

MISSOURI SURVEYOR

A Quarterly Publication of the
Missouri Society of Professional Surveyors

Jefferson City, Missouri

December 2018



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CALENDAR OF EVENTS

2019

February 13, 2019

Board Meeting and Capitol Visitation
MSPS Office,
Jefferson City, MO

May 2-4, 2019

41st Annual Spring Workshop
Lodge of Four Seasons,
Lake Ozark, MO

July 13, 2019

Board Meeting
MSPS Office, Jefferson City, MO

August 21-23, 2019

Review Course
Jefferson City, MO

October 3-5, 2019

62nd Annual Meeting and Convention
Holiday Executive Center
Columbia, MO

December 7, 2019

Board Meeting
MSPS Office, Jefferson City, MO

2020

April 30 - May 2, 2020

42nd Annual Spring Workshop
Lodge of Four Seasons,
Lake Ozark, MO

The cover photo depicts Southwest Missouri surveyors at their OPUS Workshop in June.

Donald R. Martin, Editor



Notes from the Editor's Desk

Donald R. Martin



Who Dat Say Dey Could Do Dat?

If you thought craziness in the last half of 2018 was due to the election cycle, look again! I am talking about the news of unqualified individuals stepping in and doing work which should require the expertise of the most qualified and experienced. I know what I just said sounds like more election talk (yuk yuk), but I am referring to threats to the licensed practice of regulated professions. You know, like surveying! Check out the *NSPS News & Views* in this edition of *Missouri Surveyor* for details.

From New Mexico comes the news of the Governor's executive order allowing "professionals in certain occupations [to] practice without a state license if they have consumer consent." Who is that who said they could do that? And from Mississippi we have the "tech start-up" Vizaline developing an app for bankers and other non-surveyors to plot lines over satellite images. The "lines" users plot are purported property lines per descriptions from deeds. Who is that who said they could do that?

In the matter from Mississippi we have land boundary analysis and graphic representation by unqualified, inexperienced, non-licensed practitioners. Also missing is the placing of *public welfare above all other considerations*. Oh wait, that's what surveyors do and this is about non-surveyors... doing the work of surveyors! In New Mexico, it is a potential open door to do the same predicated on the wise consent of the consumer. Who needs qualified, experienced, licensed professionals when those believing a few hundred dollars for a "survey" is too much to secure the bounds of their most valuable asset know better? BTW, how can a "professional" without a license be referred to as a professional? PLS w/oPLS?

Well readers, take note of these issues and do take the time to focus on *Response to recent article entitled 'Land Surveyors Are Paying the Price of Progress'* by Gary Kent and Curt Sumner in this edition's *NSPS News & Views*. But then again, who are these two guys to address this topic. All one really needs is a PLSw/oPLS in possession of a smart phone and experience playing Pokémon Go!

On to this Edition

Ol' Pard Tripod the three-legged groundhog suggests readers follow his lead and just "dig in" to the December 2018 edition of *Missouri Surveyor*. It is filled with pics, plots, prose, a poem, proclamations, presentations, and a performance. As always friends and readers, enjoy this publication and remember *Missouri Surveyor* is your voice; I welcome that which you may have to say or write. 🇺🇸

Donald

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President's Message

Chris Wickern, PLS



*'Twas the time before Christmas, when all through the land...
Corners were missing, confusion at hand.
Marks on the ground, could no longer be found.*

Evidence of the past, did not seem to last.

*Some were deemed lost with the passage of time.
And the meddlers had meddled, the land was unsettled.*

*Friends became foes with no monuments secure,
No Peace to be found, the cadastre unsure.*

*The family was nestled before hearth and fire,
When out near the fence, there arose such a clatter, I sprang to the deck to see what was the
matter;*

*When what to my wondering eyes did gain?
A man marking boundaries in the public domain.
That moment I knew... a Surveyor by name.*

*More rapid than eagles the courses they came, as the humble Surveyor called each distance
by name.
"Now Vera and Arpent, Rod and Chain", we go to find line and mark them quite plain.*

*The courses were laid and distances met,
Across the broad valley to the stone that was set,
The stone that was found had been hidden by time.*

*He ran the lines and bounded his way,
All the way round to the beginning point, they say.
Marks were found, restored to their place,
He set his caps, secure, for posterity's sake.*

*He marked the line plainly for all to see.
The only thing left was to draw up the plat and tend his aching knee.*

*The cold and snow he left behind him.
He knew he must eat... but was simply content to get off his feet.
He changed his wet clothes and warmed up his skin and that's when he knew, the map
must begin.*

*With the findings he noted, and boots on the mat,
He sipped his hot coffee and drew up his plat,*

*His footsteps were large as he crossed that last hollow,
He leaves his marks for others to follow.
His work not complete 'till all was in order,
His map now enshrined in a book with the Recorder,*

*The commission fulfilled, the boundaries now settled,
Confusion was gone, despite those who would meddle.*

*In the time before Christmas, Peace was at hand.
Foes were again friends throughout all the land.*

*My humble prayer for my fellow surveyors,
Take heart your high calling, in you the public does trust.*

May your lines be clear and monuments found.



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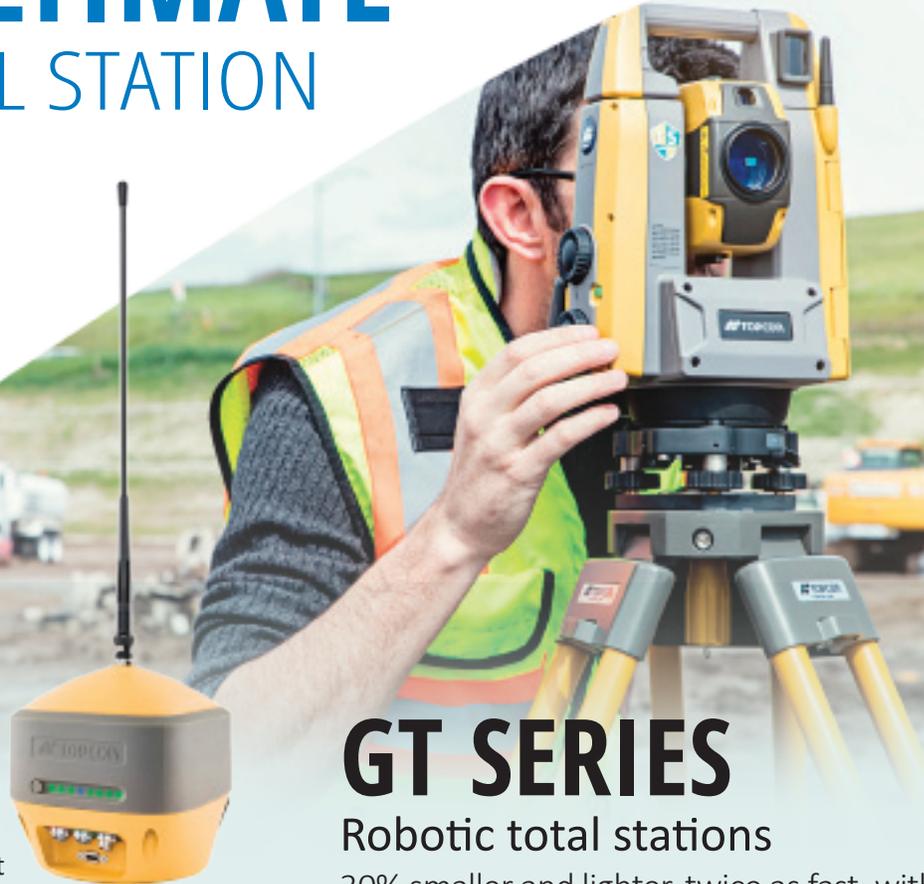
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MSPS Annual Meeting – Awards

Gerald “Duck” Bader, Surveyor of the Year

The Surveyor of the Year Award was established in 1987 and has been given to select MSPS members for giving their time and effort to the profession and working within the Society on behalf of the profession. The Awards Committee did not have to look far to identify this year’s Surveyor of the Year who also has a most unusual nickname – “Duck”.

