

The UCLS Newsletter

Volume 5 Issue 2



March 2018

What is it?



The modern land surveyor has many tools that he/she might use to perform his/her work. The March “what is it” contest exemplifies one of these tools. The first UCLS member to correctly identify this tool and explain its function will receive a free lunch at their next UCLS Chapter meeting.

Answers may be emailed to Susan at srmerrill@ucls.org. The earliest date and time of response will determine the winner.

In this issue: We have several contributions from the National Society of Professional Surveyors (NSPS); the 2018 financial position; Certified Surveyor Technician (CST) membership; NSPS Insurance opportunities; NSPS Awards; and celebration of National Surveyor’s Week.

In this edition, we take you on a trip down memory lane by reminiscing with Professor Knud Hermansen about measuring distances; we frighten you with an article about the day when GPS went away; and we celebrate a Utah Valley University student who shared his capstone project.

Readers will be entertained in items of Considerations; challenged by the Surveyor Logic Puzzle; informed by the No Man’s Land contribution; enlightened by the Legislative report; and amused by the Prospective Client Dialog.

We invite you to share charismatic photos of yourself and/or a coworker, panoramic images of Utah’s scenic wonders, or pictures of survey related tools and equipment. Additionally, we need interesting and unique descriptions or survey related stories to share with our membership. Remember, if you do not participate you have no right to complain. Please let us know your thoughts, recommendations, suggestions, or complaints.

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“If you think it’s expensive hiring a good surveyor try hiring a cheap one.”
-Anonymous

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2018 NSPS FINANCIAL POSITION

November 28, 2017

NSPS Members:

To reach and maintain the success of an organization, one must assimilate the method by which success is achieved through our businesses: the increase in work flow requires enlarging our staff, purchasing new and improved equipment, and increasing the revenue to afford all of the above. Such is the case with NSPS, our organization.

Over the past 5 years, we incorporated a method by which we could represent and service all of the surveyors nationwide - not just the hand full that could afford the dues. In forging the success of the "new" NSPS, we increased our membership from 2,000 to 17,000 and went from dues of \$225 to \$40 per member assessment of affiliates. The implementation of the latter amount did not develop quickly. Many hours of debate were needed to come up with a rate deemed fair to all, reasonably sustainable, and functional for NSPS.

The last five years have seen NSPS increase the membership as stated, improve our lobbying effectiveness, improve our public relations efforts with programs to educate the public, students, and our fellow surveyors. We have updated our office facilities, increased efficiency, improved our website, fine-tuned communications, and managed 17,000 members, without increasing the office staff!

However, after five years, we are beginning to feel a tightening of our fiscal purse strings. As successful companies increase their rates to remain solvent, to stay ahead of the growth curve, so must we as NSPS. Salaries increase, travel expenses increase, and lobbying needs increase, while fundraising activities have had only moderate success. We can no longer offer workshops at our conferences as a revenue source so as not to compete with the laudable success of State Conference workshops.

As NSPS Treasurer, I see firsthand how all these issues affect balancing the budget. For 4 years we have stayed in the black without cutting costs. In recent years, we have urged committees to hold phone conference meetings to alleviate travel expenses. In the next five years we will not be as fortunate, and funds will have to be cut for successful programs. In the not too distant future, we will need to replace at least one employee due to retirement, as well as the possibly of the retirement of a second employee. We will be replacing these members of the staff with individuals who would expect to be paid more than our present staff. NSPS must maintain what we have worked so hard to achieve.

Therefore, I am requesting the NSPS Executive Committee, NSPS Budget & Finance Committee, NSPS Directors representing the respective state societies, State Executive Directors, and Associations to support an increase of a \$5 to \$10 assessment per member starting in 2019. I feel that this will be sufficient to sustain NSPS for 5 years, at which time we may need to revisit our financial standing. For now, let us take this back to our states for their feedback. When we reconvene in February, we will discuss this issue thoroughly and vote on the change in whatever format is decided at that time.

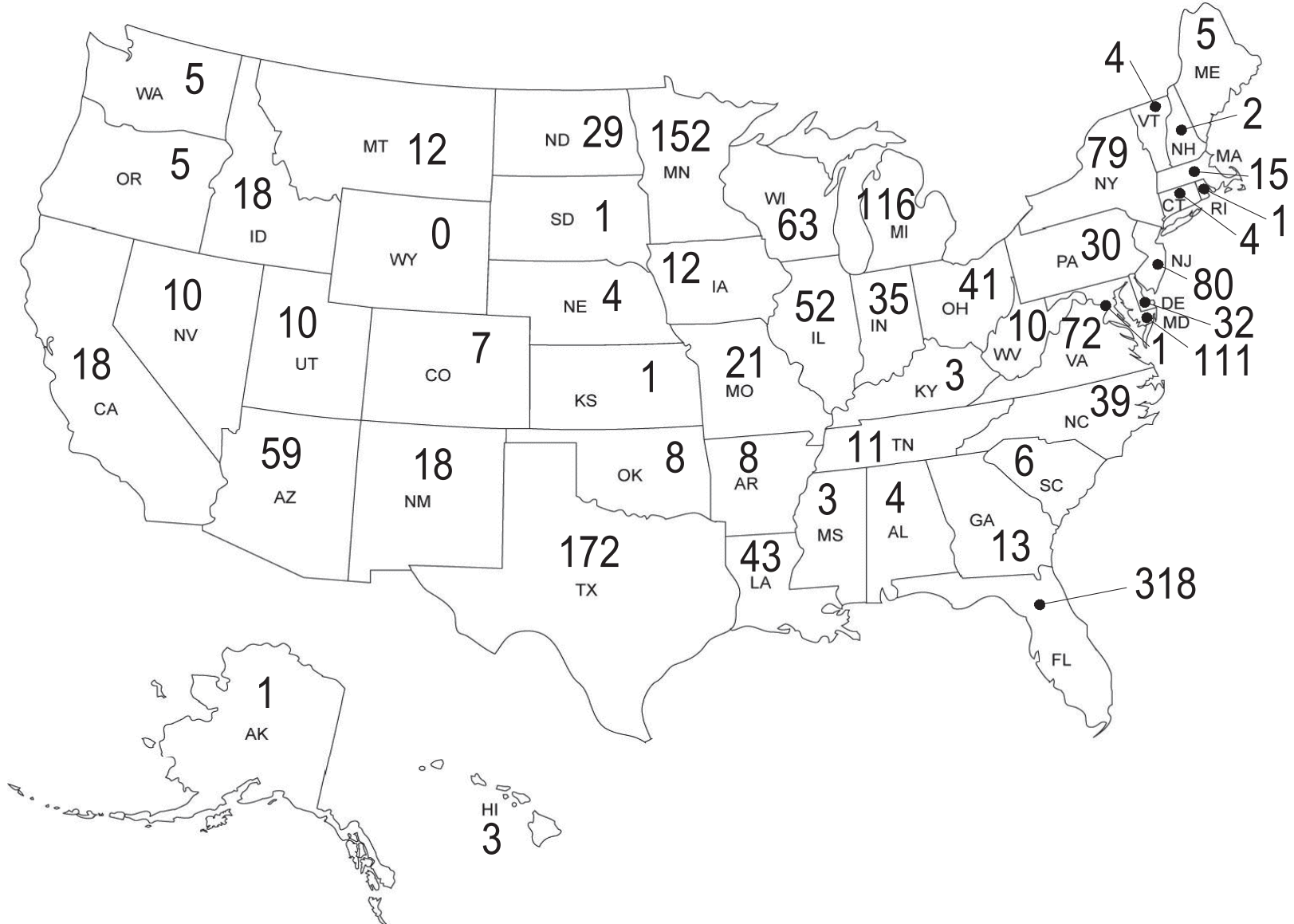
Thank you for your consideration, and taking this request seriously. I wish you all success in your personal endeavors.

