Every man is a debtor to his profession.

Surveying is fraught with danger!

Photo Credit: David “Jebediah” Holland

This Issue:
3D Digital Terrain Models • Practical Location • Surveyors and Minutemen

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I have been creating computerized 3D construction layout data using TIN (Triangulated Irregular Network) since their arrival on the market in the 1980s. As total stations and data collectors evolved, my topographic fieldwork shifted from the transit and rod using the grid method to gathering and processing electronic data. In the late 1980s, I began to compute 3D data from 2D design plans in the office to compute data for the survey crews utilizing the process of electronic radial stakeout on construction sites. Throughout the remainder of the 1980s and into the 1990s, we saw the utilization of computers, software, and total stations grow tremendously and completely transform our industry. Solid horizontal and vertical collimation techniques were introduced to the field crews and we began electronic grading by trigonometric leveling techniques and electronic cut sheets to supplement the electronic stakeout. I purchased my first GPS/RTK system in 1996 for my own land surveying business and began electronic stakeout by inclined planes + geoids using global positioning instead of total station radial methods. In 1998 I was introduced to a 3D system on a Grader called Blade Pro 3D. This system was dependent on computerized road parametric but it could also grade by interpolation of a TIN Surface. The horizontal and vertical positioning was handled by a robotic total station. I saw this as the future of construction stakeout and with my background in TIN Networks becoming a 3D Data Prep provider was a natural fit for my company. In the year 2000, GPS was added to the Blade Pro tool box and off we went. I believed at that time it would take the design community no more than five or six years to shift from Computer Aided Drafting (CAD) to Computer Aided Design with Drafting (CADD) as an automated product of the design. But for a very few exceptions, this acceptance has not taken place. And even the few exceptions have disclaimers regarding the use of their TIN’s and are too risky to use in the field.

In taking a closer look at this situation, in order to position my company for the years ahead, I have changed my original way of thinking and now accept that all Digital Terrain Models are not created equal -- there are 3 different Qualities to 3D Digital TIN Surfaces:

- **ESTIMATING QUALITY**
  3D data developed for estimates does not provide the accuracy necessary for design and construction. This is true because most estimators are under pressure to bid a project they may not get. There is absolutely no reason to put more time into a 3D model for a bid. After all it is called “Estimating.” I have seen a few contractors use these TIN Surfaces to rough grade and then bring in the surveyors for finish grading stakeout. It is better than no AMG equipment at all but it falls far short of exploiting the investment.

- **ENGINEERING DESIGN QUALITY**
  Engineers are under pressure to design a project quickly, have it meet codes and compliance, and get approved. They are a part of the construction and development project that can be very fluid as far as revisions go. This seems to be even more prevalent with the increase of design/build projects. Usually the 3D TIN surface is good for conventional stakeout and grading, but falls far short of the precision required in today’s Automated Machine Guidance systems.

- **CONSTRUCTION QUALITY**
  If the engineered design is to be conventionally staked and graded, with stakes +/- every 25’, and the use of string lines to help in grading, then engineering quality 3D models can be satisfactory. If Automated Machine Grading is to be utilized then you need a certain precision added to the model as AMG equipment does not “eye ball” or “field fit”. AMG will build it wrong very accurately. The standard AMG machine with GPS can get +/-1’ out of the box. We have seen that cut in half as operators master the tool and learn more hydraulic tuning skills. Also, the GPS and satellite systems are becoming more robust every year. With a tight machine, the proper training and a good skill set, you can improve the accuracy to 1/4 inch with a total station or laser augmentation.

This equipment now requires 3D models that are accurate to ¼” throughout the design to meet these standards. This brings up the questions of: 1) when should the 3D model shift from engineering accuracy to construction precision, and 2) who should generate the 3D construction model? To answer these questions I am going to outline the thought process that contractor clients and I use in making our decisions.
PRESIDENT’S MESSAGE

The year is half over and it has been a busy time for me serving as your president. I attended the Fairfax County Apprenticeship Graduation Dinner hosted by the Mount Vernon Chapter. Eight young surveyors graduated from the five-year program that night and are going to be fine additions to our profession. This program is one that has constantly over the years given new surveyors a place to go for a surveying education. This program is staffed by volunteers who quietly give a large amount of their time back to the surveying profession and deserve our thanks.

I also attended the South Carolina convention in Hilton Head. The Annual Membership is conducted very much like ours. The South Carolina Surveyors have many issues in common with us. They are concerned with the economy and how that affects the well-being of their members. One new issue I found of interest was their state’s definition of land surveying. The Committee Chair for their State’s Licensing Board augured that even construction surveying should be under the preview of a licensed surveyor. I’ll follow those developments closely.

