"Absolutely Relative"

Season greetings from the Armchair Geographer! While driving to work the other day, I started wondering about holiday visits from relatives, which led me to remember time was running out on the GIS Certification 'grandfather clause' and that somehow lead me to start thinking about relative and absolute positioning. This is something I have found myself dealing with in a daily basis in the GIS world, and it has all but become somewhat ubiquitous.

Most of the private surveyors that file new surveys or irregular tract divisions for our area of Nebraska tend to do this with very accurate **relative positioning**. What does that mean? They have surveyed and marked distances and angles (bearings) that are established in the field in some "cartesian" X, Y grid format. Therefore, when they measure and set a stake, rebar, or pipe at different corners they are very **accurate relative** to each other. (See Diagram 1)

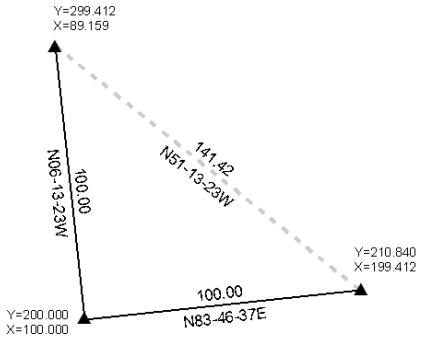

Diagram 1

Absolute positioning has become fairly simple with the advent and application of GPS receivers. In my view, absolute positioning is the establishment of a geographic feature to a real world coordinate, most usually latitude and longitude. Even simple hand held devices can give a fairly accurate latitude and longitude. Increasing the accuracy of the absolute position usually involves mathematically adjusting (vector "ties" in the geodetic world) by simultaneous measuring on a known geodetic control marker published by the National Geodetic Survey and performing complex mathematical adjustments with dedicated software. The result is an **accurate absolute position** that can be used as field control of any GIS project. (See Diagram 2)

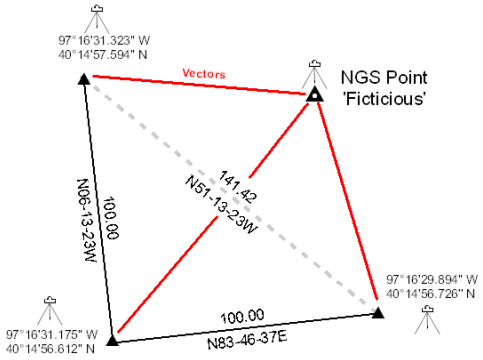

Diagram 2

The complexity of translating the curve linear Earth latitude and longitude coordinates has been simplified with the creation of **'projections'**. These are complex mathematical models to move geodetic coordinates to different positioning systems usually associated with a flat plane. Newer GIS software converts many datasets in various coordinate systems to a 'master' coordinate system (usually the first data layer input), but prior to the "on-the-fly" capability, some of you may remember the headache of mismatching coordinates and datasets (State Plane? UTM?? Which zone??? Which datum ????). This is where this author stands on his soapbox and asks his local GIS teachers to teach more geodesy despite the heavier math overload.

Moving the surveyed relative position into a GIS can sometimes be problem. The GIS is usually established in a projected coordinate system – implying of course absolute positioning. The surveyor usually assumes a field position and orientation other than what the GIS uses for its projection and/or datum. **Rotation angles** usually must be applied over the extent of the surveyed data to fit the **"relative accurate"** puzzle piece into the absolute accurate GIS. (See Diagram 3)

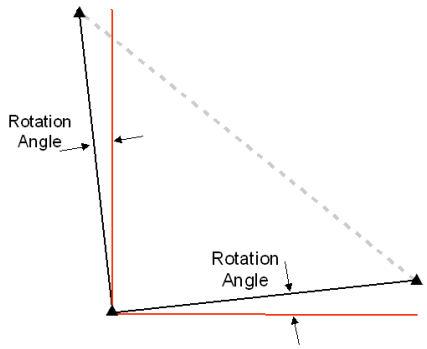

Diagram 3

Our last concern is "will the accurate relative position (survey distance and bearing) fit into the constraints created by the accurate absolute position (GIS)?" As always, the answer is … absolutely maybe.

Happy holidays and safe travels to all. May all your relatives be accurate. See you in April!
--Robinson, November 2008

(Ideas? Concerns? Email the Armchair Geographer at cfescr@yahoo.com)