Sincerely,

A handwritten signature in blue ink that reads "R. Miller". The signature is fluid and cursive.

Robert R. Miller
NSPS Treasurer

CST Population by State as of March 2017



Reminisce Of An Old Surveyor Measuring a Distance by Taping

by

Knud E. Hermansen

P.L.S., P.E., Ph.D., Esq.

I don't like to think of myself as old but I am. I have been surveying for close to 50 years. The difference between how I used to survey and how surveying is done now is different. This difference was brought to the forefront of my thinking one day when I was surveying with a young surveyor. As we compared the distance we measured between two corner monuments to the distance set forth in the original survey performed in 1968, the young surveyor was appalled that the original surveyor was off six tenths of a foot between the two monuments. Until this young surveyor spoke I was thinking that the 1968 surveyor had done some exceedingly good measuring given the fact that the distance between the monuments was almost 2,000 feet across uneven landscape filled with pucker brush. My young associate had never used a tape to measure a long distance. Had he done so, I'd think that he would have marveled at the accuracy of the 1968 surveyor.

I would be surprised to hear that any surveying firm operating at this time still tapes long distances. If there is some firm that still practices this ancient art, surely they cannot compete on a fee basis with another firm.

So my young colleagues in the profession will better understand how the boundary they are now retracing was measured, I will reminisce about the lost art of taping a long distance.

Taping required at least two people in the survey crew. Three were ideal, with a person on each end of the tape and one person on the instrument to keep the two people on a straight line between the end points.

My employers at the time were some what tight-fisted with expenses so most of my taping was done with one other person.

With the direction to be measured selected, a distant object was chosen to use as a point of reference to guide us while taping. I suppose when taping across open land, a pole was included as part of the survey equipment. The pole was placed in the ground on line with the direction to be taped and used to guide the taping crew. Where I surveyed there was always some natural object that could be used or an appendage of a tree or bush where ribbon could be hung to serve as a guiding point.

Unless we were in farmland or urban land there followed some physical labor as brush and other vegetation was cut and removed from the direction to be taped. Of course if the distance to be taped was part of a traverse, the direction was often selected so as to avoid the denser portions of vegetation thereby saving a great deal of physical labor involved with cutting a traverse line. If memory serves me, I seem to remember more time spent cutting a clear line in preparation to taping the distance than actually measuring the line.

My employer favored a 200 foot steel tape. Most surveyors employed the standard 100 foot steel tape. I heard a few surveyors that employed a 300 foot steel tape. The longer tape meant fewer markings on the ground that I shall explain later. However, the longer tape made a wicked sag unless extra tension could be exerted on the ends of the tape to reduce the sag. Of course the extra tension made plumbing the tape more difficult. Still, I came to appreciate the longer tape and used it when I first practiced on my own after becoming licensed.

Now I will say here and now that I was well familiar with tape corrections such as sag, tension, and temperature. We never made those corrections nor do I remember a surveyor that I met at this time that did so though they were common subjects in academic learning. I do not believe these calculations were omitted from ignorance. It must be remembered that calculations during these times were done without benefit of an electronic calculator. As a result, any calculations involving multiplication and division were a tedious undertaking.

Also, the errors associated with the failure to make tape corrections were often as not dwarfed by other factors present in the boundary survey. Would a temperature or sag correction to the steel tape make much of a difference when the corner was a 22 inch diameter tree or a three foot diameter stone pile?

My employer did deem it important that the taping be done on a straight line and as near to horizontal as possible unless the end of the tape could be placed at the instrument allowing a vertical angle to be read and used to reduce the slope distance to a horizontal distance. I do not remember ever employing a hand level to check to insure the tape was horizontal, the level of the tape being accomplished by a fair estimate with the eye.

Leveling the tape required a plumb bob be suspended from at least one end of the tape and usually at both ends of the tape. Even on relatively level ground it was necessary to suspend the tape above the ground and employ plumb bobs or else the tape would wave up and down over brush we had cut, fallen trees, stones, and high grass that was normally present on the line of taping.

I don't believe a plumb bob can be found among the equipment of the modern surveyor. Perhaps it may be found buried in the equipment box on the survey truck yet. The plumb bob was a serious omission - akin to forgetting the tripod. Not only was the plumb bob necessary for taping but it was a necessary piece of equipment to hand under the tripod in order to place the instrument over the point, the optical plummet not being present on transits and compasses that were used to measure directions at that time.

Beginning at the instrument, the tape was laid out in the direction to be measured. Perhaps laid out is the wrong word - for the procedure was to grab the 'zero' end of the tape and drag it in the direction to be measured until the rear tape person would yell "stop" or some other recognizable command. Now in doing this simple task it was important that someone watch the tape or at least be sensitive to the resistance to drag offered by the tape to prevent the tape from looping upon itself where continued tension would cause the loop to collapse and the steel tape to break. Careful observation was especially important when turning the tape back upon itself.

Reminisce of an Old Surveyor continued...

Breaking a tape would cause the ire of even the most placid employer because there was no reason for this event to occur but for negligence. I am sure some survey crew members did try their best to think of some other plausible excuse that would explain a broken tape and not attach blame to themselves.

Having dragged the tape to its farthest extent without causing the tape to break, the forward tape person would be directed to the right or left by the rear tape person so as to cause the forward tape person to be on a straight line between the two points where the distance was required. This is where the pole or point of reference spoken earlier assists the taping crew.

More times than not it seemed this simple task would reveal that the forward tape person had passed on the wrong side of a tree or bush requiring the forward person to drag the tape back to the offending tree or bush and pass on the correct side of this transgressing vegetation. Surely if the tape did not kink or break in laying the tape out, the risk of a break by kinking the tape increased with this realignment because the forward person was looping the tape back upon itself and was now agitated with the extra effort necessary to make the measurement. In their frustration they would tend to pull on the tape harder than good practice should allow.

