Land Surveyors: What we do, Who Benefits

We are land surveyors (LS) and we are here to tell you a little bit about what we do.

LS's make very small and detailed maps of things. There are two basic categories of maps, boundary surveys (S) and topographic Ss. Often the two are combined. In both cases we are just making maps that show the locations of things. What things? All kinds of things. A lot of physical, tangible things and a few intangible things and one very important intagible thing, the property line. Show a boundary S and a topographic S.

To make these maps we go to the field and make measurements using some of the equipment that you see here. More about that later. But we make measurements and record the data and bring it back to our computers and plot it out. We also gather additional information from public records. We analyze everything. We compare the record data and see if it agrees with our measurements. Then we make our maps. Or our Ss. We give them to our clients and hopefully, our clients give us money. That, in a nutshell, is what we do.

And I'll tell you something. Every map that you have ever looked at, every map you will ever look at, owes its existence to a LS. Maybe not the particular map you're looking at. It probably is based upon some map which was based upon some map, etc. But at some point in time there was no one else's map to base this map upon and you would have to call in a surveyor who went out and gathered information from the field. So you can think of us as map makers. But most of the big things in the world have been mapped. The State of Georgia has been mapped. Gwinnett County has been mapped. The City of Lawrenceville has been mapped. Mostly, only the very small things and the very new things are left. Someone's 20 acres of farmland. A new subdivision of houses. A new shopping center. A new hospital. And people generally call these very small and very detailed maps: Surveys.

When we go to the field to gather data, that is to say "to make measurements" we often use this instrument. It is called a transit. It is nothing but a fancy, tricked-out protractor and measuring tape. (hold up a circular protractor and pocket tape) It measures distances and angles and records that information in a data collector. Then back in the office we upload the data to a computer and with the magic of trigonometry (more about that later) we can plot out the data graphically. Now with Windows based data collectors we can graphically see the data as we collect it. We measure by positioning a prism rod at different points that we want to show on our Ss. It gets placed over a fire hydrant, next to a mailbox, a sewer manhole. It gets placed along linear features such as a driveway, the edge of a road, the edge of a sidewalk. Then we connect the points with lines in CAD programs. This is mostly what we mean when we say field measured. In the old days the LS would stretch out a steel tape to anything needing to be shown from the transit and record the angle to it from the transit. (point to the old transit) Now we use pulses of infra-red light. Some modern transits multiply the time interval by the speed of light to derive the distance. Most observe the propagation of the light beam to derive the distance. As you can see by looking into the prisms on the rod they are retro-directional and return a ray of light exactly the opposite direction. (pass around a single prism. Tell them it's an artificial quartz crystal) No matter how you orient it you end up looking at your dominant eye. Just a few years ago technology delivered prism-less transits. Now we can bounce the ray of light off of most any object and get enough reflectance to derive a distance. We still use the prism pole predominantly but for hard to get shots, some of which are very high off the ground, some of which are dangerous due to high voltage power lines or traffic, or penned rottweilers, the prism-less feature is invaluable.

The other part of the measuring done with the transit is measuring angles. And as stated previously this part involves little more than a pointing telescope settled upon a protractor. We set the protractor to zero on to some fixed point and away we go. The angle measurements are correlated to distance measurements and recorded in the data collector. So you can see how combining angle and distance measurements gives us a spatial representation of objects measured. Thus we have the basis for drawing our Ss. (show screen shots on laptop of points collected, then connecting the points with lines, then a finished S on screen, then point to a printed S)

In the not so old days, one person would move the rod and one person would follow him with the transit. The person

at the transit would write down the angles and distances in a book and later calculate positions. Now it is very common to use robotic instrumentation such as this. With a servo motor embedded in the transit housing and linked by radios the transit can now track the prism rod as it moves around and the person moving the rod records positions when he has it at the right spot. (Demonstrate robot)

Now, a new technology is on the scene that can greatly increase production and efficiency of most kinds of surveying; GPS. As you probably know GPS involves a constellation of satellites owned by the military. By timing the departure of radio signals from the satellites and their arrival to receivers like these, we can derive a vectored distance between the two. Since we are observing the vectored distances of many satellites simultaneously, and since the position of the satellites is known very precisely, we can derive the position of this receiver. Thus, I can move it about much like the prism rod and it knows where it is. I can record positions on an attached data collector, very similar to the transit. I should add that this GPS system costs around $25,000 and is much more precise than the hand held units that outdoorsman use and that may be embedded in your family car. With GPS, we don't have to be in sight of the transit. We can just walk down the road and collect positions, we can walk 10 miles if we want. We do have to be open to the sky, however, so in heavy forest it is still better to use the transit. GPS is indispensable out in the western, big sky states.

That is a summary of the measurement part of what a LS does. But that is only half the story. The other part involves determining property rights, determining boundary lines. This involves searching carefully through deeds and previous Ss which are stored at the county courthouse. These documents are part of the public record and everyone has the legal right to examine them and obtain copies. No one can secretly own land in the US. If you own a parcel of land then your name will have to be on record somewhere at the county courthouse or tax assessor for anyone to see. Anyway, we read the land description in the deed. It might describe the land as "beginning at the corner of Dogwood Ln and Main St and thence 150' southwest to a marked oak tree, thence 165' northeast to a rock with an X carved in the middle, thence 240' northwest to a fence corner." We take a copy of that description with us to the property and follow the directions around and try to find the oak tree, the rock with the carved X, and the fence corner. Sometimes the deed refers to an older survey such as "as shown by Bill Jackson's survey which was drawn in 1976 and which is filed in plat book 34 page 18." Then we take a copy of that survey to the property and follow the directions around the look for the physical corners called for in the survey. We find them and then locate them with the transit and prism rod. Back in the office, and increasingly now on the site with laptop computers, we compare our measured distance with what is called for in the deed or previous survey. We make our decisions, draw our Ss and present it to the client. And thus we help people understand what it is that they own, how much and where the boundaries of it are. (show a boundary survey with encroachments and discuss) (show a topographic survey with contours)

Some people get their land surveyed at the time of sale so that the new owner gets an accurate portrayal of what they are buying. Another time that people need our services is when something new is being built to ensure that the new building lies entirely on the subject property. Also, when new things are built, architects and engineers need to know what the land looks like so they can correctly design and build new buildings to sit correctly in place. They have to ensure that water drains away from the building and that driveways and parking lots and new roads are not too steep. In a nutshell, people rely on us to truthfully describe the land and to mark on the ground where the property line is so that people can know what they own. Because land and the development of land is such an expensive enterprise LS's are licensed by the state, similar to doctors, to ensure that the public is protected. To get licensed in Georgia requires some college and a long apprenticeship, and passing several examinations.

That is it in a nutshell. Are there any questions?