He is the county surveyor for Ste. Genevieve County and has been the President of Bader Land Surveying since 1996. He studied land surveying at Ranken Technical College and he is married with two children.

He has been a member of the MSPS Board of Directors for eight years and serves on the Trig Star, Standards, Legislative, History and County Surveyors Committees. He has been elected as the Ste. Genevieve County Surveyor six times and served as President of the Missouri Association of County Surveyors (MACS) for three terms.

More importantly Jerry has restored and re-monumented at least 250 to 300 original GLO corners through the Land Survey Program. He is an avid surveying historian particularly knowledgeable on land grants of upper Louisiana (see Missouri Surveyor, September 2018). He has been a leader in honoring the surveyor of the 5th Principle Meridian, Prospect Robbins, including the setting of a commemorative granite bench in the Ste. Genevieve Cemetery. He was also active in the tri-state corner monumentation in 2004.

He is a very worthy recipient of this Surveyor of the Year award and truly represents what it means to be a “Professional Land Surveyor” in every sense of the word. Congratulations Jerry! 🇺🇸



Mike Flowers presenting the Surveyor of the Year Award to Duck Bader.

Wow -- Surveyor of the year! I was not expecting this!

I want to take this opportunity to thank the Missouri Society of Professional Surveyors, Past President Joe Clayton, Chair and the awards committee; the committee members, officers and members of the Board for this honor. To be on the same list as past recipients has yet to sink in. This started back in the 90's, when I got involved with the County Surveyors and signed up for a MSPS (or back then MARLS) committee. That grew in to being asked to run for a position on the MSPS board and the rest is history. Again Thank You. I did not get involved for the accolades or hardware; I just wanted to be involved and help. On the personal side; to my wife Denise, children Brett and Alina along with the gentleman I work with every day, Myron Naeger, Thank You!

Congratulations to Joe Clayton recipient of the Robert E. Myers Service Award. With Joe's accomplishments, contributions, and dedication to MSPS and the Survey profession, you have earned the award. The next time we meet, I want to shake your hand and officially congratulate you.

Sincerely Jerry “DUCK” Bader, Past President

MSPS Annual Meeting – Awards

Joe Clayton Receives the Robert E. Myers Service Award

The Robert E. Myers Service Award is presented each year to a member of MSPS who has shown exemplary service and dedication to the surveying profession and to this society throughout their career. This year's recipient is a very deserving individual who is held in high regard as a land surveyor and leader in MSPS. He has fulfilled the duties of MSPS President, other offices on the Board of Directors, a committee chair, and a founding member of his local MSPS chapter. He is a role model of leadership qualities for our members.

Beyond formal roles, he has also excelled in volunteerism for MSPS activities and events. He has "been there" during Capitol visitations, addressing issues with legislative contacts and providing House and Senate testimony to promote MSPS legislation. He was a driving force in 2016 for the *200 Year Anniversary of the Osage Treaty* line recognition and activities, resulting in MSPS winning the *NSPS 2016 Public Relations Award*. He also participated in the October 2015 *Joseph C. Brown* recognition ceremonies in St. Louis and the December 5th, 2015 celebration of the *200th Anniversary of Setting the first USPLSS Corner in Missouri*. He has even contributed to our newsletter, *Missouri Surveyor* with the most recent article being published in the June 2018 edition titled "Stadin Elbow".

He started his survey career in the U.S. Army before spending more than 30 years in public service with the Missouri Department of Transportation and the Missouri Department of Conservation, retiring in 2014. He is currently an Associate Surveyor with Anderson Engineering in Joplin.



This year's recipient is the proud father of two adult sons and a dotting grandfather of two little girls.

For his dedication to land surveying and MSPS, please help me in honoring this year's recipient of the Robert E. Myers Service Award, Professional Land Surveyor, Joe Clayton. 🇺🇸

Receiving the Robert E. Myers Service Award is humbling and I am honored to have an award that bears Mr. Myers name. I find myself inclined to future dedicated service to our Society and I am thankful to those who found me worthy of the honor. The journey of my membership has been rewarded with a fellowship that goes beyond our profession and I am a better person and surveyor as a result. I would like to thank both Bob Myers and Earl Graham for being so welcoming back in 1993. They introduced me to this society 13 years into working as a surveyor. Our profession and this Society are both important to me and I hope to help many others find their way to the rewards surveying as bestowed upon me.

I was unable to attend this year's Annual Meeting and receive the Myers Award in person. At that time my 22 year old son was befallen with a health crisis associated to his epilepsy. During his trying ordeal he persevered through medical treatment including a week-long induced coma and I gladly, thankfully can report he is well and improving.

*Thank you,
Joe*

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MSPS Annual Meeting – Awards

Representative Bart Korman Honored at Annual Conference of Surveyors

During the 2018 Annual Conference of the Missouri Society of Professional Surveyors member Bart Korman was recognized for his untiring and dedicated efforts toward the advancement of the professional of land surveying while serving in the Missouri House of Representatives from 2010 through 2018. The Society thanks him for the many times he has been involved in introducing and sponsoring legislation on behalf of the surveyors of Missouri.

Bart is a Republican and represents Montgomery County and parts of Warren and St. Charles Counties (District 42) in the Missouri House. He was first elected to the House of Representatives in 2010.

In addition to his legislative duties, Bart is a professional land surveyor and professional engineer with Lewis-Bade, Inc. in Warrenton. He is also an auctioneer with the family auction business, Korman Auction Service.

In Representative Korman's legislative career he received the *Freshman Legislator of the Year Award* for his outstanding work in fiscal responsibility and the *2012 Missouri Farm Bureau Friend of Agriculture Award*. The National Association of Social Workers, Missouri Chapter gave him their *House of Representatives Legislator of the Year* award in 2013. From the Missouri Society of Professional Surveyors he received their *Sincere Appreciation Award* in 2012.

Bart is an officer in the Warren County Rotary Club and has been active in the Missouri Association of County Surveyors, the Montgomery City Knights of Columbus, the Montgomery County Fair Agri-land Committee,



Fellow House of Representatives member and surveyor Robert Ross(L) presenting Representative Bart Korman with his MSPS recognition.

Farm Bureau, NRA and Immaculate Conception School Board. He is a former president of the Missouri Society of Professional Engineers - Central Chapter and a graduate of the Montgomery County EXCEL Leadership Program.

A 1994 graduate of Montgomery County R-2 High School, Bart Korman graduated from the University of Missouri in 1999 with a B.S. in Agricultural Engineering and a B.S. in Agricultural Systems Management. That same year, he also graduated from the Missouri Auction School.