In some instances, it would be determined that rather than drag the tape back and go on the other side of the offending vegetation, the vegetation could be cut and removed. This idea was good in theory but often fraught in practice. More than once I have seen a good swing of the machete or brush hook designated to cut the offending brush not only cut the brush but to also cut the tape as well, the tape being next to the offending brush because of the circumstances I have mentioned.

It was always a discussion among survey crew members whether the employer will think the intelligence of an employee to be less if they broke the tape with an overlooked kink or the result of a powerful stroke of a machete. Thankfully that is one conversation and confession that will no longer occur with modern survey practice.

Once satisfied the tape is aligned properly in the direction of the survey, the tape would be raised off the ground in a manner to effectuate a level line. In raising the tape, the taping party often discovers that the recent maneuvering with the tape has allowed the tape to seep under some brush that had been previously cut in clearing the line and allowed to remain in the vicinity. The discovery of the offending vegetation occurred when an effort is made to raise the tape and one or more pieces of brush would also rise with tape. At this discovery some vigorous attempt is made at shaking the tape to throw off the offending brush. This effort seldom worked other than to jerk the end of the tape out of a person's hand.

With the failure of shaking the brush off, it became necessary for someone to once again walk along the length of the tape and remove offending pieces of brush that had found their way to laying on the tape rather than under the tape.

If a person following this story and is counting the trips along a particular segment of line, they will realize that the distance of the tape has probably been walked three or four times. First, a person must walk the line to cut a clear sight along the line. Second, a person will walk the line to drag the tape to set up the measurement. The third walk occurs when retracing the steps in order to come back around the correct side of a tree. Finally, the fourth walk of the line is to throw off brush and vegetation that has climbed on the tape. I know that vegetation can't move or climb on its own but if you had been there you would swear it does just that.

Finally, the tape could now be raised off the ground to effectuate as near as possible a horizontal line that could never be a straight and level line since the weight of the steel tape always caused a sag. To remove some of the offending sag, tension had to be applied to the ends of the tape. I supposed there were surveyors that employed tension handles in the field that allowed the tension, measured in pounds, to be carefully applied to the tape's length but I have never met the field crew that used them in the field doing a boundary retracement survey. Perhaps a diligent survey firm would have had at least one tension handle in their office in order to show a new employee what 15 to 20 pounds of tension felt like.

For those surveyors that have never seen a tension handle, a close similarity can be visualized by thinking of certain weight scales with a handle at one end and a hook at the other end that are sold to fisherman to weigh the trophy fish they plan to catch. I suspect that some of the survey tension handles that were purchased by surveyors were used more often for weighing fish rather than applying tension to a tape.

With the tape raised off the ground, great skill must now be employed to do several tasks at once. The tape person had to keep the tape level, at a consistent tension, and steady enough to fix a point on the ground using a suspended plumb bob.

The rendition of these tasks in print does not begin to describe the difficulty of combining these tasks in practice. First, the plumb bob string must remain fixed and immovable on a mark found on the tape. This requires one hand be employed to clamp the plumb bob string securely to a mark etched on the steel tape. The other hand is employed pulling on the end of the tape to keep a constant and desired tension. It must be remembered that the steel tape is a smooth ribbon but for some minor roughness caused by marks on the tape surface indicated feet, tenths and hundredths of a foot. The last two mentioned markings only present at the ends of tape. The combination of the tension, tape smoothness, and literal sweat on the hands resulting from the physical labor involved in surveying at the times and the reader can deduce the challenge required in making a measurement while exerting tension on the tape. Usually a leather thong at the end of the tape was used rather than holding the tape itself.

A consistent tension was employed by tucking the hand to the body and leaning the body in the direction away from the other person in order to render the desired tension.

Where a leather thong was not present or 'breaking the tape' required, often as not the tape person would grab hold of the tape and bend the tape down at their hand to afford a better grip - much as a person would do when pulling a rope to get a better grip. This grip often left a 'jog' in the tape at the completion of the measurement. After years of usage, a tape would no longer lay flat but would have rises and dips along its length that would be coupled with a few points of extra thickness where the tape had been repaired.

To be continued next month

Why not make a business resolution and re-evaluate your Business Insurance?

Allow yourself to keep your resolutions 80% of the time and fail to keep them 20% of the time.

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Business Insurance Resolution Check List.

2018

2018 Gotta get it done!

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The National Society of Professional Surveyors announced their awards for 2018. We encourage your participation. All nominations are due to NSPS by April 30, 2018. For a copy of the guidelines for any of the following awards, email the NSPS Office at www.nspis.us.com/page/ActiviesReport. The UCLS Publications Committee could use your input on which issue to submit this year. If you had a favorite, drop us a line, to help us submit the best issue of the year.

Affiliate of the Year: Awards will be presented each year in two categories: small (under 400 members) and large (more than 400 members).

Surveying Excellence: This award is open to anyone who has made an outstanding contribution, or has performed outstanding service to the surveying profession.

Student Project of the Year: Any undergraduate student enrolled in a surveying or surveying related program (i.e. geospatial sciences, civil engineering, forestry, etc.) is eligible for this award.

Earle J. Fennell: In honor of Earle J. Fennell, ACSM President 1966-1967 and ACSM Executive Director 1968-1971, ACSM created this award to be presented for distinguished education contributions to the surveying and mapping profession.

Map/Plat Design Competition: State Surveying Association affiliates of the National Society of Professional Surveyors, Inc. (NSPS) are invited to submit maps and plats to the 2018 competition. Entrants need not be members of NSPS, however of member of NSPS must sponsor the submission.

Excellence in Journalism Contest: The purpose of this contest is to encourage high-quality publications and content by NSPS affiliates. The contest is judged by a committee established by the Chair of the NSPS Board of Directors, and is open to newsletters, magazines, and content in either having been published between January and December of the previous year. The affiliate's, executive director, publications editor, or their designee may submit entries for consideration.

December "What is it?"

The contiguous United States is comprised of forty-eight states between the Pacific and Atlantic Oceans that lies South of Canada and North of Mexico. Furthermore, the boundary of each State is common with the boundary of at least one neighboring State. However, most States share a common boundary line with multiple States. A Tri-State corner is the location where the boundary of three States converge.

Kelly Schmutz was our first candidate with a guess of 65 followed by Kent Setterberg with a guess of 56 Tri-corner locations.

The actual total is unknown; however, the internet provided us with several answers:

- 65 monuments per The Corner corner at <http://www.bibsoftware.com/corners/>
- 62 monuments per Tri-State Corners at <http://www.peakbagging.com/TriState.htm>

The correct answer is probably debatable, however we now have a great trivia question to share.



