Additional Concerns

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The September 2016 issue of Benchmarks contains the fourth of five articles written in the context of the NCEES effort to examine the Future of Surveying. This "Additional Concerns" article is the fifth and last article in that series. Subsequent articles will discuss items related to the proposed elimination of the surveying engineering program at NMSU.

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On March 30, 2016 Bill Hazelton posted an item on the NCEES Basecamp site citing concerns about possible misrepresentation of the surveying profession. He was responding to an item headlined, "Monuments Move – Landowners Lose*: A Surveyor's Dirty Little Secret*." The item is posted at:

http://www.usobserver.com/archive/march-16/monuments-move-landowners-lose.htm

I believe Bill's concern is legitimate and encourage others to read, study, and respond appropriately. We, the surveying profession, need to pay close attention to public perception of our work and activities. In addition to promoting our "brand" we need to protect the image of surveying in the face of efforts to discredit same. What is the best way to do that? I don't know.

In an earlier post I suggested that we should not promote "branding" at the expense of building capacity. I got into trouble by equating the consequences of such an imbalance as "hawking snake oil." That was an exaggeration, probably inappropriate, and offensive to some. I apologize again. I'd take it back if I could.

I continue to believe in a vision that the surveying profession can make a huge contribution to society in competent use of 3-D digital spatial data. Bill acknowledged same in his supporting comments to the "Why? Because!" article. I appreciate his insight but I observe that the future he describes is already here. I have a good friend employed by a defense contractor who is heavily engaged in tracking missiles and other objects. According to him, the 3-D geometry tools embodied in the global spatial data model (GSDM) are completely routine in defense applications. It will be interesting to see how soon (or if) the GSDM becomes the standard default software model for drones, intelligent vehicles, and other civilian airborne applications. Another reason for my optimism is that the GSDM includes both a functional model using geometry to describe location uniquely and a stochastic model for establishing, tracking, and using spatial data accuracy. That too is well in hand as illustrated in a traditional section breakdown (www.globalcogo.com/3DGPS.pdf). The body of knowledge required to use those tools can be routinely covered in a BS Surveying degree. I know BS surveying graduates who are running successful practices utilizing those 3-D concepts. But, Bill is quite right in that the GSDM is not yet mainstream because as he says, "other groups have their own agenda."

I've posted a lot of 3-D material on my web site. Everything is there. But, the material is much better organized in the book I wrote, "The 3-D Global Spatial Data Model: Foundation of the Spatial Data Infrastructure" published by CRC Press in 2008. The Preface and Foreword (www.globalcogo.com/preface.pdf and www.globalcogo.com/foreword.pdf) in the book provide background information about the content and concepts. And, yes, CRC Press has asked me to prepare material for a 2nd Edition to the book. I agreed to do so over a year ago and am deeply engaged in that task. Working on the 2nd Edition has made me even more convinced of the "golden" opportunity 3-D offers the surveying profession – if leaders (top-down) and users

(bottom-up) can both be inspired to embrace the challenge. The manuscript for the 2nd Edition was sent to the publisher October 31, 2016.

I have another concern to discuss and I don't really know the best way to do it. The "concern" Bill expressed has an obvious villain. In that case it is easy to express "righteous indignation" as appropriate. But, how do I handle it if the villain is my fellow surveyor and/or the state board of licensure? Those persons are my friends and respected colleagues – not really deserving the villain label. At the end of "Way Forward" (May 2016 issue of Benchmarks), I suggested that the NCEES should sponsor workshops devoted to use of 3-D spatial data issues. I still believe such workshops would be appropriate. That information is generic and strictly my opinion. But, the following is factual and specific.

Among others, the practice of surveying in New Mexico is governed by the Practice Act, Rules and Procedures, and the Minimum Standards for Surveying in New Mexico. The Minimum Standards are revisited from time to time to time - the previous published version is dated May 01, 2007. The Board invites input from the New Mexico Professional Surveyors (NMPS) and holds public hearings on proposed changes before the changes are adopted. Even though it is not possible to please everyone, the collective wisdom of many should be included in changes to the Minimum Standards. The Board has the responsibility of arbitrating and developing final wording prior to adoption.

Following is an example of changes to the section in the Minimum Standards on Basis of Bearing as presented by the NM Board in a public hearing prior to final adoption. While the integrity of board members is not questioned, the proposed changes illustrate a basic lack of understanding with regard to fundamental underlying concepts – especially with regard to use of map projections. Where and how is the public protected in the following?

(6) the basis of bearings used in the survey which shall be based upon: ~~a procedure such as a solar observation or geodetic control stations or a line shown on a prior recorded document and defined on the ground by existing monuments; the use of assumed bearings is prohibited;~~

(a) NM State Plane Coordinates with specifics to elevation, vertical datum, horizontal datum, zone, mapping angle, ground to grid factor used if using a modified ground system.

(b) A specific line between two pointes either found or re-established set points as shown on an existing filed plat,

(c) real geodetic control values based upon an OPUS solution or geodetic control station.

(d) A longitudinal line is acceptable based off GPS observation or other means for determining the longitude of a bases of bearings as long as the longitudinal value is published on the survey with the method used in determining the longitude. "GPS North" or similar notations without explanation as described above is unacceptable. "Assumed bearings" are prohibited.

Comments:

1. If NM State Plane Coordinates are used as a basis of bearing, the elevation and vertical datum have absolutely nothing to do with basis of bearing.
2. The grid to ground factor has nothing to do with bearings whether using state plane coordinates or a modified ground system.
3. An OPUS solution provides "approximate" geodetic coordinates for a point – not a line. An OPUS solution might be used to identify that point on the survey where the meridian is referenced to true north. But neither OPUS nor a geodetic control station provides a reproducible direction of a line to be retraced.
4. You don't need to know the longitude of the point where true north is selected. Subsequent surveyors just need to know at what point on your survey you held the true meridian.

The following articles were printed in the NMPS Benchmarks several years ago and readily available to both the NMPS Minimum Standards Committee and the NM Board.

http://www.globalcogo.com/Basis-of-Bearing-and-Summary.pdf

My point is that both practicing surveyors and board members have, in this case, demonstrated a woeful lack of understanding of fundamental principles. Many surveyors are dedicated to the profession and understand land ownership/legal principles. But society also has a reasonable expectation that something as fundamental as basis of bearing can be handled competently by a licensed professional.

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Postscript:

Several items to update this article include:

1. Bill Hazelton posted comments on this article on the NCEES Basecamp Forum page. In his comments he noted that the current ALTA/NSPS standards identify a defect in the proposed use of Relative Positional Precision. I concur with his assessment and followed up with a "nerdy" response showing how the GSDM does cover that circumstance with the "local accuracy" computation. Both Hazelton's comments and my response are included in the post at www.globalcogo.com/ALTAandNSPS.pdf.

2. The NM Board of Licensure published "Minimum Standards for Surveying in New Mexico" dated July 24, 2016. I have formally objected to the wording in the Minimum Standards that include irrelevant, extraneous inclusion of elevation into the specification for basis-of-bearing. It is my earnest desire that the BOL would, on their own, initiate revisions to the Minimum Standard to make them grammatically correct and to reflect the collective wisdom of the NMPS.