Bart was born in Hermann and is married to Sarah (Young) Korman. They have two sons, Wyatt and Grant. They attend Immaculate Conception Church in Montgomery City. 🇺🇸

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PRESIDENT

Should a College Degree be a Required Element of Professionalism

by Donald Johnson, PS, 11.06,2018

I recently attended a continuing education seminar where amendments to our state land surveyors act were being discussed. Running through the various texts, we came to the section of our act that outlines requirements for licensure as a Surveyor Intern. The most notable change to this section concerned educational requirements to sit for the fundamentals of surveying examination. With the intent to increase licensure, our act was amended to allow candidates with a baccalaureate degree in any subject including 24 hours of surveying courses to qualify for the exam. Prior to the change, a candidate needed a baccalaureate in land surveying or related science plus the requisite 24 hours of surveying.

Personally, I support the change and found it relatively insignificant. However, a passionate discussion began when the audience was asked to voice its opinion regarding the amendment and the value of requiring a four-year degree at all. While we generally acknowledged the need to increase our numbers, opinions were mixed on the degree requirement.

Some proposed a technical associates degree. Others were hell bent on the four-year requirement, rationalizing ... “if we want to be on par with engineers and architects we need to keep it”.

I interjected that I would like to see a non-degreed path to licensure. Something requiring a combination of college course work and on the job experience. One of the guest speakers responded to my comment, retorting ... “in some States you cannot be considered a professional without a college degree”. As a non-degreed surveyor, I fully understand my bias on the topic, nevertheless, this comment got under my skin. Whether it is true or not is not the issue—rather why does the opinion exist at all? After all, I considered myself a professional.



(continued on next page)

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Should a College Degree... (continued)

I founded my own survey firm shortly after obtaining my license, problem solved with attorneys, engineers, planners and many other design and legal professionals over my thirty-three-year career. I can't recall a single time that my professionalism has been called into question. Quite the opposite, I remember receiving complements for my professional conduct. The thought that my life's work in the survey profession is somehow relegated to a lower status, simply for not possessing a college degree, is disturbing.

That's not to say that I believe that obtaining a college degree is a bad thing or that schools are not preparing students adequately. To the contrary, obtaining a college degree should be rewarded as being the most desirable and quickest way to becoming licensed. However, it should be viewed from the proper perspective and assigned appropriate weight. After all, what unique knowledge is bestowed on a college student between eighteen and twenty-two years of age that so separates them from their non-student counterparts, that are actively working in the profession?

Is it the history of the U.S. Rectangular Survey System? If so, any authoritative book on land surveying will provide insight on that subject. Maybe some form of special math or science? I've taken college level math and science classes, but I can safely say that my high school courses would have sufficed to solve any survey computation I've encountered so far. Attorneys at law have some of the highest educational requirements of any profession; following this logic, lawyers as a group should be a paradigm of professionalism. These are our current and future judges, many ascending to high political positions, making and shaping the laws that govern us. But you need to look no farther than their billboard advertisements to find evidence to the contrary.

Professionalism manifests itself based on our beliefs and personal ethics that were developed over our lifetimes. In fact, our parents probably had a greater influence on our professional capacity than any college course or job training experience ever will. Professionalism can't be legislated into existence—which is the primary reason I rallied against mandatory continuing education before it was enacted in Illinois. It became clear to me early in my career, that if an individual did not possess the drive, commitment and most importantly the passion to continue learning on their own, no amount of mandated study would substitute. You either conduct yourself in a professional manner or you don't. There is no middle ground.

For reasons that escape me, we tend to compartmentalize things to the point of being meaningless—for instance, the topic of ethics. In my state of Illinois, surveyors are required to have taken two professional development hours in ethics every renewal period. This is not entirely unreasonable, but what is it really teaching us? Ethics class for me typically consists of three to four real-life examples of abhorrently reckless surveyors attempting to cover up a mistake they made, resulting in damage to one or more parties. This is usually followed up with a short question and answer session. Where is the mistake? Was it ethical for said surveyor to withhold this information from his client? Blah, Blah, Blah. Of course not, it's a cover-up! And why was the reckless surveyor attempting to cover up their mistake? Because he doesn't want to pay for the damages and admit the embarrassing mistake. A perfect example of the ageless dilemma of choosing between right and wrong.

Certainly, there exists cases where the difference between right and wrong is nebulous, but in the end, it still comes down to a binary choice between right and wrong. Simply put, you can't be a professional without first being ethical. The two are mutually inclusive. You can't develop ethics over the span of two hours biannually—nor can it be obtained in the four to five years spent earning a baccalaureate degree.

Mentioned earlier, but worth repeating, professionalism is based on our beliefs and personal ethics which combine to create our principals. Principles guide our moral compass and help us navigate the right and wrong in the decision process. In my opinion, this the only required element of professionalism. As practitioners of the profession, we are the sole arbiters of professional conduct and bear the responsibility for policing our peers. We do this through our state board of registration. Should we decide to define professionalism in terms of college, I believe that we will have effectively ceded our authority to the universities. 📌

Donald Johnson is a licensed Land Surveyor in Illinois and Wisconsin. He currently serves as survey manager for Omega and Associates in Lisle, Illinois. Prior to this, Don co-founded and operated a small survey and engineering firm located in suburban Chicago



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New Board Member

Missouri Board for Architects, Professional Engineers, Professional Land Surveyors & Professional Landscape Architects

Jerrod Hogan, PLS, was appointed on September 20, 2018, by Governor Mike Parson to serve as a member of the Professional Land Surveyors Division of the Board. He replaces John Michael Flowers, PLS whose term expired. Jerrod was born in Connersville, Indiana and has lived in Joplin, Missouri for the last eighteen years. He has been married to his wife Melissa for nearly sixteen years. Melissa owns an insurance agency and a storage facility, and has the full-time job of keeping Jerrod in line. Jerrod has three children. Shae is 19 and is enjoying her second year at Purdue University. Miles is 12 and excelling through the transition to middle school for his 6th grade year at Joplin Schools; and Ava just turned 10 and is a sassy 4th grader at Joplin Schools who brings incredible energy to every occasion. Jerrod and his family enjoy golfing, camping, fishing, boating, traveling and SCUBA diving. Jerrod is very active in his home community of Joplin. After the devastating Joplin tornado in 2011, Jerrod started a nonprofit called Rebuild Joplin. The nonprofit, with the help of many donors and volunteers, was able to rebuild 181 homes that were damaged or destroyed in the storm. Jerrod is grateful to the many professional Architects, Engineers, Land Surveyors, and Landscape Architects who gave time and treasure to help Joplin rebuild. He currently serves on multiple nonprofit boards and is Chair Elect for the Joplin Area Chamber of Commerce. He believes strongly in being an active participant in his community. Jerrod is also an instrument rated pilot who enjoys flying small airplanes for fun and work. His lifelong passion for aviation led him to be an early adopter of utilizing drones to support Land Surveying projects. Jerrod has been a licensed Remote Pilot for the past few years, and enjoys traveling and speaking to Land Surveyors and Engineers about the benefits of drones in our industry.

Jerrod started his Land Surveying career in Indianapolis, IN in the mid 90's and fell in love with the profession. In the summer of 2000, he moved from Indiana to Missouri to be close to family. Soon thereafter, he joined the survey department at Anderson Engineering, Inc. as a field party chief. In his sixteen years at Anderson, he has held nearly every position in the survey department from running an instrument to running a field crew and drafting

to managing a survey department. He feels very fortunate to have been mentored at Anderson by very professional and dedicated engineers and surveyors.