2018 National Surveyors Week

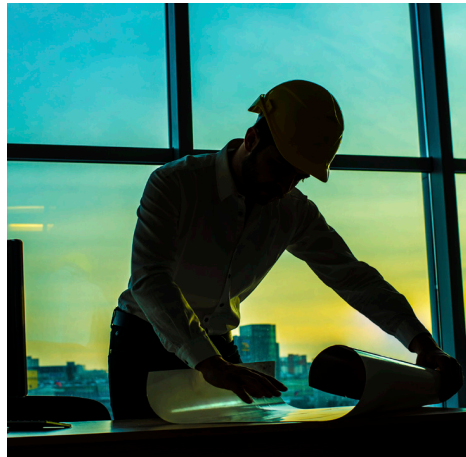
March 18–24, 2018

{ Global Surveyors Day }
{ Wednesday, March 21 }



Download the Volunteer Kit

Get great ideas about activities to try in your region. Visit nsps.us.com and enter **volunteer kit** in the search bar.



Distribute Brochures

For a supply of surveying brochures, please contact Trisha Milburn at NSPS.

✉ trisha.milburn@nsps.us.com



Try This In Your Region

- 1) Have Survey Day at the mall
- 2) Sponsor a Trig-Star Test
- 3) Conduct a Boy Scouts Merit Badge event
- 4) Obtain a proclamation from your state or local government
- 5) Organize Geocaching or Benchmark Hunting: <https://geocaching.com/mark>
- 6) Try Surveying Mark Recon: [oceanservice@noaa.gov/education/for_fun/SurveyMarkHunting.pdf](mailto:oceanservice@noaa.gov)
- 7) Plan GPS on Benchmarks: <https://geodesy.noaa.gov/GPSonBM/>



Talk About Surveying

- Local civic clubs (American Legion, Elks, Grange, Kiwanis, Lions, Rotary, Ruritan, VFW, etc.)
- Professional organizations (realtors, attorneys, bankers, title agents, etc.)
- Teachers and school counselors

Getting Older

As I get older, I realize:

1. I talk to myself, because there are times I need expert advice.
 2. I consider "On Trend" to be the clothes that still fit.
 3. I don't need anger management. I need people to stop pissing me off.
 4. My people skills are just fine. It's my tolerance for idiots that needs work.
 5. The biggest lie I tell myself is, "I don't need to write that down. I'll remember it."
 6. I have days when my life is just a tent away from a circus.
 7. These days, "on time" is when I get there.
 8. Even duct tape can't fix stupid - but it sure does muffle the sound.
 9. Wouldn't it be wonderful if we could put ourselves in the dryer for ten minutes, then come out wrinkle free and three sizes smaller?
 10. Lately, I've noticed people my age are so much older than me.
 11. "Getting lucky" means walking into a room and remembering why I'm there.
 12. When I was a child, I thought nap time was a punishment. Now it feels like a mini-vacation.
 13. Some days I have no idea what I'm doing out of bed.
 14. I thought growing old would take longer.
 15. Aging sure has slowed me down, but it hasn't shut me up.
 16. I still haven't learned to act my age.
- And remember..... Youth is a gift of nature. Age is a work of art.



**Mark Twain's RULES
for Boys & Girls (and surveyors)
American Humorist (1835-1910)**

- Always respect your superiors, if you have any.
- We ought to never to do wrong when people are looking.
- Always obey your parents when they are present.
- Never tell lies at all - not at all - except in the case of the most urgent necessity.
- It is not best to use our morals weekdays, it gets them out of repair for Sunday.
- Let us swear while we may, for in heaven it will not be allowed.
- There is a charm about the forbidden that makes it unspeakably desirable.
- A good and wholesome thing is a little harmless fun in the world.
- Each must for himself alone decide what is right and what is wrong.
- When in doubt, tell the truth.

Legislation

By: Lee Colvin

It was interesting to note that House Bill 16, which passed the Utah House of Representatives with flying colors a few years ago, was voted down in the Senate and died an ignoble death. This was, of course, the bill which would have changed the Utah State Fish from the rainbow trout to the Bonneville cut throat trout. Similar trivial bills are considered by our lawmakers every year. The lengthy debate they inspire causes other monumentally important bills to be overlooked because of time constraints. The following examples are illustrative of bills that should have passed but didn't:

House bill 254 - would have made ringworm our state fungal disease. It is more than deserving, for its propensity to form a ring on the skin, just as our pioneer forefathers used to form rings on the prairie with their covered wagons.

Senate Bill 113 - would have made the chuckhole at 1-80 and 1300 East the state chuckhole. This bill would have provided \$6 million for a visitor's center and observation platform, to go along with the \$1.5 million, which was spent several years ago, to provide landscaping and sprinkler systems for the approaches to the chuckhole.

House Bill 228 - would have made sweat the official state secretion, reinforcing the image of industry and hard work projected by the beehive on the state seal.

House Bill 261 - would have outlawed the singing of songs containing the name "Dave" in public schools.

House Bill 189 - would have added death by over-taxation to lethal injection and firing squad as legal means of execution in Utah.

Senate Bill 193 - an amendment to the Utah Clean Water Act would have prohibited sea gulls from regurgitating crickets into the Great Salt Lake.

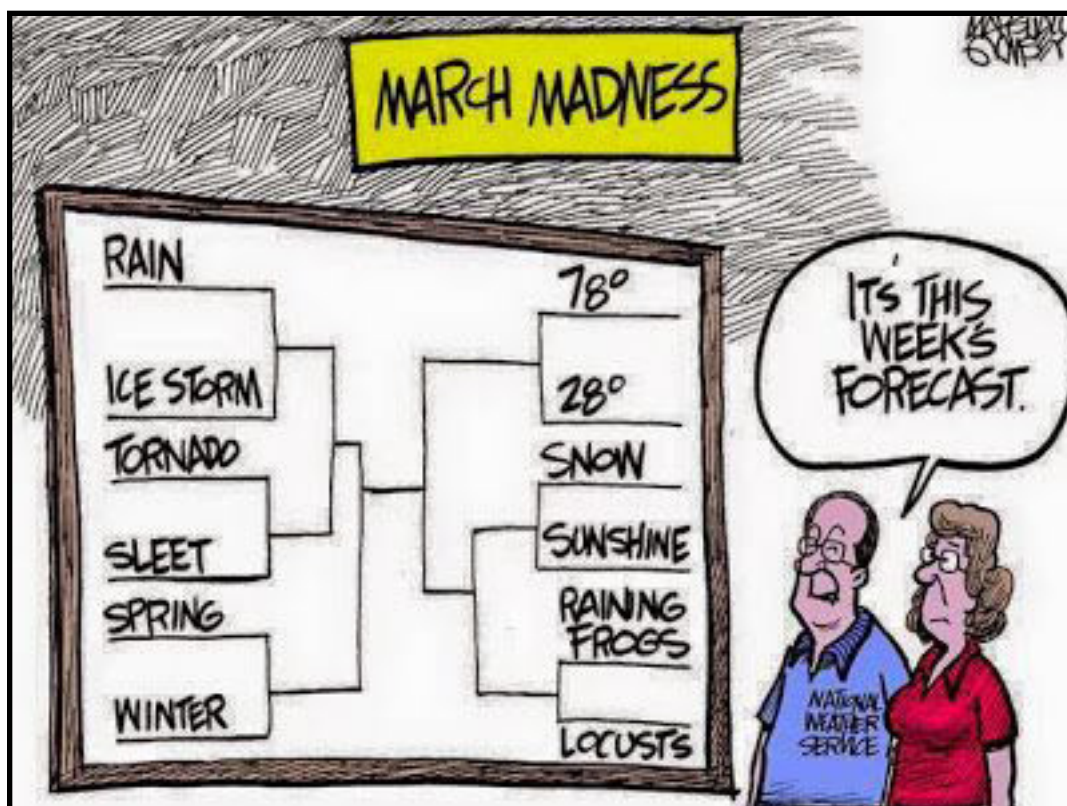
House Bill 214 - would have prohibited flossing within 25 feet of a public mirror.

