

Threads Posted on NCEES Basecamp Forum Discussion Site

(Combined by Earl F. Burkholder – April 25, 2016)

Something of real concern

Posted by Bill Hazelton on Mar 30



The Item of Interest

I just popped out to get the mail, and in it there was a 'newspaper' addressed to 'Postal Patron' (which I suppose beats 'Occupant' as a nickname). The particular publication, yclept "US Observer," had a front-page teaser headed 'Land Theft' and titled "Monuments Move — Landowners Lose: *A Surveyor's Dirty Little Secret.*" This had a part-paragraph, and then continued on page 11. The picture was of a Topcon total station on a Leica-looking tripod standing alone in some quite pleasant-looking rural setting. The on-line version has someone running what appears to be a Wild T2000 and DI-2000, but it could be a similar instrument.

The gist of the article is that a surveyor in Idaho is alleged to be running a scam whereby he claims that the BLM marks are erroneous and proceeds to move monuments around. This has resulted in the loss of 40 acres from one concerned landowner, and there may be something in the allegations. The surveyor is named: Hunter Edwards of North Idaho, along with his father, are accused of creating this 'scam.'

Now if this were all that the article discussed, then I wouldn't worry too much about it. Given that the lead front-page story is that Schaeffer Cox of Fairbanks, AK, was framed, I wouldn't give this paper a huge lot of credence. And there are always cases where a client is unhappy with a survey. But the majority of the article could only be described as almost defamatory to the surveying profession as a whole, as it implies that many more surveyors are doing the same trick, based on interviews with a number of 'professionals.'

The article claims that surveyors are facing a huge fall-off in business since the 2007 crash, and have turned to this monument relocation exercise as a way to generate money. I don't know about surveyors in North Idaho, but in Alaska they are working like mad, and have no need to create work. (That may change when the state's \$4bn deficit

bites, but for the moment, it's so busy that some of the local GIS-focused graduates have taken surveying jobs!) But the accusation is of totally unprofessional behavior, robbing their clients (and the public), damaging the land ownership system and its integrity, and breaking numerous laws; and not just Mr. Edwards, but the profession in general.

The article mentions Jeffrey Lucas in the first paragraph, but not in a way that suggests anything beyond looking at his published articles. He is the only real person outside the aggrieved landowner and the surveyor named in the story.

This article embodies some of the usual excesses of yellow journalism. It extrapolates one case to the entire profession. It cites and names no-one who spoke to the reporter (Will Goode), beyond the aggrieved landowner. It develops an elaborate conspiracy around supposed widespread efforts to rob people of land and surveying fees. It states "The reality is that there is not one consumer in 10,000 who understands what surveyors do; which makes them easy prey for surveyors to commit the crime of property theft by fraud," which indicates we have not done a good job of informing the public about us and conveying that we care enough about what we do to maintain our professional integrity. That the comments with the article so readily damn surveyors, again with little more than the accusation of collusion between various professionals to back them up, indicates that we need to get the message out far more widely than just for recruitment.

The suggestion that 'Starving Surveyors' are destroying the cadastral system with fraudulent surveys to keep themselves in work is clearly ridiculous. To sell one's professional soul for just the fees is very poor recompense. There is no suggestion that the surveyors are getting the land, although there is a veiled hint that neighbors (or someone) is paying them in the footer of the article (and that this will be exposed soon). But even then, how lucrative can it be?

You can find the article here: <http://www.usobserver.com/archive/march-16/monuments-move-landowners-lose.h...>

Working Backwards

A subsequent look into some other details found an earlier US Observer article on the same issue. This one, by Edward Snook (who may be the editor of the paper) in the November, 2015, issue, titled "Idaho Board Charges Surveyor Chad Erickson," is a better written piece. It provides a step-by-step accounting of the process, names names and what people did, as well as keeping the business totally focused on the case. The Board

is commended for charging Erickson, and nothing implies that the problem extends beyond the four surveyors named in the article. This article states that Jeffrey Lucas was hired as an expert in one of the litigation actions in this whole business.

