BUREAU OF LAND MANAGEMENT

Double Proportions

With Belle Craig

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CADASTRAL SURVEY

Double Proportions

To better explain the process of double proportioning this edition of the Manual has clarified the procedure with expanded discussion and figures. Here to tell you more is Belle Craig.

Today we are going to talk about Double Proportions. The reason we are talking about double proportions today is because the 73 Manual has had a figure in it that has caused some confusion. After about 36 years of constructive criticism, one of the things we are trying to do in this issue of the Manual is to clarify how to do a double proportion. I would like to start with just a quick discussion on what a double proportion is and what a double proportion is not.

In this edition of the Manual as well in the past edition, a double proportion is identified as a primary method for restoring a lost corner. We have got to remember that proportions in general are a method of last resort. In this case what we are trying to accomplish with doing a double proportion is we are trying to do a careful and faithful reestablishment of a lost corner position after we have exhausted and searched all available sources of records on the ground, looked at all available evidence that we can find in the field, and really made a thrilled determination that the corner is lost.

One of the things that a proportion is not, it is not merely a technical procedure. It has its basis in the law and the courts tell us that it is a fair and equitable way to restore a lost corner. This is the citation from this edition of the Manual about what a lost corner is and you can find it of course in the section of Restoration of Lost Corners. A Lost Corner is one whose original position cannot be determined by substantial evidence. Either from traces of the original marks, or from acceptable evidence or reliable testimony that bears upon the original position and whose location cannot be restored by reference to one or more independent corners.

This is actually a significant change in this edition because we have changed to the substantial evidence standard in this Manual. Before we go on and actually talk about the specifics of how to do a double proportion, I would like to talk about a little bit of "do's" and "do not's."

Now what a double proportion is, figuratively speaking is what you are trying to do is compare your chain, and again I am speaking figuratively, to the chain of the original surveyor. What we are trying to do is come up with a legitimate ratio of comparing your measured lines to the measured lines of that original surveyor.

One of the most important concepts is to make sure that when we are making these comparisons we are starting at the same place, the same ends of the line that the original surveyor started from. I like to think of this as a way to get your

chain calibrated and to make sure, when you compare your measurements to the original surveyor's measurements that they are in the proper basis.

In Chapter 2, it talks a little bit about this. In 2-4, it states "…All measurements must be reduced and placed into a common reference system that is well defined, understandable, and more importantly consistent with the historical record." What I mean by consistent with the historical record, is that most GLO and BLM plats, the basis of bearing is astronomic; they are referenced to the true meridian.

We are not dealing with grid bearings; we are not dealing with assumed basis of bearings. These plats had their basis generally in astronomic or true mean bearings. Distances were generally reported in chains but were based off the US Survey and measured at ground elevation, not at sea level. One of the things we do not want to do is use grid bearings or grid distances from an RTK field device where we have got our data referenced to a rigorously defined coordinate projection for instance. We want to make sure we have reduced that data and the same basis that that GLO plat is in, in order to calibrate our chain and do this proportion correctly.

If you want to know a little bit more about the PLSS datum, read up on it in Chapter 2 of this edition. What I would like to talk about next, is again …this is a direct quote from the Restoration of Lost Corner section of this chapter. This is a very important point that I would like to make.

I am going to read it directly out of this Manual in the same language used in the previous Manual. "Lengths of proportioned lines are comparable only when reduced to their cardinal equivalents." This is very important. What this means, is that when we talk about the use of cardinal equivalents, the Manual goes on to say that "use of cardinal equivalents employs only the northerly components called latitudes of the north and south controlling record lines to compute the latitudinal position in a double proportion. Only the easterly components or departures of the east/west controlling record lines to compute the longitudinal position." This is a very important point that we are trying to make in this edition of the Manual.

I would like to go back to that problematic diagram that we had in the 73 Manual and talk about the intent of what that figure was supposed to be. I would like to focus on that middle circle and talk a little bit about that term, cardinal. Of course, we have already said the basis of bearing is going to be with reference to the true meridian. And when we talk about cardinal equivalents, we are talking about is of course is reducing those lines and our ratio is going to be based off only the north/south, or latitudinal, and east/west, or departure of the record lines.

What the middle of that figure shows is at Point E that would be the position of a single proportion on the north/south line as computed using cardinal equivalents. And Line C, D is the position of a single proportion using cardinal equivalents on the east/west line. There is another place where we use the term "cardinal" when we talk about double proportions. That is where from Point E we move easterly, and Point F we move northerly to a point of intersection to compute where the position

of the double proportion lies. This is figure 7.2 from the next edition. What it is, is a way to show you not only how to do a double proportion but what we are trying to do here is illustrate that if you do not use the cardinal equivalents, if instead you use just retraced distances to do this computation you can come up with a very different answer.

If we use cardinal equivalents, we can see that the proportioned distance there on the top line, we come up with 40.42 chains. If we used measure distances when we compute our ratios instead of cardinal equivalents, we come up with quite a bit of a different answer. On that first leg, we would come up with basically 40.49 chains. This is significant because in the end, what we end up with is a difference in position of about five feet. So we want to underscore that the use of cardinal equivalents is very important in making sure that in using a double proportion what we are actually trying to do a careful and faithful reestablishment of a corner position of course requires us to do the computation correctly.

The Manual emphasis is lengths of proportioned lines are comparable only when they are reduced to their cardinal equivalents. Remember use cardinal equivalents in your computation. A double proportion is not merely a technical procedure. Proportionate measurement is a fair and equitable way to distribute error when restoring a lost corner.