House Bill 194 - an amendment to the Clean Air Act, would have designated Oxygen as an endangered natural resource, and imposed a tax on breathing it.

Senate Bill 127 - would have made the right turn signal the official state hand signal, reflecting Utah's rich Republican heritage. A stronger bill, which would have outlawed all left turns on state highways, died in committee because Canyon lands national park would no longer have been accessible from Moab.

Senate Bill 219 - would have established a motor - homeless shelter, for tourists who can't afford Winnebagos.

Senate Bill 177 - would have recognized the wearing of clothes that don't match as a preventable disease, and provided its victims with matching funds.



Surveyor Logic Puzzle

Five surveyors worked in a growing town. One was employed with the city while the other four worked for private companies. You could always tell who had surveyed a property because each surveyor preferred to use a different color of ribbon on his stakes and also used different monuments.

Determine where each surveyor was employed, which size & type of monument he used and his ribbon preference.

1. Charlie, who didn't work for the City, didn't use pipes. The Survey Solutions surveyor didn't use the 1/2-inch monument. Bob, who didn't work for Rocket Land Surveying, used rebar, but not the 1-inch size.
2. Ed, who didn't use rebar, used a larger monument than the surveyor who used blue ribbon.
3. The two 3/4-inch size monuments were a pipe and the monument set by Blue Moon Surveying. Archie from Survey Solutions didn't use rebar. Doug used a 3/4-inch monument, but it wasn't a pipe.
4. One of the surveyors who used rebar also used green ribbon. The City surveyor used rebar.
5. The two surveyors who used pipe were the one who also used orange ribbon and the Zodiac Engineering surveyor. One surveyor's rebar was the 1/2-inch size.
6. The surveyor who used pink ribbon also used rebar, but not the 1/2-inch size. The square bar wasn't set by the surveyor who used yellow ribbon.

Surveyor

Employer

Ribbon

Monument

Size

Archie

Bob

Charlie

Doug

Ed



Geomatics Capstone Project Introduction

Summer 2017, I had the opportunity to work on my Geomatics Capstone project as a Senior at Utah Valley University. My topic is focused on the National Geodetic Survey (NGS), specifically GPS Bench Mark Project within Salt Lake, Utah, Davis, and Cache Counties. This project deals with determining the location of multiple NGS Benchmarks within the National Spatial Reference System (NSRS) in each county to obtain current elevations. Using survey-grade GPS equipment, I collected metadata from two or more observation sessions on each of the found monuments. In gathering the data about the condition of the monument and the structure in which it resides, tying together anything that can help in the process of identification; this project is considered a small contribution to the Surveying community by providing all the land surveying professionals a precise update on benchmark elevations.

My report covered the methodology and the difficulties encountered, the data for five successfully observed points, which was provided to NGS, a list of points not observable, and for what reason. The report also highlighted the methodology used for research and observation, including the process of submission to the Online Positioning User Service (OPUS), reporting the solution to NGS, and the time required.

RESEARCH METHODOLOGY AND FIELD RESEARCH

To locate the benchmark, the NGS website provided the primary source of information required. I spent several hours on the NGS website researching all available details about the height modernization and tips to avoid errors. I used the Geocaching website as a research tool, to discover found benchmarks that have never been reported to NGS. I retrieved all data for each county from the NGS website by arranging each county's data on a spreadsheet with their respective PID, followed by the Order of Priority. By utilizing Google Earth and the Bench Map application, a large amount of time was spent researching the points before going out into the field. It is crucial to spend time researching on the NGS website to verify if the benchmarks still exist, since they were placed in the ground years ago. As we all know many changes have occurred such as new roads, buildings, fences, and railroads over the times.

Field research is the process of discovering and observing the physical points that were placed in the ground.

While doing the preliminary research for Salt Lake County on the NGS website, I investigated the points in the field. I reviewed 75 points, most of which lie in roads or buildings. For Salt Lake County, I found two points with respective PID AA3690, LO0639.

On May 22, 2017, I started my field research in Utah County, which was largely unsuccessful, since most of the monuments fell into federal lands, such as Government offices, and private properties where the owner was not available. On June 4, 2017, I recovered a point with PID LO0494 in the city of Payson (Utah County). It was not observable as it was located on the entrance steps of a Church. On June 9, 2017, I discovered one point with PID LO0510 by Utah Lake which was easy to observe. I made three trips to Davis County, and could not find any monuments, while research showed they fell in the middle of the Legacy Highway or near the railroads. On June 16, 2017 in Clearfield City, I found a point on the street curb with PID M0144. I observed this point twice, which is given in the Method of Observation Used section. In the spirit of finding the maximum number of monuments possible, on June 30, 2017, before the holiday, I drove to Logan to investigate some areas where, unfortunately, most of the points were either in the highway, airport, or university buildings. Sadly, I found these three points were unobservable. The respective PID of these points are: MR0445 Junior High School is presently in renovation, MR0447 set vertically on the building wall, MR0725 and MR0450 and MR0728 USU were not found, MR0447 found on the steps to the main entrance to the post office.

METHOD OF OBSERVATION USED

I followed all the recommendations made by the NGS regarding Mark Recoveries. In pertinent part: "Organize your information collected while performing reconnaissance and recovering the NGS benchmark." As NGS recommended I recorded all the following information: PID, Condition of mark, your agency (If you are a geocache your agency code is "LGEOCAC"), your initials (optional), recovery date, name and email, any additional text about if reference objects are gone or measuring of new reference objects, recommended 3 photos (close up, eye

level and horizontal photo preferably to the south)”

ACTUAL OBSERVATIONS AND OPUS SUBMISSION

For the field observation, I followed all conditions and requirements discussed previously. Four benchmarks were observed in two, four-hour increments, to insure accurate data. After collecting the data, it was necessary to upload them to OPUS, which provides simplified access to high-accuracy NSRS coordinates. OPUS required minimal user input and uses software which computes coordinates for NGS's Continuously Operating Reference Station (CORS) network, which this project meets.