Most of my email traffic is by far the issues surrounding LightSquared and the effects on our profession. A news article in the Washington Post talked about issues that Caterpillar, John Deere, and the aviation industry would have with the interference of the GPS signal. No mention was made about surveyors and their equipment. Is it possible someday we will be without survey grade GPS equipment? Will any industry compromise include surveyors? Will we have to purchase new equipment with new technology to work around this problem? If you ever wonder what your Association can do for you, this is it. There are members who are meeting with elected officials, advising members which elected officials to contact, and sharing information from all types of news services. This controversy could very well drag on for some time. I urge each member to stay informed.

That’s it for now, hope to see you at our next quarterly meeting.

EDITOR’S NOTE

Well, it’s the summer edition of The Old Dominion Surveyor and hopefully everyone will enjoy reading our magazine relaxing by the pool! That being said, we really need input from all of you that read and enjoy the magazine. Please send us (Judy or I) your articles, opinions or anything you think would help improve the magazine. The next edition will contain a section I will call Surveyors profile. We will pick a member of our organization and give you some background on that person you may or may not know. So, if you’d like to be the first or would like to nominate someone else, let me know. Have a great rest of the Summer!
We focus on what we are trying to build and what the required accuracy will be. This will determine the time and effort involved in 2D to 3D data conversion. Heavy highway construction usually requires more effort than site and development projects.

We look at how much AMG equipment will be utilized on this project and the skill level of the operators. There is no sense in paying for the creation of data that will not be used because of lack of AMG equipment and poor skill sets. Some operators refuse to capitalize on all the “tool” can do for them.

We determine whether the design team create a model for use on this project or if we have to make our own. If the model was created as a by-product of design and the owner wants us to use it with no disclaimer’s, then I can convert it to the particular machine control system and we are ready to go. If the model was not made or cannot be trusted, it is best to build it from scratch. I have found that all of the quality control is in the creation of a 3D model. You can never get to that total level of comfort just by checking a model made by others. The cost of inaccurate construction is too great to skimp in this area. The creation of a good 3D model cannot be over-emphasized. The time spent solving conflicts and problems in a virtual construction environment on a computer before the iron and construction personnel hit the ground, the better. It is much cheaper to fix the problem beforehand. Also, the 3D model conversion is not a separate cost. It is already accounted for in the standard survey budget. If you use conventional methods, you have money for stakeout, if you use AMG, the money you save on reduced stakeout is applied to the creation of the 3D model which is ALWAYS less than the stakeout budget anyway. My clients have never had a survey budget increase by the use of AMG. The largest return to the contractor still remains in the field by eliminating re-work and increasing productivity. Just as the quality of good 3D modeling data can increase the bottom line, a poorly created 3D model can decrease it.

So, in response to the first question, quite simply, the 3D model should shift from engineering accuracy to construction precision after final plan approval but prior to construction. With regards to the second question, we have learned that a 3D model builder for AMG needs a certain skill set. One that includes:

a. field construction experience,

b. engineering experience with the ability to improve the design from a constructability point of view and still meet design intent without jeopardizing the approved plans, and

c. the measuring skills of a surveyor to maintain accuracy vs. precision and ensure there is no error accumulation on large sites particularly highways with long linear features.

In recent times so many universities teaching civil engineering have dropped the survey component and do not require field construction internships of their graduates. The students have no chance of gathering the experience required for precise model building. The best model builders today come from construction surveyors, construction engineers and experienced construction layout foremen who have solved these issues on real world projects. If you know construction, I can without difficulty, train you how to use computer software. On the other hand, to teach construction to a computer technician is a much more daunting task.
We’ve added a lot more capability.
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Practical Location
Knud E. Hermansen and Robert A. Liimakka

Practical location is an equitable doctrine allowing parties-in-interest (e.g., adjoining neighbors) to fix the location of their common boundary in a location that may differ from the location where a surveyor would place the common boundary.

Equity jurisdiction permits courts to recognize a boundary location where certain elements exist. Equity has long recognized that a line of peaceful possession or occupation, in certain circumstances, established without fraud or deceit should not be disturbed.

The first element generally required for practical location is that the record boundary be vague or unknown. Some states require that this boundary be vague after examination by a competent surveyor. The remaining states only require that the boundary be vague or unknown to the parties-in-interest. The purpose for this element is to prevent parties from usurping the legal requirement that parties alter the location of their record boundaries by written instrument. By requiring the boundaries be vague or unknown, the legal fiction is created that the parties-in-interest have not altered the location of their deed boundaries. Rather, the parties-in-interest have fixed a definite location for the boundaries described in their respective deeds.