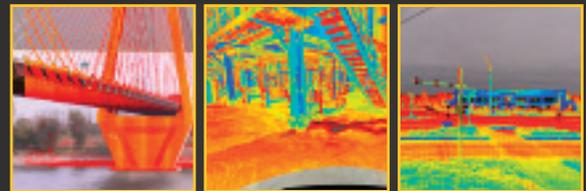
He is currently transitioning into his newest role as President of Land Surveying and Business Development for Anderson which will be effective January 1st, 2019. Jerrod was recognized as one of the "15 People to Watch" in 2009 by the Joplin Regional Business Journal (JRBJ). In addition, he was recognized as one of the "Regional Men of Distinction" by the JRBJ in 2014. In 2014 Jerrod was recognized by the Red Cross as an "Every Day Hero," and was one of Professional Builder magazines 40 under 40 in 2015. Jerrod was a charter member of the Southwest Chapter of the Missouri Society of Professional Surveyors and was the founding president. At the time of his appointment, he was serving on the board of directors for the Missouri Society of Professional Surveyors. Jerrod has always been an active servant leader. He is extremely honored to be appointed for this role, and looks forward to serving alongside the other Board Members. 🇺🇸



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NEWS & VIEWS

National Society of Professional Surveyors

October 24, 2018

NSPS

Maryland Surveyors Celebrate Workforce Development Program

The Maryland Society of Surveyors (MSS) recognized interns its summer 2018 Future Surveyors internship program at their annual conference on October 19 in College Park, MD. Pictured (l-r) are Nikki Rucker, Program Director of the Urban Alliance of Baltimore; Kyree McLeod, Ca'Mara Salmon, and Shania Savage, interns; Stephanie Amponsah, Executive Director, Urban Alliance, and MSS President Jeremy Burns.

The MSS Baltimore Chapter began a workforce development program with the Baltimore Mayor and the Urban Alliance, surveying outreach to high school seniors, as well as summer jobs in surveying. Bryan Haynie, chair of the Baltimore Chapter and chair of the MSS Workforce Development Committee, led the program. For

NSPS info on beginning a workforce development program to recruit the next generation of surveyors: www.nspss.us.com/page/WorkforceDev.



NSPS

The Federal Land Rights Series — Exploring Boundary and Title Issues in the Federal Context

This article is part of a quarterly series on the wide variety of issues associated with boundary and easement disputes which arise in the federal context, emphasizing the importance of understanding the historical origin of federal land rights, from the perspective of a professional land surveyor. This 15th article in the FLRS takes us to Lake Rogers, a veritable paradise which forms a particularly beautiful portion of the historic Atlantic Intracoastal Waterway, near Boca Raton, to learn how the federal Quiet Title Act operates in the riparian easement context. Finding a marvelous location like this one for a dream home might seem like a fantasy, but converting dreams into reality can be immensely problematic, when powerful federal policies converge upon that location.



October 10, 2018

New Mexico Professional Surveyors

Recent Action by the Governor of New Mexico Affects Licensure

From a recent article in the Albuquerque Journal; “Professionals in certain occupations could practice without a state license if they have consumer consent, under an executive order signed by Governor Susana Martinez ... “ The Executive Order states that “boards” and “commissions” affected include the State Board of Licensure for Engineers and Professional Surveyors. Read the article at:

<https://www.abqjournal.com/1228841/governors-order-no-license-needed-for-many-occupations.html>

September 19, 2018

NSPS

ALTA/NSPS question!

Can you explain to me what’s going on with Title Companies referencing “draft” surveys in Title Commitments relative to potential encroachments? This is very confusing and concerning to me as the Title Commitment refers to a “survey” with a specific date. These are only draft surveys that will not be sent to the County to be filed, nor are they kept by us after we update the survey. I am seeing this on a lot of Title Commitments lately. How should they be addressed on the revised ALTA/NSPS Land Title Surveys?

Answer: This is becoming more common, although I don’t know that it is becoming “normal.” It makes no sense to me that they are referencing “draft” surveys because those are not complete nor signed. If I saw that, I would probably ask the title company and point out exactly what you said – a draft is not a final drawing, and it is not saved in any form, so making reference to a “draft” survey is risky and nonsensical.

An associated problem is that attorneys often then want the surveyor to note, on the final survey, the potential encroachments noted in the title commitment as being shown on the “draft” survey. I refuse to do that because it is (1) a circular reference, and (2) it is a reference to an unfinished, unsigned document.

August 29, 2018

NSPS

Get Kids Into Survey ‘Mining’ and ‘Smart Cities’ posters popular items!



Get Kids Into Survey poster - ‘Mining’.

(continued on next page)

NSPS News & Views (continued)

Thanks to the many who have responded by ordering these posters through Trish Milburn (trisha.milburn@nsps.us.com) at NSPS. You can also order them by visiting www.getkidsintosurvey.com! Use discount code POSTERGIVEAWAY18 to order. Contact Trish for information!



Get Kids Into Survey poster – ‘Smart Cities’

(continued on page 25)

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City Land Surveyor Builds from the Ground Up

by Nicole Roberts, Jefferson City News Tribune, November 11, 2018



Land Surveyor Ric Hurst in his office at Jefferson City Hall. Photo by Sally Ince/News Tribune.

With more than 30 years of experience under his belt, Jefferson City registered land surveyor Ric Hurst has built his career from the ground up and continues to hone in on his skills.

As a registered land surveyor with the Jefferson City Public Works Department, Hurst does a variety of work, such as solving right-of-way or alleyway disputes, deciding where property lines run, and staking out various locations for proposed construction projects. He also assists the Jefferson City Police Department when they respond to fatal car wrecks by mapping the crime scene.

Hurst worked on various projects over the years, such as the Hyde Park area, now home to the Jefferson City Animal Shelter, Jefferson City Fire Department training facility, and the Jefferson City Street and Sewer divisions buildings.

“Just to see the ground from back in the early ‘80s to what it is now is pretty amazing — just to go from the raw, completely untouched ground, to the product it is today,” he said.

The various work projects keep his days interesting.

“Everything has its own application,” Hurst said. “Everything has to be done differently and every job is

unique and where the setting is and what we’re having to do at each one. I like the diversity of the job. Some of them seem are mundane in a way you work on it for a few days, weeks, even months, but then it’s done and you move onto the next one.”

Hurst first came on with the city 33 years ago as a survey technician and worked his way up the ladder by getting his pre-license and license. He landed in his current position in 2005.

Hurst previously worked as a surveyor for the Callaway Nuclear Plant during its construction and at Central Missouri Professional Services before working for Jefferson City.

Map making became Hurst’s passion, which was evident by his desk. Various maps rested on his gray desk while others were tacked to boards overlooking his work area. Pens, pencils, and pink and yellow highlighters marked different items on the documents.

“I really like map making,” Hurst said, pointing at a white map on his desk. “I like to see the ground for the way it is and how it’s transferred on paper.”

Part of his job entails analyzing documents to understand the history and layout of a piece of land. While he wasn’t a fan of history at first, Hurst learned to embrace the land’s past, reviewing maps and documents that go back before the founding of Jefferson City or even the United States. Now, he said, he is making his mark in history.

“I talked to an old guy years ago and I told him, ‘I find myself being a little more interested in history,’ and he said, ‘Because you’re living it. You’re becoming part of history,’” Hurst recalled. “I didn’t realize how profound that was until years down the road. Since I’ve been here a long time, people will ask, ‘Remember when you did this or that?’ So, I’m a little bit of a walking history book.”

His hard work at Jefferson City hasn’t go unnoticed. Hurst received the 2018 City of Jefferson Outstanding Service Award last month, which he said was “overwhelming.”