NATIONAL GEODETIC SURVEY (NGS) SUBMISSION

At the NGS's request, I recorded the proper attributes including antennae model, pole height (generally fixed height 2m), and all other metadata for each observation made, then submitted to OPUS and NGS. At this point, the observation was approved and published to the NGS website. The retrieval link is below.

TIME COMMITMENT

This project was time-consuming, as well as expensive, to perform. At the early stage of this project, I spent a lot of time researching online, which saved time in the field. To realize the Height Modernization, the time commitment works side by side with energy to face stress and difficulties. I had to be highly proactive and engaged with my mentor, to take the initiative to meet my goals.

CONCLUSION AND RECOMMENDATIONS

The purpose of this capstone project was about the recovery of the benchmarks for the National Geodetic Survey (NGS). Four benchmarks were recovered and observed under NGS requirement guidelines. This project has exposed me to fieldwork, which was a great time of learning and decision-making. This allowed me to see how dangerous the surveyor's profession can be, at times. It allowed me to have hands-on experience with the instruments, outside of class. I'm proud of the work I did for this project, which provided ample learning experiences and the opportunity to offer the surveying community my time and contribution. My recommendation for the National Geodetic Survey: I would encourage the NGS to establish an arrangement with the government to facilitate easy access to federal lands for anyone doing benchmark modernization, as I learned many points fell onto those lands. I recommend students avoid the Height Modernization project without a grant or subvention as this project is quite costly and requires access to equipment.

<http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=LO0510&style=modern>

<http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=LO0639&style=modern>

<http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=MS0144&style=modern>

<http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=AA3690&style=modern>



My Name is Jude Jean Pierre. I was born and raised in the city of Les Cayes, in the southern part of Haiti. I am the third child in a loving family. My father was a carpenter and my mother was a small business owner. I went to Frere Audile Joseph for Primary School. As a child growing up in Haiti, I was fortunate enough to attend a well-regarded, private school from primary to high school. I attended the College Lysius Felicite Salomon (High School) and Juvenat college des Freres Sacre Coeur a Catholic School. After High School, I studied one year of theology at CIFOR, Port-au-Prince. Then, I went to Info-tronique University to study Computer Science.

In 2007, I moved to Florida, where I attended Barry University and Florida Atlantic University to enroll in the ESL program. Early in 2009, I joined the St. John Vianney College Seminary, where I spent two years in philosophy studies. In 2011, I moved to Utah and within a few years, which was difficult, but nevertheless, last Fall, in 2017, I graduated with a bachelor of science degree in Geomatics. My years of study at UVU were motivated by the importance of learning, and the ability to serve my community and homeland, Haiti, which is still recovering from the 2010 Earthquake. While I

miss the Caribbean heat, I've developed some new hobbies since living in Utah like hiking, camping, travelling, landscape photography, playing soccer, and ping pong, as well a daily workout routine to maintain my health.

My goals presently as a new professional in land surveying is trying to learn as much as I can from the experiences of others, as well as take advantage of all the opportunities my current job offers to prepare me to become a Licensed and Certified Federal Surveyor.

St. Patrick's Day

The Origins of St. Patrick's Day

St. Patrick's Day celebrates the Roman Catholic Feast day of the patron saint of Ireland. St. Patrick died on March 17, 461. But did you know that he wasn't even Irish?

History:

Patrick's birthname was Maewyn. He was born in Roman Britain. He was kidnapped into slavery and brought to Ireland.

He escaped to a monastery in Gaul (France) and converted to Christianity. He went back to Ireland in 432 as a missionary. While Christianity had already taken hold in the country, tradition has it that Patrick confronted the Druids at Tara and abolished their pagan rites, making Christianity more widespread.

Patrick became a bishop and after his death was named Ireland's patron saint. Celebrations in Ireland were understated though. When the Irish emigrated to the U.S., they created the bigger celebrations and parades known today.

Eighteenth century Irish soldiers who fought in the Revolutionary War held the first St. Patrick Day parades. The celebrations became a way for the Irish to connect with their roots after they moved to America.



Fun Facts:

The Shamrock: According to legend St. Patrick used the three leaf clover (or shamrock) to explain the Trinity.

Dyeing the river green: The practice of dyeing the river green started in Chicago in 1962, when the city officials decided to dye a portion of the Chicago River green.

Corn beef and cabbage: This is an Irish American dish. Irish Americans were so poor they could not afford certain meals. On St. Patrick's Day, the best meal they could afford was beef and cabbage. It became a staple for the holiday.



Dialog with a Prospective Client

Caller (about 25-30 year old male): Yeah, I'm calling because I need a land survey, but it's only about a quarter acre.

Me: Ok, why do you need a survey? Are you buying or selling?

Caller: Yeah I'm buying this piece of land and I'm closing tomorrow so I need it as fast as possible!

Me: chuckles yeah everybody is in a hurry and I've got quite a few lined up in front of you so there is no way I can do it that fast.

Caller: well if you can just do mine first I just really need it, I would really appreciate it. How much do you charge anyways?

Me: Well I would need some information about your property before I could give you a price, either the address or preferably a legal desc. Do you have a title commitment?

Caller: ok, well I'll email you the coordinates of the property to you, but gimme a rough idea because I can't afford much and I need it cheap. No, we don't have a title commitment.

Me: Well, a lot survey is going to start out at \$500, and it might be more depending on what kinda land you're buying, and its going to be at least 10 days before I could get to it. Are you going through a title company?

Caller: Well actually no, I'm buying it cash from the seller and we are just handling the deal between me and him. What I really need is somebody that can do it tomorrow because I need to get out there and start cleaning, it is all wooded and we are the first people to build on the street, and I don't have a lot of money so I need somebody that can do it for about \$300. The seller has a contract for me to sign. He said I just need to sign it and he's giving us a BIG discount for paying cash. We have never bought land before and my wife and I are just really excited to own land.

Me: huh, I see, I'm curious how many surveyors have you called and has anyone told you that they can work within those parameters? Also it sounds like maybe your not an experienced buyer and you don't have a title company or anybody else looking at this deal for you, to be honest I would be careful, you may be vulnerable to getting scammed. I would recommend at the bare minimum get it surveyed before you hand the man cash money on a contract that you don't understand.

Caller: well I've called quite a few and most of the bigger companies are saying 2 weeks minimum turn around time, but I just can't wait that long.

I looked at the subdivision plat and the land in google earth, its solid woods, its either going to be some tough GPS shots or cutting line, depending on how thick it is, and I can't read the plat, the online copy is illegible, would need to take a trip to the courthouse to see the original. I called him back to tell him I would pass on the job, I couldn't do it within the time frame or price he wanted. He said ok, no problem I understand, but how much would you charge? I told him \$1,000-\$1,500. He whistled and said oh boy thats a lot, ok bye.