This earlier article can be found here: <http://www.usobserver.com/archive/nov-15/idaho-charges-erickson.htm>

Previous articles on this case include ones from:

June, 2014: <http://www.usobserver.com/archive/june-14/walker-property.html> and <http://www.usobserver.com/archive/june-14/usobserver-ed2-num29-june14-vWEB...> "Alleged Fraudulent Survey Creates Nightmare for Landowners"

May, 2015: <http://usobserver.com/archive/may-15/dysfunctional-idaho-surveying-system.h...> and <http://www.usobserver.com/archive/may-15/usobserver-ed2-num34-may-15-vWEB.p...> "'Dysfunctional' Surveying System in Idaho Walker's Surveyors, 'Ethics' and the Board." (This was a front-page article with the heading "Land Theft Spotlight.")

January, 2016: <http://usobserver.com/archive/jan-16/usobserver-ed2-num37-jan-16-vWEB.pdf> "Idaho Surveying — A Literal Mess: Surveyor Chad Erickson Charged" (Front page under heading "Land Grab", and on page 11. This is the same article as in the November, 2015, on-line version.)

A version of the November, 2015 article, detailing the charges, appears here: http://www.fourwinds10.net/siterun_data/government/law_enforcement_and_poli...

It seems copies of some of the articles are also to be found in various similar websites.

All of the previous articles are by Edward Snook, and all are completely focused on the case in question. The May, 2015, article reports interviews (by phone) verbatim, and asks some very pointed questions about the behavior of the various actors. Whatever the merits of the case, the articles focus only on the case and the various actors. The people interviewed are named, and Edward Snooks (billed as an investigative reporter) seems to be providing as factual an account of his investigation as he can. Some of the claims about what is covered by 'surveyors ethics' seem a little far-fetched to me, especially as some states may say the complete opposite in their statutes and regulations (e.g., re the claim that providing survey information to an adjoining owner is unethical, Oregon's ARS 672.047 (3) specifically allows this), and I suspect that some other such claims may be shown to be exaggerated. That said, at no point does Mr. Snook suggest that any surveyor outside the four accused of unethical and illegal behavior is involved in similar activity.

[Two asides. It seems that someone anonymously forwarded a copy of the May, 2015, article to the Oregon Board, but the Board found that there was no basis for a complaint that they could do anything about. Chad Erickson appears to be a semi-regular contributor to *American Surveyor*, as well as having presented at a couple of west-coast surveying conferences in recent years.]

However, the most recent article, March, 2016, by Will Goode (a suspicious name that cannot be readily traced), goes far beyond the Walker case and its various actors by implying that the type of behavior discussed in these articles is widespread. It attempts to justify this extrapolation using claims that are questionable at best, false and scurrilous at worst. It doesn't name sources, or even number them, and could be read as being as much innuendo as anything else. A conspiracy theory helps make this even less credible to thinking people, but those are not necessarily the ones who read these kinds of papers.

Should you wish to comment on this article, you can contact Edward Snook, who appears to be the editor of US Observer, at the following e-mail address: editor@usobserver.com

Also a Concern

Posted by Earl F. Burkholder on Apr 18



Like many reading this board, I did not have a good reaction upon reading Bill Hazelton's concern about undeserving bad raps the surveying profession gets from time to time. I too have a concern, but mine is more sensitive because there is no external villain. If I did not care deeply about the surveying profession, I would not share my concern.

I held off posting for more than a week because I needed to verify details with the NM Board of Licensure. Even so, I take full responsibility for the content. Any errors are mine. Help me learn more about the best way forward and to build capacity in the process. Thank you.

The following item was attached to the post by Earl F. Burkholder on April 18, 2016.

Additional Concerns

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April 4, 2016

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](#). 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](#) 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. Status of the 2nd Edition can be monitored at www.globalcogo.com/SecEd.html.

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 [NCEES-WayForward](#) article posted on March 3rd under the "Land Surveying is Boring" thread by Bill Hazelton, 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 most recent 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.

Posted April 19, 2016



Bill Hazelton

This is where we see the villain and he is us, paraphrasing Pogo. Earl's points are all well taken and very much to the point.

An unfortunate consequence of the rapid arrival of new technology, combined with its requirement for a deeper theoretical understanding, was that those without a sound foundation would be left behind, in many regards. This is aggravated by the 'aging' of the profession, in that we have far too few younger professionals who do have the theoretical understanding to spread it through the profession as a whole. This has been a serious problem for the US surveying profession for many years, and not just in this specific case. Geodesy is a bit counterintuitive when viewed from the outside. The view from the inside is very different!