The second element is that the parties-in-interest by their acts fix the boundary by definite monumentation. While corner monuments are sufficient, also acceptable are fences, walls, building lines, etc. This element is to insure the boundary location does not continue to migrate and be a source of dispute. It also provides actual notice of where the parties-in-interest have fixed the location of the common boundary. The parties-in-interest can not claim to have been misled as to the location they have fixed.

The third element required for practical location is that the parties-in-interests’ conduct and actions (or in some cases lack thereof) show recognition that the boundary so located by the parties-in-interest is recognized and accepted by the parties-in-interest as their boundary.

Finally, most courts have further required that there be either: 1) recognition for some length of time (usually the statute of limitations) or 2) some loss would be suffered by a reliant party if the deed boundary were upheld or 3) the practical location falls within the realm of possibility for the location of the deed boundary (though maybe not the location chosen by a competent surveyor). Without this last element, most courts would be reluctant to change the location of the record boundary fixed by a surveyor since there is no compelling reason to adopt a location other than the record location.

Consider the following example where practical location may be recognized:

John and Jim are adjoining lot owners. One summer day while both are doing yard work they begin discussing where their common boundary is located. Neither is sure. After drinking a couple of beers they decide that the best and least expensive way to determine their common boundary is to split the frontage (after all, they believe, they have the same size lots). John goes to get his plastic tape and Jim goes to get some old metal posts he has. Together they split the front and back distance and place the metal posts in the ground to mark their corners. For the next ten years they each respect the metal posts they set. Jim builds a new garage based on the metal posts marking his boundary. John passes away and his daughter obtains the property upon John’s death. She has the property surveyed and discovers the metal posts are three feet on her (deceased father’s) property. She demands Jim respect the surveyor’s monuments rather than the metal posts. Jim’s garage would be in violation of the set back distance required by municipal zoning if the surveyor’s opinion is determined to be the correct location of the common boundary.

In the example, the surveyor hired by the daughter should locate the record boundaries based on a complete and comprehensive evaluation of the evidence within the framework of the rules of construction. It is not the duty of the surveyor to determine if a location by practical location has been fixed by the parties-in-interest. However, the surveyor would have been wise to inform the daughter that the metal posts established by her father and Jim may now be the ownership boundary based on the doctrine of practical location or equity. Of course, it would be up to Jim to prove each of the elements of practical location in order to have the metal posts recognized as the location of the common corner.

The daughter’s surveyor may want to consider wording such as the following in a letter or report to the daughter:

I have established the location of your common corner based on the best available evidence with due consideration to the rules of construction established by the court through precedence (stare decisis). My opinion conflicts with metal posts that appear to have existed in its location for some time and have been recognized as a monument to the corner. I do not know the history of the metal posts or how long the posts have existed. Under certain circumstances a court would recognize these posts as the corners even though it is not cited as a monument to your deed or is located where your deed description would place the common corner. Much like a person that makes a mistake on their taxes ten years ago, the court is often reluctant to unsettle what has appeared to have been an innocent mistake in the past. Seeking the counsel of an attorney will give you a better explanation of the law and your chances of success should a dispute ensue.
The doctrine of practical location can be useful foundation for the surveyor’s opinion in the situation where the location made by the parties would reasonably coincide within the realm of possibilities for the location of the record boundary.

Consider the previous example and assume that Jim’s deed called for a frontage of “200 feet more or less” and John’s deed called for a frontage of “200 feet more or less” and the situation the surveyor discovered was the following:

As the diagram shows, the metal post falls within the realm of possibilities given the vague deed description (though not an equal allotment of the excess). While the post may not be where a surveyor would place the common corner, the post does fall within the realm of possible locations fixed by the deed description. As such, the courts would tend to favor the position of the post as the deed corner simply because the parties-in-interest have historically done so.

In this situation the contents of the letter or report may state the following:

I have determined your common corner is the location fixed by an existing metal post. There are three factors that support this decision. First, the metal post has existed for some time without apparent dispute or disagreement as to its location. Second, predecessors in title have appeared to recognize the post as marking the location of the common corner. Finally, there is reasonable compliance between the position of the post and with the deed description given the loose and imperfect description (e.g., “200 feet more or less”). Under the circumstances, the courts often presume that the post location is a practical and reasonable location monumenting the common corner location intended by the original grantor.

Practical location is similar to the equitable doctrine of acquiescence. The major difference is that practical location requires the parties-in-interest all participate, while acquiescence requires only one party act while the other parties-in-interest acquiesce to the acts of the one party.

