

Land Parcels in a GIS: Truths and Fallacies

How accurate are static maps?

By Joseph Paiva

With the advent of GIS, portraying spatial information, making custom maps, and doing various kinds of geographic analysis is steadily approaching the point where almost anyone moderately conversant with software and geographic concepts can turn out pleasing, detailed, and informative maps. But the adage “garbage in, garbage out,” (GIGO) still applies. Unfortunately, many people, corporations, and governments rely on this information to make conclusions or decisions about themselves or other people or entities. The lives of people, be it their finances, their environment, their happiness, or their safety may be adversely affected if the information upon which the maps and analysis are based is flawed.

When I tell GIS managers I am a land surveyor, the recurring comments I get go something like this: “I don’t understand why measurements made by surveyors on neighboring land parcels of common lines don’t always agree, and why don’t all the parcels we get from our local land records agency fit together neatly as in a jigsaw puzzle?” Such questions are neither easily nor quickly answered.

The portrayal of land parcels in a GIS may occur in the offices of a public utility or in a government office such as a tax assessor or county planner. Generally, these maps (I am referring to the maps that can be generated by a GIS after parcel information has been input.) are produced to replace paper maps that

have existed to help these institutions and agencies more efficiently discharge their work. There certainly is a legitimate place for these geographical information systems—regardless of whether they are on paper or electronic. But the GIGO principle applies, which may be because “official” looking maps can be generated by these systems that the uninformed regard as 100 percent accurate. In some localities the maps may even be used in lieu of property bound-

maps I described above are not reliable sources of information about property boundaries. The first reason is that boundaries are not static and can change. Property lines can be affected by such things as elements describing the property line that are contained in the deed, but which have been overlooked in the process of monumenting the line by building a fence or wall. Valid forms of unwritten title transfer can occur through adverse possession and prescriptive rights. Eminent domain, exercised by a government, a utility, and even private corporations that do not fall under the utility category, can also cause changes to a property line that may not be within the four corners of a deed. Most changes regarding formal actions to exercise eminent domain will, at least, be somewhere in the official public records of a locality. But the courts have also always recognized valid transfers of title that have *not* been recorded.

The layperson assumes that the description contained in the property defines the property’s extents. This is true, but only in a perfect world. The problem is that many other factors can influence a deviation from what a layperson may see as a clear cut expression of measurements to determine the boundary.

There may be a clear intent that is within the deed that conflicts with what is often referred to as “metes and bounds.” The metes and bounds themselves may be ambiguous. Metes means measurements; bounds are monuments,

ary surveys. It sounds like I am saying that maps carefully put together electronically by the same people who put together land parcel maps on paper are not to be relied upon for certain information about property lines. I am indeed saying that, and further saying that the paper maps were not a source of certainty about property boundaries either. But why?

Not a Static Thing

There are several reasons why the



natural objects such as rivers, and even abstract lines such as the boundary of a neighboring property, that may be called in to “bound” the property description. There may be junior and senior rights involved. There may be evidence such as monuments, occupation, and many other indicia that may only be found by collecting evidence on the site. There may be scrivener’s (writer of the legal description) errors and plating errors and surveyor’s errors. These (and many more) combine to develop a situation that only the courts may solve.

For example, Property Owner A owns a 40-acre tract of land. How does he know it is 40 acres? Well, that is because the person who sold it to him claimed it was 40 acres and Property Owner A can see that it is approximately so, because the tract is square and is about 1,320 ft on a side. He decides to sell the “North 15 acres” on January 1 of this year to his neighbor, Property Owner B, and on June 15th of this year, sold the “South 25 acres” to Property Owner C. There are many things that a surveyor has to determine. For example, at what direction must the dividing line go? The layperson only thinks of a square tract. But in reality, most 40 acre tracts are four-side polygons with non-parallel sides of varying length. And real problems occur when it is determined that the actual acreage is 39.2 acres. How can this happen? It could be due to measurement errors or gross assumptions about area made by the original surveyors (or original platters—the people who made a map for purposes of selling the land). Without getting into the matter of the direction of the line separating Property Owner B and Property Owner C, it turns out that Property Owner B has a senior right, and gets all of his 15 acres. But Property Owner C has a junior right and only gets what Property Owner A has left, up to the stated limit of 25 acres.

A similar problem may exist if it turns out that Property Owner A’s tract is actually 41.3 acres. In this case, Property Owner B gets his 15 acres, but Property Owner C does not get the remainder; he gets 25 acres. What can be overlooked is that Property Owner A still retains title to 1.3 acres, meaning that Property

Owner B and Property Owner C are not adjoining neighbors. Laypeople call these resulting problems overlaps and gaps, respectively, but in reality there is no such thing. Someone always owns all the land, even if it is the government, the original granting authority. But depending on where Property Owner B and Property Owner C decide to place a fence could be problematic.

The Surveyor’s Function

The courts have recognized that licensed land surveyors are the only legally authorized individuals who can provide to the landowner and the courts a physical location of the limits of ownership. This is done by researching the land records, examining the deeds and histories of title transfers of adjoining, finding and examining physical evidence in the field such as monuments (property markers), limits of possession, location of natural objects, etc. Then measurements are made and further analysis is done before a determination is made of the legal extents of the boundary. This determination is not final, as the courts can change it. But the process of making measurements is only one aspect of the surveyor’s job. In fact, in many ways, it may be the least important of the methodologies the surveyor uses.

In *Boundary Control and Legal Principles*, 3rd edition, Brown, Robillard and Wilson comment on the surveyor’s function:

“Courts of law interpret the evidence, meaning, and intent of legal documents used to describe land ownership and land boundaries. If surveyors are to correctly measure and lay out boundaries, they must know what the courts have defined as the meaning and intention of words and phrases used in land descriptions. Thus land surveying includes 1) the science of measurements, 2) knowledge of the laws and customs that define the boundaries of real property, and 3) the art of evaluating the evidence needed to **prove** the location of the boundary....”

Justice Thomas Cooley, a Michigan

Supreme Court member in the late 1800s, referred to the surveyor’s singular role as a “quasi-judicial” one. Cooley recognized that in many cases the surveyor weighed the evidence in a manner similar to that of the courts and then made determinations of boundaries. There is no group of people today who are conversant in the art and science of land boundaries that is legally authorized to determine boundary location except for land surveyors. When a map has been put together by parties who are not land surveyors, users of the map who are ignorant of the legal authorization given to land surveyors are taking an unknown risk. If they know of the legal authorization, then they are making it known that they understand the information on the map and what they do with that information is not related in any way to reliable property boundary location.

Parcels in a GIS

It is worth adding that *even* when a licensed land surveyor puts together parcel information in a GIS, assuming that the effort taken to make the map is similar to that of performing a land survey on every parcel in the map, that the information is only current at the time the map is made. Boundaries are not static and users of the information must always bear that in mind.

The purpose here is not to dissuade the construction of a GIS that portrays land parcels, ownership, or the rights of various parties. Rather, it is to recognize that uses of information in a GIS have to be limited to the quality of the data that was used to create the GIS. The quality of a database of linked data can only be as good as the worst of the data, similar in a way that the strength of a chain is only as that of its weakest link. GE

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