In the wider geospatial field where there is a better understanding of new technologies and their associated theory, the GSDM is simply a sensible and logical approach to getting work done. It fits in nicely with 3-D and 4-D geodesy in general, and GNSS in particular. But making that step from outside geodesy seems very difficult, so few make it voluntarily. Map projections is not a simple field, and messy when viewed from the outside as well.

'Building capacity' can be thought of in two ways, if I may suggest it. One is building the numbers needed, while the other is building the knowledge and understanding to do the work in today's rather different circumstances. If we have a strong education process for new surveyors,

then any efforts to build numbers will help with building knowledge and understanding. But we do need to bring many current members of the profession up to speed with new technologies and what sits behind them. [The rationale is that knowledge and understanding are necessary for professional capabilities, while more 'operator' skills are sufficient for technician level proficiency. That is hard on technicians, but we may consider this to be at a minimum level of competence.]

We have serious problems with our education system for new surveyors, not from any lack of will or capabilities on the part of the faculty, but because of the education system we have created. By making it, in essence, state based, we have kept the programs small and under-resourced, so that most of them are eternally close to existential crises. Given that the differences between states' needs amount to no more than the equivalent of two courses, this is a major handicap for minimal advantage. Further, by forcing a focus on traditional surveying, we have made ourselves poorly prepared for the shift to image-based and image-analog-based technologies, which are now over half of new equipment and techniques for data collection. We aren't well prepared for that in most programs. We talk a lot about drones/UAVs, but we can treat these as just another platform and focus on the sensors, together with the how and why. The sensor is the important piece to understand, as that is the actual measurement tool.

But back to Earl's concerns. We need to educate our profession in many ways in this process, and for many reasons. We need to draw attention to not only poor descriptions of the profession in the wider press, but also to issues that come up within the profession. In addition to Earl's example of the NM regulations, there is a similar problem in the 2016 ALTA-NSPS standards, because a least squares adjustment, correctly weighted or not, does not give 'Relative Positional Precision' between various points in an adjustment: it provides Relative Positional Precision with respect to the points held fixed (it gets messier if the 'fixed' points have precisions associated with their positions). With a regular adjustment, this means running the adjustment multiple times with each corner point held fixed in turn (as the one fixed point, thereby needing multiple unconstrained adjustments to resolve this issue in basic cases). I am not aware of any commercial LSA packages that do the full 'Relative Accuracy' computations to calculate Relative Positional Precisions for all the points in the survey relative to each other. I'm glad to see the error of a 95% confidence level being equated to two standard deviations has been removed in the 2016 version: this is the 1-D case, not the 2-D case required here for error ellipses.

Posted Tuesday at 1:52pm

Nerdy Stuff



Earl F. Burkholder

This Basecamp web site provides for excellent exchange of ideas. Thanks again for the opportunity to participate.

Specifically, in response to Bill's comments about the ALTA-NSPS standards, I've prepared some comments. A word of caution, don't read it if you don't like "Nerdy" stuff.

Posted Wednesday at 4:58pm

Date: April 20, 2016

TO: Bill Hazelton and
Readers of the NCEES Basecamp Forum on the Future of Surveying

FROM: Earl F. Burkholder

RE: Comments on Spatial Data Accuracy and the ALTA-NSPS Standards

This item is written specifically in response to Bill Hazelton's comments posted in response to the item I posted "Also a Concern." Maybe I should have just sent it only to Bill because he is the one who raised the issue. Quite possibly, few (if any) others will be interested in same. But, I believe in transparency and I would rather let you, the reader, choose to ignore these comments than to make that decision for you by not letting you see it – your call, not mine!

Specifically, Bill notes the inclusion of Relative Positional Precision in the 2016 ALTA-NSPS standards. In my opinion, Bill is right on. But, here again we, the "nerdy" surveyors, can make a significant contribution to consistent efficient use of 3-D digital spatial data – in this case, spatial data accuracy.