Some commentators equate practical location to a boundary by unwritten agreement. The difference between practical location and agreement is subtle and not always clear (some courts do equate the two doctrines). For an agreement the law requires an offer, acceptance, and consideration. In other words, an agreement requires a bargain fairly reached where each party derives some real or imagined benefit from their bargain. These elements are not required for a boundary by practical location. As a consequence, an unwritten agreement is appropriate where the parties are placing the boundary in a location different from what they know or perceive to be a location fixed by their respective deeds.

Knud is a professor in the Surveying Engineering Technology program at the University of Maine. He is also a consultant on boundary disputes, alternate dispute resolution, land development, real property law, and access law.

Rob is a professor in the Surveying Engineering Program at Michigan Technological University. He is a professional surveyor and holds a MS in Spatial Information Science and Engineering from the University of Maine, Orono and is currently working on a doctorate in civil engineering.
64th Annual VAS Convention

Our 2012 convention in Williamsburg will be January 26th thru the 28th. Just to bring everyone up to speed on the planning thus far, the following will be features of the 64th Annual Meeting of VAS.

Thursday will see two four-hour seminars and the afternoon will be our Board of Director’s meeting. The Ladies can shop at the Prime Outlets in the morning and return to the Williamsburg Inn for Tea in the afternoon. This year’s Spouse Program will gather both Thursday and Friday and both days will be leisurely and a la carte. To wrap up the day, the President’s Reception will be held in the exhibit hall where everyone can socialize and shop for the latest technology at the same time.

Friday the spouses will enjoy the DeWitt Wallace Decorative Arts Museum, Abby Aldrich Rockefeller Folk Art Museum, and Bassett Hall. A tour, tasting, and lunch at the Williamsburg Winery will wrap up their morning.

Surveyors will get a choice of two eight-hour seminars for those needing CEUs and then an evening of fun and fellowship for all. The marquee event will kick off with a cash bar which will lead into our Annual Banquet. This year, we will install all the officers, recognize out-of-state officers and other dignitaries, award the plat contest prizes and other special presentations, and enjoy a great meal together. Wrapping up our evening will be “Casino Night.” This event isn’t just for those who see themselves as “gamblers,” but it is a great time to mingle and unwind. The dealers are very helpful and entertaining.

Saturday’s Annual General Membership meeting will conclude our convention. Since we are not having the luncheon this year, we will probably start the meeting around 9:00 a.m. so as to not roust anyone out too early who may have really enjoyed Friday night. Below is an outline of the seminar planning thus far:

**THURSDAY**

Tech I: 8:00am to 12:00pm
Bob Gilliland, CPA, Action Coach
*Business Principals for the Virginia Surveyor*

Tech II: 1:00pm to 5:00pm
David Doyle, Geodetic Surveyor, NGS
*Modernization of the National Spatial Reference System*

**FRIDAY**

Tech III: 8:00am to 5:00pm
Josh Rayburn, Mid-Atlantic Tech. Rep., Leica Geosystems
*3D Laser Scanning*

Tech IV: 8:00am to 5:00pm
Open - Looking to fill slot with a national speaker.

Note: Some seminar titles are subject to re-wording. Subject will remain the same.
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The 2011 ACSM annual conference is set for the San Diego Convention Center July 7-12 in conjunction with the premier Survey Summit hosted by ACSM and ESRI. That Sunday, July 10, the NSPS Board of Governors Meeting convenes in what promises to be the beginning of a new era for NSPS.

As you may recall, at last year’s annual ACSM conference in Phoenix, a motion was passed by a slim majority for NSPS to begin the process of withdrawal from ACSM. A previous agreement with ACSM spells out a two year term of separation for any MO (member organization), which can be rescinded at any point along the way.

Since that time it has been determined that a complete re-organization of ACSM will be necessary. Currently ACSM is composed of three member organizations (MOs) which are: NSPS (National Society of Professional Surveyors), AAGS (American Association of Geodetic Surveying), and GLIS (Geographic & Land Information Society). Under the current ACSM structure, the 2600 member NSPS has the same representation as the 60 member GLIS and the 200 member AAGS. This inequity of membership number is the root cause of the current upheaval and precipitated the NSPS withdrawal motion, or the possible creation of a restructured single-member organization. To add fuel to the fire, there has been financial problems with ACSM overhead due to lack of attendance at last year’s Phoenix conference and meager book sales.

Therefore, given this background, the possible re-organization of ACSM or the possible withdrawal of NSPS will be discussed and/or resolved at the upcoming Board of Governors meeting in San Diego. There is also a third possibility, which is to re-structure the organization with a new name. An example would be “The National Society of Surveyors & Mappers”.