I'm really curious how this deal is going to turn out and I'm curious as to which one of my competitors is going to take this job. Maybe I will call him back in a few days to follow up out of curiosity.

The Day GPS Went Away

By: Tim Burch

The day started like any other day. The land surveying crew loaded up their vehicle, equipment and marching orders to tackle the next project on the list.

This field party is like most surveyors across the globe—they are equipped with the latest surveying technology including GPS base and receivers, robotic total station and a UAS for aerial photography. These tools are necessary to be competitive in today's surveying arena as speed and productivity are paramount to the success of the project and the company.

But on this day, any device with the ability to determine geographic location via satellite reception was rendered useless.

Today became known as the day that GPS went away.

How we became dependent on GPS

Let's back up the story to the introduction of GPS and how our dependency on this technology came to be. With the invention of satellites culminating with the Russian effort to launch Sputnik, the United States became involved in a "race to space." Our early efforts to use satellites were proven worthy with the successful ability to track submarines by reception of radio signals and trilateration.

Further enhancements through research resulted in the development and creation of the NAVSTAR satellite in 1978. By 1993, 24 satellites were in orbit to make the GPS system fully functional (NASA.gov)

Meanwhile, the Russians were committed to a satellite network for navigational purposes during the same time. The first satellite, Kosmos - 1413, was launched in 1982 with the full 24 satellite constellation becoming operational in 1995.

Together, these systems (known as global network satellite systems or GNSS) allowed for location and navigation abilities never thought possible, and the surveying community began its adoption of the technology.

Early survey adopters of GPS were usually large engineering firms, state departments of transportation (DOTs) and federal agencies that could afford the large financial commitment to the equipment (both GPS and computers), software and computing costs required to use the technology.

The data-collection times were long, and the software analysis required enormous patience and extensive mathematical knowledge, but the results were beyond what the everyday surveyor had ever before accomplished.

Significant distances could now be measured with the same or better accuracy than taping or using an electronic distance meter could have provided. The true revolution came when real-time kinematic (RTK) GPS was invented and was affordable to the everyday surveyor ([GPS World, May 2016](#)).

S/A and A-S

Most GPS users, especially operators of survey-grade receivers, are not aware of the early days of satellite navigation and the military's use of selective availability, otherwise known as S/A ([SPS World, Sept/Oct 1990](#)). This methodology was implemented by the Department of Defense (DoD) on May 25, 1990 to limit accuracies for non-military GPS users.

This procedure was created to allow erroneous timing at random occurrences throughout transmission of satellite radio signals. These variations in timing more than negatively tripled the normal precision of an autonomous GPS position calculation, all in the name of introducing uncertainty to potential enemy users.

And if S/A wasn't enough, the DoD also could implement another department called anti-spoofing (A-S) and encrypt the precision or P-code of the satellite signal. The big factor here is that the general public (in our case, the surveying community) didn't know if or when A-S was turned on. These factors were frustrating to the GPS user, so data collection and coordinate determination become a tedious operation.

Early receiver use by surveyors relied on differential GPS data collection for high-accuracy location (<10 cm or better). This method consisted of placing one or more receivers on known positional points (usually on monuments published through the National Geodetic Survey) while simultaneously performing data collection on new points for positional establishment.

Prior to S/A, the software utilized to analyze and reduce the data collection provided feedback on "bad" data, but there were usually environmental issues causing the problem (such as cycle slips and radio interference.) The software would highlight the suspect data for the reviewer to determine validity and acceptance.

Because of the nature of differential GPS data collection, error checking remained the same once S/A was implemented. If the software calculated an incorrect coordinate at a known point, the same measurements to the new survey points were dismissed as a false reading.

Surveyors were mostly left unfazed by S/A as real-time kinematic (RTK) and real-time network (RTN) follow a similar procedure reutilizing a correction from a known terrestrial point. Even with the anti-spoofing activated, the surveying profession considered to use this high-tech location system that revolutionized long distance measurement. Things have been running along smoothly with steady improvement of receivers, data collectors, and data coverage until...

The day GPS went away continued....

The day it goes away

...the unthinkable happens. Our national satellite system is no longer available.

It doesn't matter why GPS has gone away on this day. It could be for many different reasons: federal budgets; enemy interference such as geomagnetic disturbances (GMD) or electromagnetic pulse (EMP); conventional or nuclear war; interference from solar storms, asteroids, or comets; or the system just simply breaks.

Another thing for all users of GNSS to consider in these tumultuous times is how newer systems are integrating other countries' satellite networks into their navigational observations.

Our relationship with the Russian government can be on unsteady ground from time to time, so our use of their GLONASS signals must be reviewed for accuracy as well (See *GPS World*, August 2017).

It won't matter whether a spoofed satellite signal originates from a private Russian hacker or from their actual government; it will still lead to incorrect information and bad data. Imagine having to revise a plat because the GLONASS data was purposely corrupted!

Obviously, the main reason they would allow transmittal of misinformation would be for military reasons, but I can only imagine their joy of messing with professional navigation and the recreation users of the U.S. These opportunities will also apply to the Chinese and Indian constellations, too.

We're not ready

The bottom line is that we, the U.S., aren't ready for it. Whatever may be the reason for the failure, we do not have a backup plan and have relied much too heavily on satellite navigation. Gone is our ability to navigate through our electronic devices, including smartphones, fitness trackers, in-car mapping and, yes, high-precision surveying equipment. These items have now become doorstops and space wasters.

This new conundrum doesn't just stop with the surveyor and recreational GPS equipment. A significant amount of construction equipment relies on machine control, from bulldozers and road graders to high-rise cranes.

This will also affect a large amount of agricultural equipment and processes. Those high-tech tractors with auto steer and computer-guided planters? Back to the drawing boards. So many things in our lives today are guided or controlled by navigational systems designed around GPS use, and the surveyor is squarely in this mix.

What's a surveyor to do?

The first thought on the surveyor's mind is now having to perform all surveying tasks with instruments that are not based on satellite navigation. Yes, the reason for this GPS shutdown isn't widespread enough to affect cellphone signals and other radio communications, but it killed off the

one navigation system more people relying than any other.

Because of this unfortunate shutdown, all GPS-based equipment is now worthless. This means your trusty RTN receiver with cellphone connection, your old base unit for those times when cellphone coverage is lacking, the fancy new UAV for taking orthophotography, and your cellphone or handheld GPS receiver for tracking down NGS monuments - all of them are done. Only your conventional equipment will complete the job.

Is the surveying profession finished? How do we locate those remote section corners in the middle of nowhere?

Don't throw in the towel just yet. Surveyors have been measuring land using these type of instruments for centuries, with today's versions being electronic and sophisticated. Robotic servos, mini computer-data collectors, efficient radio links and active tracking prisms have turned our forefathers' simple transit into a sophisticated topographic or construction staking machine.