From my perspective, the spatial data accuracy discussion is in terms of network accuracy (with respect to the control points held in the adjustment) and local accuracy (with respect to adjacent or other points in the survey or data base). As I understand it, the authors of the ALTA-NSPS standards intended to address local accuracy and, as Bill points out, there is a discrepancy in their nomenclature. Without faulting others choice of words, it may be that a clarification in a subsequent version of the ALTA-NSPS standards will be appropriate.

Yes, I continue to promote adoption and use of the global spatial data model (GSDM) which includes spatial data accuracy as part of the stochastic model. And I will agree again with Bill when he notes that the view from "inside" appears much simpler than from an external view. But, learning more about the inside view is part of that thing called continuing education and capacity building. Having been both

inside and outside, I'll suggest that learning the inside view from the perspective of the GSDM is not nearly as intimidating or as much work as might be suspected. I've seen any number of undergraduate students handle same with aplomb. I will also admit that, when attempting to differentiate network and local accuracy, the whole issue can become rather involved.

1. Basic assumptions (you may have seen it before) underlying the GSDM are:

- <http://www.globalcogo.com/BasicAssumptions.pdf>

2. If you wish to really dig into the GSDM, links for various parts are:

- Functional model: <http://www.globalcogo.com/gsdmdefn.pdf>
- Stochastic model: <http://www.globalcogo.com/fsdagsdm.pdf>

3. Specifically, with regard to Network Accuracy and Local Accuracy, several items may be of interest:

- Rigorous Estimation of Local Accuracies, T. Soler and D. Smith, Journal of Surveying Engineering, August 2010, vol. 136, No. 3, pp 120-125.
- Discussion (Burkholder) and Closure (Soler/Smith) of "Rigorous Estimation of Local Accuracies," Journal of Surveying Engineering, February 2012, Vol. 138, No. 1, pp 46-48.
- The following item is a follow-up to the ASCE Discussion/Closure item and includes several important conclusions:

<http://www.globalcogo.com/StdDevLocalNetwork.pdf>

- A. The network/local accuracy material in the book, "The 3-D Global Spatial Data Model" is correct, complete and rigorous. The assertion made by Soler/Smith appears to be legitimate under certain circumstances but breaks down specifically as the network accuracy of the "control" points grows – up to 5 meters in cases shown.
- B. That Local Accuracy can indeed be obtained using the off-diagonal parts of the covariance matrix of a least squares adjustment. This is the Relative Positional Precision as named in the ALTA-NSPS standards.
- C. The paper also shows that Local Accuracy can be still obtained although the Network Accuracy of the "fixed" control is deficient – even if based upon an OPUS solution (+/- 0.010 meters) or a mapping grade code phase solution for the control point (say +/- 5 meters).
- D. A map of the network (9 different CORS in Wisconsin) is shown on the last page of the article above. Documentation for the entire project is given at:

<http://www.globalcogo.com/WisGPSNet.html>

- E. A computer printout of the “network” and “local” accuracies of each pair of points (not just the directly connected points) is available at:

<http://www.globalcogo.com/NetworkLocal-results.pdf>

- F. A comparison of accuracies for various scenarios is posted at:

<http://www.globalcogo.com/AccuracyComp.pdf>

The scenarios include holding control point values (network accuracy) at 0.002 meters, 0.010 meters, 1.0 meters and 5.0 meters. The comparison also includes examples between directly connected points and between points that are not directly connected. In all cases, the local accuracy reflects the internal quality of the network used and is fairly constant. The network accuracy of the points and between points suffers as the quality of the control points is degraded.

Yes, the GSDM has much to offer and the surveying profession has much to gain by adopting and using the GSDM. But, like stated in the 2011 item written for the Western Federation of Professional Surveyors (<http://www.globalcogo.com/WestFed.pdf>), it will take time/effort to realize those benefits.

Bill Hazelton

Maybe we need a geospatial version of 'Revenge of the Nerds' as a recruitment tool... Nah, we need something beyond that, to cover the full spectrum!

But the more I think about the GSDM, the more I think it is a critical piece, not only for day-to-day use, but more importantly in thinking about what's happening. It's definitely something we need to adopt, but we need to do so in a way that integrates it across the geospatial discipline.

Let me work on that for the next book....

Posted Wednesday at 7:11pm - April 20, 2016