When he’s not working as a land surveyor, Hurst enjoys working on his farm and spending time with his wife, four children and three grandchildren. 🇺🇸



National Geodetic Survey

Positioning America for the Future

NGS News & Events

NGS Posts Imagery of Areas Affected by Hurricane Michael

October 15, 2018

NGS collected, processed, and posted on its website aerial imagery of areas affected by Hurricane Michael. Imagery was processed and posted online within approximately four hours of the flights, and may be viewed online via the NGS aerial imagery viewer. NGS began response efforts on October 11, one day after landfall. NOAA's King Air aircraft, operating from Mobile, AL, collected 9,580 images covering 10,756 square kilometers of the most heavily affected areas.

The imagery assessed coastal impacts to navigation and identified landing zones for helicopters to deliver supplies to areas cut off by the storm. NGS thanks the NOAA Gulf of Mexico Disaster Response Center in Mobile and its staff for assistance in staging operations and uploading imagery. The U.S. Coast Guard incident command post also used the imagery to coordinate response efforts. Data is available covering inland areas between Florida's State Road 20 and Interstate 10; areas north of I-10 and west of Lake Seminole; coastal areas west of Panama City; and inland areas near Apalachicola.



Roof damage to aircraft hanger at Tyndall Air Force Base, Florida.

Scoping Study for New National Spatial Reference System Database

October 12, 2018

NGS recently completed a scoping study to investigate how to reprocess older survey observations to be compatible with the new National Spatial Reference System (NSRS) database. The study sampled projects that are currently part of the NGS Integrated Database, retrieved the original data, scanned field logs, and attempted to reprocess the data with OPUS-Projects, the latest extension of the NGS Online Positioning User Service (OPUS). The scoping study provided significant insights that NGS can use to develop its new dynamic database.

NGS Scientists Describe Positional Reference System Changes

Friday, September 28, 2018

At a meeting of the **Civil GPS Service Interface Committee** (CGSIC), several NGS scientists described the significant upcoming changes for the surveying, mapping, and geosciences community with modernization of the **National Spatial Reference System** (NSRS) in 2022. The modernized NSRS will be founded primarily on Global Navigation Satellite Systems, such as GPS, as well as an updated and time-tracked geoid model. The CGSIC is the recognized worldwide forum for effective interaction between all civil GPS users and U.S. GPS authorities.



Civil GPS Service Interface
Committee

CORS Sites Upgraded in the Great Lakes Region

September 06 , 2018

NGS and the Center for Operational Oceanographic Products and Services (CO-OPS) cooperated to upgrade communications and power systems at four **Continuously Operating Reference Station (CORS)** sites co-located with water-level stations in the Great Lakes region. A common, accurate, and well-defined height reference datum for water levels is essential for coordinated international management across the Great Lakes. Since the region is prone to postglacial uplift, understanding height and water-level changes over time is crucial for safe navigation and other activities.

Improving the International Terrestrial Reference Frame

August 31 , 2018

NGS recently conducted a site survey at the National Radio Astronomy Observatory in Brewster, WA. The objective of the survey was to precisely measure the geospatial relationship between reference points associated with a Very Long Baseline Array antenna station and a co-located Global Navigation Satellite System and **Continuously Operating Reference Station (CORS)**. The International Earth Rotation and Reference System Service uses information from local site surveys, along with observations from space geodesy techniques, to improve the International Terrestrial Reference Frame (ITRF). Improvements to the ITRF will provide more accurate measurements for activities requiring high-accuracy positioning, such as monitoring sea-level change.



Credit: NRAO/AUI/NSF

(continued on page 34)

Southwest Missouri Surveyors Work for 2022 Datum

by Donald Martin

With each passing day surveyors and their associates in geospatial communities move closer to impending changes of the National Spatial Reference System in 2022. That year will mark the replacement of the North American Datum of 1983 (NAD 83) and the North American Vertical Datum of 1988 (NAVD 88) with new geometric reference frames. The new reference frames will be time dynamic systems adjusting for geoid undulations, changes to orthometric heights, gravity anomalies and the resulting changing coordinates to positions throughout the system. Free from the constraints of the current fixed location system based on terrestrial surveys of monumented positions which deteriorate over time, the new reference frame will be a system reflecting a new era of refined measurements incorporating GNSS derived results and gravimetric geoid modeling redefinitions to the vertical datum. The new geopotential datums replacing NAD83 will be named for their respective tectonic plates...

- North American Terrestrial Reference Frame of 2022 (NATRF2022)
- Pacific Terrestrial Reference Frame of 2022 (PATRF2022)
- Caribbean Terrestrial Reference Frame of 2022 (CATRF2022)
- Mariana Reference Frame of 2022 (MATRF2022)

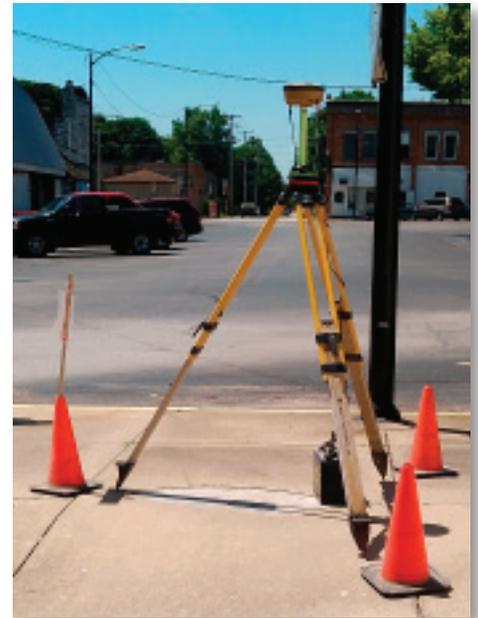
...with the vertical reference NAVD88 being superseded by the North American-Pacific Geopotential Datum of 2022 (NAPGD2022).

The National Geodetic Survey (NGS) is providing guidance to efforts which have taken place to facilitate the upcoming transformation. One of these efforts is the program *GPS on Bench Marks* (GPS on BM). This program called upon the states and private surveyors to make field observations on existing network positions and submit measurement results to NGS. The National Geodetic Survey will use submitted data to support improving the next hybrid geoid model (GEOID18), improve the *2022 Transformation Tool*, and be incorporated in the *Coordinate & Transformation Tool* (NCAT). *GPS on BM* has called on participants to fulfill a three phase set of activities with the “catchy” phrase *Recover, Observe, Report*. This was the shortened form instructions for surveyors to; research existing bench mark

descriptions then physically find the mark, setup and collect GPS observations on the bench marks with accompanying field notes and photographs, and submit the information to NGS via online tools - *Recover, Observe, Report*.

As reported in the March 2018 edition of *Missouri Surveyor* by Jess

Moss, Missouri’s Geodetic Coordinator, surveyors from the Land Survey Program of the Missouri Department of Agriculture have participated in *GPS on BM*. According to Moss, “the Land Survey Program has performed approximately 300, four-hour observations on benchmarks throughout the state of Missouri and submitted the data to NGS.” He also pointed out Land Survey Program efforts to coordinate additional observations by other agencies and private firms. Moss included in the March report an invitation to surveyors to participate in *GPS on Bench Marks*. Well, someone in the Joplin area was paying attention as he was reading...



4 hour GPS session underway. Sarcoxie, 21 June 2018.