Data collection is much easier than writing everything in a field book, and have graphical interfaces and remote connection capability to keep you in touch with the office from nearly anywhere. The reality, however, is that the surveyor will now have to use methods and equipment for traversing, data collections and all staking tasks that will greatly reduce our productivity and profitability.

Experience could also end up being a big factor here as well. The average age of the professional land surveyor in the United States is 58 and climbing. This means most of these practitioners have been in the business well before GPS technology, so there is still the potential of surveying without the electronic birds in the sky.

Surveyors can still hand their shingle and practice their craft, but we've now lost a big component of our world: geographical location. The key to the success of GPS was the ability to determine geographic location and subsequently convert that information into a data format compatible with one's local system. From UTM coordinates to State Plane, the world became smaller with this technology.

The surveyor can still determine latitude and longitude using manual surveying methods for specifically observing the sun and Polaris. The mathematics and procedures are complicated; but they still allow for determining a geographical location with high accuracy.

We can also utilize the extensive geodetic monumination networks established nationwide, all started around the formidable effort by the Coastal and Geodetic Survey. This key federal agency, later to become the National Geodetic Survey, laid the groundwork and set the monuments for the backbone of our national horizontal network system. This system has been augmented over the years by their own programs, as well as state and local authorities, to expand our coverage to all portions of the United States.

The day GPS went away continued....

By incorporating these monuments into a survey, a relationship to geographical datums is still easily obtained. While these methods of establishing geographical coordinates through use of conventional equipment sound time consuming, without GPS and other satellite-based navigational aids, it will become much more cumbersome.

So, what do we do next?

Depending on which industry you are in or your necessary level of accuracy, several alternatives are being developed. For those in the shipping industry (including trucking sector, which numbers more than 15 million vehicles), accuracy may only need to be nominal - for instance, 5 meters, give or take.

Several systems are in development with the biggest priority on enhanced Loran (short for "long range navigation") or eLoran (also see [GPS World April 2014](#) and [GPS World Nov 2015](#)). Several bills are currently being reviewed in the U.S. House and Senate for consideration of funding this technology.

Another government agency, the U.S. [Defense Advanced Research Projects Agency \(DARPA\)](#) has been exploring backup technologies for GPS for many years. Among the systems being considered are [Adaptable Navigation Systems \(ANS\)](#), [Microtechnology for Positioning, Navigation, and Timing \(Micro-PNT\)](#), [Quantum-Assisted Sensing and Readout \(QuASAR\)](#), [Program in Ultrafast Laser Science and Engineering \(PULSE\)](#) and [Spatial, Temporal and Orientation Information in Contested Environments \(STOIC\)](#) (love the government and their overuse of acronyms).

These programs are still under development, but DARPA has been tasked with finding another system so our dependence on GPS will not cripple our defense in a time of war.

Another alternative will be private satellite networks. With programs like SpaceX and Blue Origin, vehicles to carry new satellites into orbit are now a viable option. It will be possible for companies to create their own networks for private or commercial use.

With the large number of construction, shipping and automobile sales, the day may come with the navigation system within each of these is proprietary. However, if we are faced with geomagnetic disturbances (GMD) or an electromagnetic pulse (EMP) as mentioned earlier, it won't matter whose network it is - they will all be rendered useless.

Until another viable option is created, the surveyor will be forced to take a step back in productivity and technology with conventional instruments. While not the most ideal thing, it will force the profession to retrain its entire workforce on procedures and methods that haven't been regularly utilized for many years.

For some, it will be like throwing away the computer for a typewriter or the remote control for the television set. For others, it will be an opportunity to truly "follow in the

footsteps" of past surveyors. They will understand exactly how their predecessors went about "running the lines" and completing a true boundary survey.

I, however, hope we don't find ourselves in this situation, and that a suitable backup system or even a more advanced replacement for our antiquated GPS is invented soon.

But if the day comes and our GPS goes away, I'm guessing that surveyors not having their favorite location device will be the least of our society's worries. It will truly be a day that will live in infamy.

"The day that GPS went away" was published in the September 2017 edition of GPS World. For the complete article visit <http://gpsworld.com/the-day-gps-went-away/>



MULTI-TASKING

SURVEYOR



n.[ser-vey-er]

Someone who does precision
guesswork based on unreliable
data provided by those of
questionable knowledge.

See also **WIZARD, MAGICIAN**

No Man's Land Between New Hampshire and Canada

The tall tale(s) of two boundary markers

BY MARSHALL HUDSON

Looking something like two toddlers in a playpen or two boxers about to go toe-to-toe swapping punches, there exists an odd configuration of boundary markers in northern New Hampshire on the international border between Canada and the US. These two bounds are near the point where Route 3 crosses from Pittsburg, New Hampshire, into Chartierville, Quebec, and are about as far north as you can go while still remaining in New Hampshire. Stories told about these side-by-side monuments say that one bound is in Canada while the other is in the US, and between them lies approximately 18 inches of no man's land.

If you are wondering why there are two monuments marking one single spot or how there came to be a gap of no man's land between the two countries, you have to look back to 1842 and the Webster-Ashburton Treaty, named in part after New Hampshire statesman Daniel Webster. This treaty was written to end some 60 years of squabble over the border. The dispute resulted from an unclear description included in the 1783 Treaty of Paris, which officially ended the American Revolutionary War.



When the Webster-Ashburton Treaty was negotiated and finally executed, the two countries, by mutual agreement, set out to survey the length of the newly defined border from the mouth of the St. Croix River in Maine and New Brunswick to the St. Lawrence River in Quebec and New York. Legend says that one team of surveyors started at one end and proceeded east, while the other team started on the other end and proceeded west. The two survey teams concluded their work in 1847 when they met in the middle in Pittsburg, New Hampshire. But at the point where the two surveys came together, they discovered that their lines didn't quite meet, creating a discrepancy of a little less than two feet.

Considering the total distance that was surveyed, the equipment available and the techniques that were then in practice, this small discrepancy was not very significant. The two survey teams could not determine the cause of the error, nor reach an agreement about the proper location of the point, so they shook hands and erected two boundary monuments side-by-side that have remained in place, locked together by a concrete pad for more than 170 years. The International Boundary Commission now recognizes this double monument as Monument #484, yet it remains an unresolved — although amicable — dispute between the two nations.

As with any good tall tale, there's another version of this legend. This alternate story suggests that there wasn't really a surveying discrepancy at all, but rather that the surveyors involved had an extra monument with them (and a sense of humor) and decided to erect a double monument just to make for a good story. Personally, I prefer the version of a lack of precision that needs a little international camaraderie to resolve the issue.

One final tall tale told about these monuments says that the steel playpen erected around these bounds was done to prevent criminals from escaping into the sliver of no man's land, and thus being beyond the reach of the law from either country. More likely it was done just to prevent snowplow trucks from bumping into the monuments while pushing snow around.



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