Ultimately the two stumbling blocks at this re-organization meeting will probably be the new structure? and the name of the organization? There will also be some legal issues as part of the re-organization. For example, currently the ACSM and the member organizations are 501 (C) (6) corporations. ACSM is incorporated in Washington DC, and the MOs are incorporated in Maryland. Some questions are still outstanding, but it was determined by the NSPS leadership that in Maryland, in order to dissolve a 501 (C) (6), an affirmative vote is needed by a majority of all the members of an MO. In other words, if an MO has 3000 members, a vote will not pass unless 1501 positive votes are cast. Hmm!!! It looks like F. Lee Bailey will have to figure this one out!!

I’m afraid chaos will once again reign supreme in San Diego. I will definitely be taking a bottle of aspirin with me to this meeting. My suggestion is we rename ourselves the United Auto Workers Union in order to take in some of that federal bailout money!!
In September of this year, we will commemorate the horrific events of 911, but March 3rd represented another 10 year commemoration that Virginia surveyors should not forget. On that day in 2001, an Army C-23 Sherpa transport was returning 18 members of Virginia’s 203rd Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers “Red Horse” Unit to their home base in Virginia Beach after completing a two week construction project at Hurlburt Field, FL. Fowl weather in the area of Unadilla Georgia brought the plane down and none of the 18 Virginia Air National Guard Engineers or three Florida Army National Guard Aviators survived the crash.

The 203rd is a component of the 192nd Fighter Wing of the Virginia Air National Guard where I spent more than 20 years of my military career. One of the 18 was a friend, Major Fred Watkins who I had served alongside in the weapons element of the 192nd based in Richmond before he was transferred to the 203rd, was the Troop Commander on the flight. Another of the 18 I did not know but shared common ground with on two fronts.

Master Sergeant Eric G. Bulman, 60 (Posthumously promoted to Senior Master Sergeant), was the First Sergeant assigned to this deployment. He was also the owner of Technical & Environmental Services in Virginia Beach and was a member of VAS and the Tidewater Chapter. Eric represented the very backbone of the nation’s citizen soldiers, sailors and airmen. During his years of military service he had no doubt deployed to hostile locations and had been confronted with many hazardous situations. His practice probably suffered on occasion due to the fact that he was the only licensed individual there and certain things would have to wait until he returned from deployments. Since the mandatory retirement age for Air Force personnel is 60 this was to be Sgt. Bulman’s last deployment. He was sad about the prospect of not being associated with the Guard after his retirement. Unlike active duty personnel who move from place to place and unit to unit, Guardsmen stay associated with one unit for long periods of time and there is a real sense of family.

There is truly an incalculable benefit to the nation to have men and women like Sgt. Bulman using their talents, training and education to defend America and also spread our good will in the form of aid and assistance to developing nations. Of course the training and education is a two way street and many surveyors and other professionals learned much of what they use every day from time spent in the military and resulting G.I. Bill educational benefits.

Memorials

Ralph Perry Hines
Ralph Perry Hines passed away on April 27, 2011. He started the firm of Ralph P. Hines & Associates now known as Maxey-Hines & Associates. He was a member of the Virginia Association of Surveyors and the Southern Chapter.

Carl Watkins, Jr.
Carl Watkins, Jr. of Richmond passed away May 7, 2011, in Elyria, Ohio. He worked for LaPrade Brothers here in Richmond.

William LeRoy Matthews
William LeRoy Matthews of Arlington, Virginia passed away on June 23, 2011. Bill was a member of the Virginia Association of Surveyors and a past president of the Mt. Vernon Chapter.

In honor of MSgt Eric Bulman the Education Supplement Fund fundraising committee will accept donations to the ESF in his memory.

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Ralph, Carl, and Bill will be missed by their fellow surveyors and families.
Calendar of Events for 2011 - 2012


VAS Fall Seminar & Board Meeting — September 16 & 17, 2011, hosted by the Tidewater Chapter.

Central Chapter — General Membership Meetings September 23 (Picnic and Crab Feast), November 15, and December 9, 2011 (Christmas Party). Contact: Jamie Pruett, jpruettt@baydesigngroup.com.


Peninsula Chapter — General Membership Meetings: September 14, membership meeting and seminar; October 12, dinner meeting and election of officers. Contact: Dwayne Potts, dpotts@adpotts.hroxcmail.com.

Rappahannock Chapter — Board of Directors Meetings and November 17, 2011. Dinner Meetings Photo supplied by Jebediah Holland August 18, September 24 (Crab Feast), and December 8, 2011. Contact: Daniel Dorton, ddorton@g-and-o.com.


LSIT Exam Schedule — Exam Date, October 29, 2011; Exam fee due, 9/9/2011.