The SouthWest Chapter Steps Up

Like a lot of *Missouri Surveyor’s* readers, Monnie Sears (Allgeier Martin & Associates, Inc.) took note of Jess Moss’s article but then went on about business-as-usual. Now Monnie is an active surveyor known to be engaged in the profession beyond his own practice of it; he is a “big picture” guy. He is also known as a leader among his surveying brethren of MSPS’s SouthWest Chapter. Like many the members of the “SW”, being a leader isn’t limited to offices or positions, it is about taking on

necessary roles when effort is needed. The same could be said for Jim Here (Indian Creek Surveying). Jim was reading the same article about the same time as Monnie. And Jim gave serious consideration to the article's title, "Helping To Improve the Next Hybrid Geoid Model." A few days later Mr. Here pays a visit to Mr. Sears and shares an idea in response to Jess Moss's call for "help."

One of the hallmarks of the SW Chapter is the robust continuing education effort they deliver to their members. Under the auspices of their Education Committee, this group of "locals" brings

first-rate programs to a region of surveyors that is just a bit beyond the convenient reach of similar programs in the surrounding four states. As Jim and Monnie shared their responses to the article, a plan to contribute to GEOID18 and provide the surveyors of the SW with a learning opportunity was hatched. The SouthWest Chapter's Education Committee was to make plans for a workshop where those attending would learn how to suitably collect data and in turn contribute to the new datum planned for 2022. Since field observation data was to be submitted to the National Geodetic Survey through their Online Positioning User Service (OPUS), the Education Committee would host an OPUS Workshop. And since the surveyors needed to apply what they learned, they would conclude the program with series of OPUS sessions.



Who You Gonna Call?

In Missouri surveyors benefit from the presence of an informed authority possessed of expertise in matters cadastral and geodetic – the Land Survey Program (LSP) of the Missouri Department of Agriculture. The team of public servants at the LSP don't merely "manage" or be "responsible" for, they provide real stewardship for their charge. In the matter of geodetic surveys they perform them, they contract them, and they teach other surveyors how to do them. So to get the SouthWest Chapter OPUS Workshop right, Here and Sears called on the LSP.

As Jess Moss took the call from Monnie Sears, the Joplin based surveyor started asking for instructions on just how to conduct a proper OPUS session for inclusion in the *GPS*

to BM program. Instead of leading Sears through a series of steps and procedures, Moss twisted the Missouri motto a bit from *Show Me* to *I'm Going to Show You!* That's right. The OPUS Workshop would now include expert instruction from the expert. For good measure Moss also committed others from the LSP team. Joplin bound for the event would be State Land Surveyor Ron Heimbaugh to present *Missouri's Options for Coordinate Systems in 2022*. In tow would be Land Surveyor Ron Lather to provide specific instruction about *GPS On Benchmarks*. Geodetic Section Chief Jess Moss was coming too and he would be introducing the topic of *Low Distortion Map Projections*.

With the LSP onboard and SW members anxiously awaiting the event, the survey party (wink) grew to include interested members of the Ozark Chapter as well. June 21st was picked as the designated day for the three geodesists from Rolla and the Ozark'ers of Springfield to sweep down I-44 to the friendly confines of Joplin and the OPUS Workshop.

Learn, Eat, Recover, Observe, Report

Twenty six surveyors made it to the show on the 21st, ready to get on with the job. The morning start of this *GPS to BM* workday began with three hours of instruction from the LSP team and learning by some of southwest Missouri's finest surveyors. Jess Moss kicked things off with his presentation on Low Distortion Map Projections. *Missouri Surveyor* readers will recall State Land Surveyor Ron Heimbaugh discussing low distortion projection (LDP) zones in the June 2018 edition article *Options for a State Plane Coordinate System of 2022*. LDP's are designated small areas such as counties or topographic regions with their own projected coordinate systems, reducing the linear distortion inherent in larger statewide or state zone projections. LDP's may provide projected coordinates close enough to horizontal ground distances as to preclude required scale factors. Jess discussed the design of LDP's and how they could be used. He also presented comparisons of linear distortion results between LDP zones and coordinates derived in the existing State Plane Coordinate (SPC) System.

Mr. Heimbaugh was next with a session on NGS proposals for the coming new datums and coordinate system in 2022. Ron framed the weighing of choices required to determine

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Southwest Missouri Surveyors Work for 2022 Datum (continued)

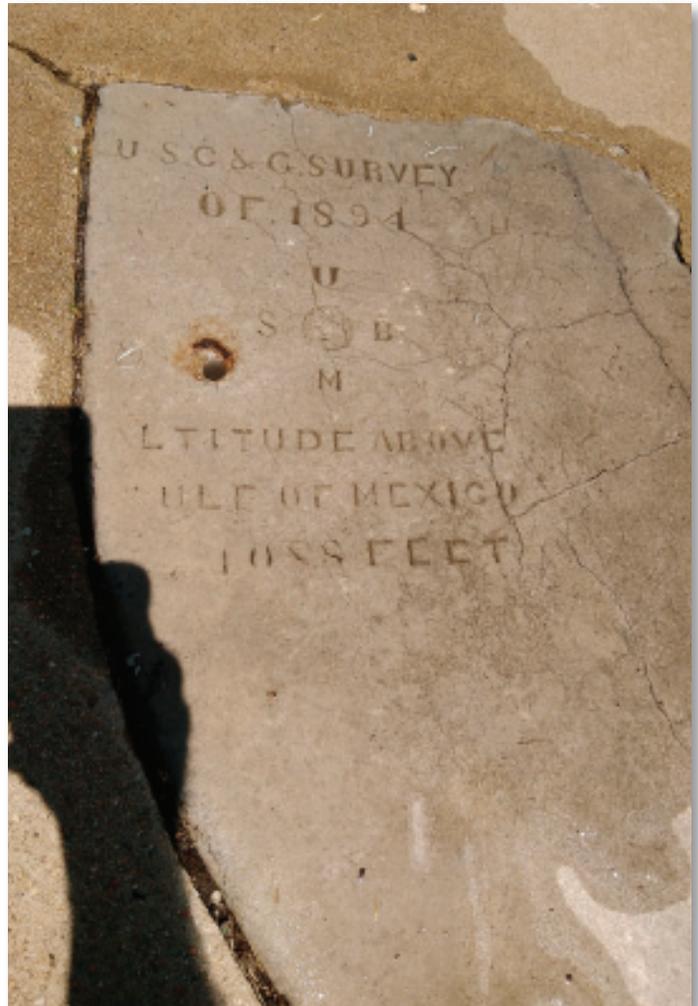
what course Missouri will take in the upcoming datums. For example, the adoption of LDP's would mean replacing Missouri's current three SPC zones. The LDP zones would have to be "small" enough that linear distortion would fall within 20 – 50 ppm. A juxtaposed choice by Missouri would entail a review of the existing three SPC zones by NGS and their optimization to create the lowest distortion for each zone. In just such a circumstance, grid north may change within the zones.

Ron Lather led the group through the nuts-and-bolts portion of the morning session by giving guidance on field observation procedures, data collection and submittal of information through OPUS. The "practical" part of the training, Mr. Lather's seminar guiding participating surveyors through field to office applications to complete the *GPS to BM* process.

Except for a welcomed break of lunch (catfish, brisket, okra, lemonade – sounds more like a summer family reunion in Missouri than a survey for "Helping To Improve the Next Hybrid Geoid Model"!) the balance of the day was spent operationally. Those attending hit the field in the prescribed recover, observe, and report routine. Each station observation entailed a four-hour GPS session followed later by a download of data to computer and transfer of files to NGS by means of the OPUS website.

A noteworthy example from the observation sessions took place in Sarcoux in Jasper County. Station "CV" (PID HE0206) is a First Order Vertical, Class II station from the old U.S Coast & Geodetic Survey. A limestone slab which initially was a step in the entrance to a bank (which has since been razed), the monument was preserved in its place where it now is enclosed on all sides by the concrete sidewalk of which it is part.

