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# SIDE SHOTS

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# Rule of the Month: Son of a Son of a Surveyor

By Earl Henderson, PLS

When is a straight line between original monuments not a straight line? A better question may be; when is the only time that line is a straight line? The only time that a line is an actual straight line is when the two monuments were originally set at each end of the line.

Let's look at this concept another way, from a historical perspective. Imagine a surveyor, circa 1885, completing an original survey of a Township. He establishes the section corners and quarter corners of the sections as original monumentation. He did his work with the most advance technological equipment he had at the time, a compass and chain (and possibly a sextant). The lines between his section corner monuments are straight lines because that's how he ran them and the quarter corner monuments are directly on those lines.

Jump to 1910. The owner of a particular section hires the son of the original surveyor to subdivide the section into quarter sections because he has four sons of his own. The son of the surveyor completes his survey of the perimeter of the section, finding all the original monuments and discovers that the quarter corner monuments are not precisely on straight lines between the section corner monuments. But those are the original quarter corner monuments so he maintains those positions and documents angle points on what were intended to be the straight lines between section corner monuments. He then connects the quarters and establishes the center of the section. The son of the surveyor is using adequate technological equipment for his day, his father's compass and chain, but the chain is old and stretched by now so there's some error in his measurements, but not enough to significantly impact the subdivision of the section by the standards of the day. According to his very best measurements the original center of section monument he sets is at the intersection of two straight lines between the quarter corner monuments. The farmer's four sons build fences because they don't get along as well as their parents thought they did, but they're very careful to preserve the original monuments all around.

Two World Wars intervene and then circa 1950 one family wants to further subdivide the SE quarter of the section. They hire the son of the son of the original surveyor who has the latest and greatest technological equipment that he got in a war surplus auction, a transit and steel tape, both recently reconditioned and calibrated. Our next son of a surveyor is diligent and thorough partly because of his excitement at joining the world's second oldest profession, partly because he wants to check out his fancy new equipment, and partly because he was well trained by his father and grandfather so he fully breaks down the entire section. With his more precise equipment he discovers what his father discovered, that the original quarter corner monuments are not precisely on the straight lines between section corner monuments. He also discovers that the original center of section monument is not precisely at the intersection of the straight lines between original quarter corner monuments. But he found all the

original monuments so he maintains those positions and documents a new angle point at the center of section. (And just as an aside here, he may also document different angles at the quarter corner monuments than his father did.) He then subdivides the SE 1/4 into 1/4-1/4 aliquot parts and sets original 1/16th monuments on the measured straight lines of the quarter section perimeter and at the intersection of the measured straight lines between his original 1/16th monuments.

Neal Armstrong walks on the moon, and then circa 1977 another heir wants to subdivide the SE 1/4 SE 1/4 of our perfect section. Again a surveyor is hired (the son of the son of the son of the original surveyor) who is using the same equipment as his father, the transit and steel tape he inherited when his father retired and passed on the business. But his father taught him well and especially to respect original monumentation. This son of a surveyor breaks down the SE 1/4 and determines that the original 1/16th monuments are not precisely on the straight lines between original 1/4 corner monuments. He feels he can measure better than his father, but in actuality no two surveyors, not even father and son with the same equipment, will get the same results when measuring the same lines. But the 1/16th monuments are the original monuments so he documents angle points at the 1/16th corners, maintains those positions and subdivides the SE 1/4 SE 1/4 setting original 1/64th monuments on the straight lines measured around the aliquot perimeter and at the intersection of the measured straight lines between his set original 1/64th monuments.

Reaganomics fails to trickle down, but in spite of that, our latest heir, circa 1988, wants to develop a subdivision in the SE 1/4 SE 1/4 SE 1/4 (theoretically 660' x 660'). Of course he hires the son of the son of the son of the son of the original surveyor to do this. (I hope I got that sequence right.) But now our latest son of a surveyor has been fortunate enough to be able to afford some fancy new technological equipment, a total station. No more chaining for this guy. But equipment does not replace training, so he breaks down the SE 1/4 SE 1/4, partly because he can traverse it in less than the two days it would take to chain it. Guess what? He discovers that because he's better able to measure the locations, the original 1/64th corner monuments are not precisely on the straight lines between the original 1/16th corner monuments. Who would have thought such a thing possible? But this lineage of surveyors, as we have come to know, were taught to honor original monumentation. So our latest son of a surveyor maintains the positions monumented by the original 1/64th corner monuments, documents a number of additional angle points in the lines, and creates a subdivision plat a portion of which contains 11 lots of 60' width, each abutting the east section line. Lots are sold individually over time and each time that happens the developer has the same son of a son of a surveyor come out and set original lot corner monuments, which he does radially from his still existing control points. Fences are built. People live large.



