

Photogrammetry and Property Surveys*

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ABSTRACT: *This paper discusses one method of utilizing aerial photographs and photogrammetry in property survey work and property ownership determination.*

There has been much discussion of the current use of photographs and photogrammetry for property ownership determination. In this paper one approach to this use is discussed and a new concept on precision is considered.

THE first decision to be made on any project is the precision that is required for the final survey. This determination will show whether the use of photogrammetric techniques is appropriate. Such consideration must include accessibility and land value; obviously there is a need for a more precise determination of ownership lines in Times Square, New York, than for areas of similar size located in a small town or village. Similarly, the degree of required accuracy is also affected by the kind of land use. For instance, more care is required in the handling of 100 acres of valuable farm land than the same acreage of swamp or woodland in the middle of the Adirondacks.

Once the decision has been made that the photogrammetric system will meet the accuracy requirements, the site is visited with appropriate aerial photographs in hand for the purpose of collecting the names of those who are reputed to be the property owners and to delineate the approximate property lines on the photographs. The local court house is then visited and an attempt is made to match names to deeds and deeds to apparent property lines as delineated on the aerial photographs.

It is highly unlikely that all deeds in a given area will be plottable or defineable on the photographs because many parcels are referenced only to adjoining owners, a combination of measurements and adjoining owners, or to a land subdivision line estab-

lished on paper and never run in the field.

While it is possible to forecast with a reasonable degree of precision the horizontal capabilities of a given stereo plotter, it is almost impossible to forecast the precision to which any given property corner may be measured. The two primary factors that enter into this problem are first, *the problem of locating the property corner on the ground*; and second, the ability of the stereo operator to *recover the ground position of the corner* in his stereo model.

Locating property corners on the ground is facilitated and made definite wherever and whenever these corners are thoroughly described, permanently marked or are on some natural feature. Otherwise and usually, the decision on location must be based on a combination of deed descriptions, good common sense and judgement.

Of 150 properties included in a recently low land value project, only two deeds mentioned irons as marking corners. In almost 90 per cent the deed description was a cedar stake set in 1870. This may seem like an insoluble situation; however, some parcels were apparently fenced at the time of the original survey and these fences are still in existence and recoverable in whole or in part.

Fortunately, as in this case there will usually be many approximate, even though not precise, property delineations. If a stone wall exists, the owner of the abutting wall will claim ownership to the wall and also that the

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wall defines a boundary of his property. Instead of the center of such a wall being straight and sharply defined, the walls may be 6 to 10 feet wide, vary in direction and largely be reconstructed. While trees or brush lines are helpful in delineating lines, these frequently are confusing. Information obtained from a land owner may be more confusing than helpful to the surveyor. In fact, one eminent surveyor has asserted that he would not ask the landowner for information on boundary lines since the surveyor after a study of the area would have more and better information based on the deeds and site examination.

The preceding is given to illustrate the problems and difficulties confronting the surveyor.

After using the aerial photographs on which names, reputed ownership lines and deed data are recorded, the field man revisits the area. By inspection, confirmation by adjoining owners and the data on the deeds, he determines the "precise" location of the corners or lines in question and proceeds to photo identify them.

This brings up the second factor previously mentioned affecting the required precision of the survey. How precisely can the stereo operator recover the exact point, determined by the field man to be the corner? Several methods may be used to assist this precisionizing. The first includes marking or paneling the points prior to photography. The second is direct photo interpretation of the point. A third involves making swing ties to photo identifiable points. Usually one of the last two will be utilized. The marked-up aerial photographs in the office are used by the stereo compiler in plotting the property lines in the stereo model. As a final check, a deed plot is compared to the manuscript to assure

that there are no gross errors.

While some will concede the advantages of using aerial photos in the preliminary phases, they may believe that using the stereo plotter is wasted effort and that the same results could be attained by assembling the deed plottings. This may be a satisfactory approach under conditions of small areas and if all deeds are plottable and are prepared from surveys believed closed with reasonable tolerance. However, if these conditions are not met, a strong framework is essential and the photogrammetric network is the most economical method of obtaining such a base.

On the ground a measurement may be made accurately to a finite value. A measurement made from a projection type plotter is limited to scaling from a graphic solution and the precision of this measurement is limited to about 1/100 of the plotting scale. This assumes, of course, that the point was well defined in the stereo model and could be accurately drawn in the plot.

The preceding discussion may seem to indicate that the photogrammetric approach does not provide sufficient accuracy for property work. This probably is true for small area surveys. However, for large areas and where many parcels are involved, a new concept on precision is appropriate. This is an area consideration rather than the precision of a line or group of lines. Of equal or greater importance is a good overall fit in a large area, rather than a precise fit for a relatively small area. Having this concept in mind, it seems obvious that the existing development of photogrammetric equipment and techniques can and do meet the requirements for certain types of property surveys and are more satisfactory and more economical than conventional ground survey methods.

1963 SEMI ANNUAL MEETING

Make a Note that dates are Sept. 12 & 13

Then make definite arrangements to attend

Place: Thousand Islands Club, Wellesley Island in Thousand Islands Area, New York

Sponsor: Central New York Region

Chairman Technical Program Committee: Robert F. McGovern, Bausch & Lomb, Inc., Rochester, N. Y.