Workshop completion marked good things for and from these southwest Missouri surveyors. For them was fellowship and learning; the greatest rewards of any gathering of surveyors. From them were contributions to America and Missouri's geospatial infrastructure with the opportunity of refined means of real 4D positioning and earth models closing the geocentric gap and vertical biases and tilt. 🇺🇸



Station CV, limestone slab with original markings of "U.S.C. & G. SURVEY OF 1894" and "ALTITUDE ABOVE GULF OF MEXICO 1088 FEET".

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NSPS News & Views (continued)

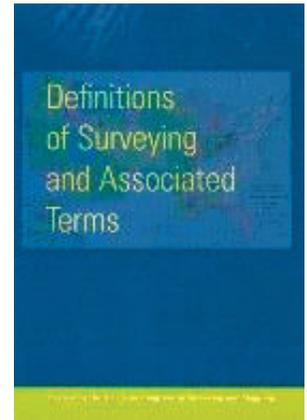
August 29, 2018

NSPS

NSPS is interested in your opinion!

As noted in recent newsletters, NSPS headquarters still maintains for sale a number of books. Among them is the NSPS-owned *Definitions of Surveying and Associated Terms* (2005 edition). We would like your opinion regarding an updating of this book. After all, it has been 13 years since the 2005 edition. There is some discussion going on regarding an update, and even an offer from someone who is willing to do it. **What do you think?**

For information about books that are available through NSPS, visit the eStore at: <https://www.nsp.us.com/store/ListProducts.aspx?catid=429300>, or contact Trish Milburn.



August 8, 2018

Gary Kent/Curt Sumner

Response to recent article entitled ‘Land Sureyors Are Paying the Price of Progress’ by Stephen L. Cater, posted in Bloomberg Opinion, July 19

The public is damaged when their boundary lines are disrupted; the cost to litigate a boundary dispute runs into the tens of thousands of dollars and routinely exceeds \$100,000. This is ultimately why the surveying profession exists, and why Professional Surveyors are licensed in all 50 states.

Without the stewardship of Professional Surveyors, and the responsibility and authority they hold to determine and describe real property boundaries, the entire system of land tenure in the United States would literally break down because boundaries would become ambiguous and conflicted.

This imminent collapse is avoided by what is necessarily a combination of the Professional Surveyor’s expertise as to boundary locations, and the title industry’s business of insuring title.

The insuring of title is one thing; however, the location of those insured title lines is an entirely different issue. Thousands of times every day, title companies (not to mention lenders, buyers, sellers, and owners) rely on Professional Surveyors to locate boundaries and produce maps that are not simply precise, but that are also accurate. Precision is nice – necessary in many cases – but accuracy is imperative.

Professional Surveyors routinely see examples of features that are very precisely located, yet in entirely the wrong location (i.e., inaccurate). For example, anyone can go to a location, and record a very precise latitude

(continued on next page)

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NSPS News & Views *(continued)*

and longitude with their handheld GPS receiver – perhaps to the nearest inch. Yet, if they try later to navigate back to that exact same position using their recorded latitude and longitude, they will find themselves off by at least a few feet, if not a few meters. Why? If they do not know the answer to that, then they are achieving precision, but not accuracy.

Many will remember a few years back when a U.S. Hellfire missile struck the wrong building in the Middle East. Was that an imprecise strike? No – to the contrary – it was extremely precise; it went exactly where it was programmed to go. Unfortunately, it was programmed to hit the wrong building. It was very precise, but fatally inaccurate.

A few feet of inaccuracy is not too bad when hiking, but it is disastrous when locating a boundary corner - and fatal when firing a missile.

This is important because, contrary to popular perception, boundaries are most assuredly not a function of mathematics and geography. We all want our boundaries to be precisely located, but with extremely rare exception, boundary lines cannot be accurately – or, for that matter, legally - defined by GPS, by lines in a GIS, by latitudes and longitudes, or by coordinates.

Technology is a tool used to locate boundaries, but boundaries themselves are defined by a complex, centuries (literally) old body of common law rules as applied to evidence found both in records and on the ground. It is impossible to define a boundary line except by searching for and analyzing evidence found on the ground. Frequently, some of that evidence is a half mile or more away and buried two feet beneath the surface.

GPS, GIS, computer applications, laser scanners, and even drones are tools that Professional Surveyors use to precisely locate features on the earth. Adapting to those technologies was, and to some extent continues to be, tremendously disrupting to a profession whose available technology was fairly static for several hundred years. However, Professional Surveyors have adapted to – and adopted – those technologies as applications are developed that generate high precision while providing for significant time savings.

But when virtually anyone can make precise measurements, the difference between precision and accuracy is more important than ever before.

To summarize, the Professional Surveyor’s duties and responsibilities are to help ensure the integrity of the “American Dream” of real property ownership.

They are the only persons competent and qualified - both under the law (examination and licensure) and by experience and education - to locate property boundaries on the ground, and to map and certify those locations to owners, lenders, title companies and other parties interested in - or with an interest in – real property.

While technologies exist to create precise maps and measurements, people should not be lulled into a false sense of confidence. Precision without accuracy is a snare and a delusion.

Contrary to the statement in the referenced/linked article, *“but I can confidently predict that the market for surveyors will eventually be disrupted. The major disruption will come when the big banks move. When those who finance big projects and big houses decide that a report that relies on GPS mapping is sufficient to mark the metes and bounds of a property, the rising tide of demand will swamp local regulatory resistance”*, when protecting property rights, it is unlikely that land owners will be accepting of the concept that “Close is good enough”. 🇺🇸

Non-Traditional Scholarship Recipient Expresses Gratitude to MSPS

Dear MSPS Members,

My name is Drew Williford and I recently received notice of award for the Non-traditional Student Scholarship available through the Missouri Society of Professional Surveyors. I first want to apologize for my delayed response to you regarding this tremendous blessing. As a non-traditional student, I am currently balancing a busy construction season as the City of Mexico's Civil Engineer, fathering an 18 month old, taking a survey class, and being the general contractor for our new house which we are hoping to break ground on within the next 14 days. By all means, do not take this delay in responding as being unappreciative of the blessing this scholarship provides. I truly cannot express how much of a blessing receiving this scholarship has been during this particular time period of life. Your generosity is deeply appreciated and will be instrumental in staying on course to take the LSIT Exam in mid/late 2019.

My survey professor, Dr. Joe Paiva, has also coordinated an opportunity for students in his class to register for the 61st Annual Meeting of the MSPS at no cost. After discussing this opportunity with my supervisor, I am happy to report that I am now planning to attend my first MSPS Annual Meeting this year. I wanted to take a moment to let you know that I greatly appreciate this opportunity which has been developed through coordination between MSPS and Dr. Paiva. I look forward to the opportunity to meet both the general members of MSPS and also those who volunteer/work for MSPS at this meeting.

*Sincerely,
Drew Williford*

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YouTuber Features the Story of a Colonial Survey

by Donald Martin

Like so many these days my evening television and movie time has given way to YouTube video viewing. Yes, when the day offers idle moments I lift my miniature library/movie theater (smart phone) to a seeable position about a foot and a half in front of my face, take on my version of a zombie's 1,000 yard stare, and drift away in to the realm of cat videos, DIY's and sports bloopers. It expands my mind every time!