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Bush II happens (don't get me started) and one of the lot owners decides to sell and live the dream elsewhere. The purchasers hire a surveyor, but their real estate agent talks them into using Joe Fixit instead of the current son of a son of a (There's no way I'm going to get this right.) surveyor because they can save \$250 on the survey of their \$750,000 purchase. Joe goes out there with his RTN RTK GPS equipment, which is now so fancy and precise it no longer even has a name but merely initials. He finds the original lot corner monuments on the east line of the subdivision. You guessed it. He discovers that the original monuments are not on a straight line between the original subdivision corner monuments (1/64th corners). Since Joe has such fancy and easy to use equipment with which he can break down entire townships before lunch, he decides to investigate further and he finds that none of the original lot corner monuments are on a straight line between the original 1/64th corner monuments, and that at each section subdivision the original corner monuments along the east line of the section (1/64th, 1/16th/1/4) are not on the straight line between section corner monuments like they're supposed to be. What is poor Joe to do?

First, Joe has to decide if there's even a problem. Hopefully Joe will see that at each stage of this historical narrative each son of a surveyor performed a proper and accurate retracement of a parent parcel, discovered a discrepancy between platted dimensions and original monuments, accepted the original monumentation, documented the measured vs. platted dimensions and set original monumentation on what was at the time a straight line. At stages, new measurements and/or more precise equipment resulted in a better determination of the location of the original monumentation and that it was not actually as precisely set as the plat dimensions would seem to indicate. Of course it wasn't. As PLS's we've been getting better at measuring, but not necessarily more accurate. *Accuracy depends on the decisions you make not on the measurements you take.* The end result of the generations of

surveyors is an east section line with multiple angle points in it. Is this a problem? Not legally. But if Joe decides to hold two monuments as a straight line and set new monuments for lot corners or aliquot corners just because he can measure better than each of the original surveyors in this chain of events (can anyone say pincushion?), he's doing a disservice to his profession and his client and likely causing a problem where no problem exists in reality. He is no longer making a legally based decision and describing his results with his more precise measurements. He's letting the measurements make the decision for him and likely causing a legal problem for his clients and their neighbors where no legal problem should exist, just a mathematical variation in measured dimensions. If Joe were to decide to fix the line to where it was supposed to be, how far does he go? He's only working on 60' of a section line but that 60' was derived from the entire east line of the section. How much gets fixed? Just that section line? The entire Township line? Or does he correct the PLSS all the way back to the Ohio River?

Notice that at no point in this narrative was an error dimension mentioned. What if the original 1/4 corner monument were 5' off the straight section line measured by Joe? Is that too far? How about 10'? 50'? 100'? Is there a limit that describes how far is too far? Who's doing the measuring, when, and with what? In Boulder County we have a Township with a tier of sections topped by Section 1 that is 1 1/4 miles wide and the tier topped by Section 5 is 3/4 mile wide. Is that too far? Of course not. Has anyone looked at a Quad sheet

lately? How many perfectly square sections do you see? None. That is how they were originally surveyed so that is where the line is. The same theory applies within smaller and smaller portions of the PLSS, within subdivisions, and in many other circumstances outside the PLSS. The decisions we make should not be about the measurements. Nor should they be about if the discrepancy is within an acceptable arbitrary tolerance limit. The decisions to be made are about the history and the law. Then, and only then, are lines dimensioned as a means of describing what decisions were made and not as a reason for making those decisions.

So when is a straight line between original monuments not a straight line? In this example, we have a straight line between the NE corner of the section and the SE corner of the section that has somehow been measured both precisely and accurately multiple times to be straight and yet has many angle points. For my next magic trick I'll show you how to cut the ends off of a rope so that it no longer has any ends.

Be safe out there.

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