the land planner, the developer, the consultant, and the individual owner. Projects as small in size as 10 acres and as large as 10,000 acres have been economically handled by photogrammetric methods with a minimum amount of ground control by a surveyor. Keep in mind that I am discussing work being done for project planning; planning studies; subdivision development, utility routes; pipeline locations, and land development. All this type of work could be handled by a land surveyor, or certainly through his office with the assistance of a photogrammetric service. But, it ain't being done.

There is no argument that boundary control in cadastral surveying is the land surveyor's bailywick. Restoration of lost corners' monumentation, property line location, description evaluation and analysis, easement determination, and ownership boundaries are all a part of the function of the land surveyor. He has been educated, trained, and experienced in this field. The land surveyor is truly the person to talk to about a project development. His background and knowledge of the area are the vanguard of any successful project. In most developments, the land surveyor is called in *after* the preliminary plan is executed and the actual boundaries of the development are agreed upon. At this time, the land surveyor is contacted to come in and do a complete boundary (cadastral) survey so that final planning can get started. Often this survey is already available before preliminary study has taken place. At any rate, this situation does not have to exist if the land surveyor would only make it known that he can provide the complete service from the *thinking* stage to final planning. Photogrammetry is his ace in the hole. But the land surveyor continues to ignore this under the guise of "cost too much, poor accuracy, timing not dependable." As a Topographic Surveyor, I say he is wrong. As a land surveyor, I say he is not only wrong, but he is misinformed and not versed on the capabilities and limitations of photogrammetry.

Ever hear of the story of the land surveyor who had to be called in when a mistake in a topo map prepared by a photogrammetric firm was uncovered by the excavator on the job site? The usual hindsight comment between the resident engineer and the land surveyor is familiar, "Boy, I told Mr. So and So to have this job done by ground methods. That—aerial mapping company is a bunch of dummys; they can't even read a rod." And so the story goes, "Man oh man, one time I was called in to run a little cross section check on an aerial map and I was over a foot off checking their contours. The "bench" was okay by running a simple loop, but those contours are sure way off. I'll bet it is going to cost a ton of money to get the cut and fill straightened out." To defend the aerial map company, I would say they *very seldom* make a mistake on the final map. Whatever mistakes that are made are human errors in transcribing elevation values or coordinate numbers. Yes, there are errors in the preparation of the map which sometimes are not found until excavation or grading takes place in the field, but these errors are as rare as when a land surveyor delivers a plat of survey showing an erroneous building encroachment. And those are rare, but they cause confusion; court action; economic hardship; and loss of company image in many cases. We must be fair and admit that the land surveyor and the photogrammetrist are somewhat alike—they are human.

On the other hand, have you ever heard the story of the land surveyor who went out in the field 4, 5, 6 . . . 10 times to pick up some extra topo or "some extra shots to check field notes on a cross section job." Or the crew that had to run back out for a few minutes to check a "bench." Or, "Say, when you go out to so and so, take a few shots here and here on that cross-section job so we can plot the contours here." Familiar? Damn right, it's familiar. Did you ever try to go out in the field and check an elevation on a contour drawn from cross-section notes? Try it and see how close you come to what you put out on a finished plat. And ask the land surveyor to what accuracy does he guarantee the contours shown on his plat.

I have often heard my former employers and many another land surveyor tell me the tale of keeping the field crew busy in the off-season by handling all topographic surveying and mapping by ground methods. They say it fills a void in the off season and, besides that, it does not cost as much to prepare the final map when done by ground methods. It is odd to hear talk like that—those same old arguments of cost, accuracy, and dependability, and speed. From experience, I would say that cross-sectioning, picking up topo; and running out extensive level lines are probably the most boring parts of field work. They are time-consuming, laborious, and usually not done completely right the first time around. Invariably, the minute you commit a field crew to a topo job to save time and money, another important job comes in that necessitates using

that crew for a land survey or a *hot* location survey. Bingo, you have lost valuable time on the topo job. Time is money in any business, and if you have to go back to a job a second time to do something you did already, or for something you should have done the first time, *you have lost money.* The other objectionable thing about the "I'd rather do it myself" philosophy that the land surveyor has is *Accuracy and Field Conditions.* Have you taken a good look at the field crew who has to do a 25 ft., 50 ft., 100 ft. cross-section in a corn field in the middle of August/September? Remember those days of April and May when you have to cross-section the NE 1/4 of Section 10, etc., etc., and then had to top that off with a re-run the following week because there were some questionable areas to check before the contours could be drawn?? The NE 1/4 of Section 10 being the back 160 and a half-mile over hill and dale. How accurate are the cross section shots (station position) in a corn field 10 ft. high, or in a wheat field in July, or in tall grass where the original base line cannot be seen? Field conditions and weather for these projects are average, i.e., rain, mud, heat, humidity, ice, cold, fog, and so on. All these conditions have to affect the accuracy of your final product. True, in flat country there is little reason to be concerned, but in areas of even slight relief the accuracy is quite important.

The field of photogrammetry is not all perfume and roses. The basis of an accurate topo map by aerial methods is: good ground control, good aerial photography, and good compliling. Ground control can be botched up, the aerial photography is seasonal, and good compilers (plotter operators) are as hard to find as a good survey technician. However, when these three components are A-1, there is no service better. If the compiler can see the ground in his stereo model, he can trace a contour that no ordinary land surveyor could ever recreate by normal cross-section methods. The accuracy of the map prepared by the photogrammetrist can hardly be matched by ground methods. In a small area in extremely flat and level terrain, the ground methods will be adequate and economical. But let the land begin to roll, and throw in a stream or two, spike it with some medium topography, and you have the makings for a Photogrammetric service to supplement the land surveyor's capability.

In conclusion, we must advise the land surveyor and the photogrammetric firm that the way for an understanding of each other's role is through mutual understanding and education of the capabilities and limitations of each. Of course, we know that the land surveyor and the photogrammetric firm will be thinking that neither has any bounds on their capabilities or limitations—but we know better, don't we?

Notice to Contributors

1. Manuscripts should be typed, double-spaced on $8\frac{1}{2}\times11$" or $8\times10\frac{1}{2}$ white bond, on *one* side only. References, footnotes, captions—everything should be double-spaced. Margins should be $1\frac{1}{2}$ inches.
2. *Two* copies (the original and first carbon) of the complete manuscript and two sets of illustrations should be submitted. The second set of illustrations need not be prime quality.
3. Each article should include an abstract, which is a *digest* of the article. An abstract should be 100 to 150 words in length.
4. Tables should be designed to fit into a width no more than five inches.
5. Illustrations should not be more than twice the final print size: *glossy* prints of photos should be submitted. Lettering should be neat, and designed for the reduction anticipated. Please include a separate list of captions.
6. Formulas should be expressed as simply as possible, keeping in mind the difficulties and limitations encountered in setting type.