Also like so many others I have wandered away from the serious, heavy viewing I already mentioned towards those channels who's content speaks to interests I have. Now I don't have to tell fellow surveyors that one of the most interesting historic eras was the American colonial period and the founding of our nation. Indeed, so many of us share pride in the significant roles surveyors played in this period. Their names and their works are among the genesis lore of this great land and they are not hard to recall – Mason and Dixon locating a line which forever bears their names and serves as the demarcation between the North and the South; surveyor Peter Jefferson, the father of the Declaration of Independence's author; Andrew Ellicott laying out the bounds of a young nation's capital and federal district; Benjamin Banneker, America's first black man of science and astronomical observer for the survey of the District of Columbia; and of course the Fairfax County Surveyor of Virginia, George Washington. Often is the case where a surveyor's study of these national fathers of our profession leads to an interest in the broader, general history occurring during that time. I am one of those. Well, YouTube stands with history books, atlases, and reproduction art as my gateway into this portion of the past.



Among YouTube venue's offering content for viewer journeys into colonial America, one of the best is the Chanel entitled Townsends. The product of Jonathan Townsend, it is a masterpiece of what he describes as "a channel dedicated to exploring the 18th Century lifestyle." Not merely a recounting of dates, battles and the names of famous men Townsends is passage into the folkways, activities and vocations of those who walked and worked with America's founders. Jonathan does this much as surveyors conduct their own work; he trails the steps of those who came before and relies on their very words as opposed to reports of historian interpretation and conjecture. Episodes from his channel will have Mr. Townsend travel on water by dugout canoe, cooking the foods of the enslaved on open fire, joining in the raising of a log barn, and working with primitive tools.

When "turning" to this favorite channel of mine a little more than a month ago I was so pleased to see that the "star" of this show had released an episode about a subject near and dear to my heart...surveying! "Who Decided the U.S. State Lines?" was an eleven minute feature covering the 1727 survey of the Virginia-North Carolina boundary line as told by William Byrd II in the book Colonial American Travel Narratives.



(continued on page 30)

Jonathan Townsend in a Wool-Felt Round Hat available on his website Townsends.

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YouTuber Features the Story of a Colonial Survey (*continued*)

Jonathan has kindly provided a transcript he used for narrating this episode for publication in our newsletter. He also invites readers to join him in his exploration of the colonial peoples and land which became the United States of America at: <https://www.youtube.com/user/jastownsendandson>. Also check out his site featuring 18th Century Reproduction Clothing and Accessories, Townsends at: <https://www.townsends.us>.

Editor's Note: The following is a transcription of the narrator's "performance." Readers are advised to bear in mind the realities of narration – one does not speak as one would write. As such, the text (with a few edits to help reader understanding) which follows reflects Mr. Townsend's story as told. Do not count on the crafting of phrases, the careful explaining found in writings nor the formality of syntax a reader's mind expects. Instead, enjoy this for the spoken word performance it is as Jonathan gives a comfortable, natural improvisation of the story of Byrd's 1727 survey of a colonial border. Or better still, view the YouTube video!

Who Decided the U.S. State Lines?

Narrated by Jonathan Townsend

Today I wanted to talk about something that you don't necessarily hear that often about. Unsung heroes in a way and a thing that happens in the Colonies of the 18th century but we don't really give a whole lot of thought to it. It is "who's drawing the lines on the map?" Or in this case "who's drawing the map around the lines."

In 1727, early on in the 18th Century, William Byrd II is part of a commission from Virginia joined with another set of commissioners from North Carolina to survey the line or set the line that is the demarcation between North Carolina and Virginia. They have a couple of surveyors, what they call mathematicians to come and help them as well as 15 or 20 woodsmen to go along with that group of people to survey the line between those two colonies. Of course the King had sort of drawn a line and there was an agreement between the two governors but they didn't know where that line actually went so they needed to send some folks to go in and survey that line. William Byrd is part of that; he does his part as a commissioner and is given the job of recording the events.

Drafting written records of the events, William Byrd makes two sets of records; the private and the public versions. The public set goes to the Governor. The other set which he does on his own is in the form of a private sort of correspondence with himself. I don't know if he really intends to publish it but he kind of gives his own personal thoughts about the private things happening. This is published within the Colonial American Travel Narratives (Penguin Books). This is an excellent book with four different journals about colonial life.

In Byrd's secret journal he actually gives funny names to the characters because he's saying not so necessarily nice things about them so he doesn't want to use their real names. It turns out though I think, that as you read this narrative the true heroes of this survey are the woodsmen. The guys with their feet on the ground actually making this undertaking work. In fact you kind of get a real feel for it pretty much right away when he talks about the provisioning of this group of men and the accommodations.





Most of the time the commissioners they have along with them have two tents; a Markey tent probably for the supplies and then a smaller tent for their sleeping accommodations. They

don't describe it more than just saying a tent. And the vast majority of the time when they're out in the "field" they're actually staying at local houses. These areas they're going to aren't necessarily completely devoid of habitation - except for one spot. So they're staying in houses while the woodsman and the guys actually doing the work are out there in the field. These guys don't have tents; they don't have anything! I'll describe a little bit of their sleeping arrangements here when I get further on.

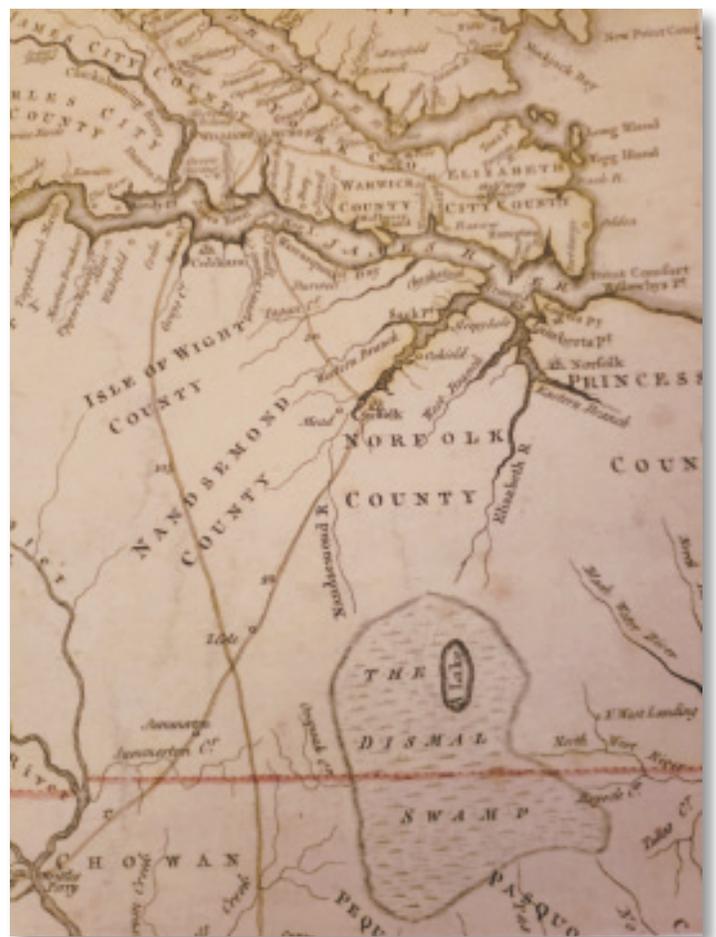
Let's talk about the supplies for these men. Here the commissioners were supplied with two kegs of wine, two kegs of rum, a hundred and seventy three pounds of bread and several other conveniences. So there's what they've got here and really they only talk about wine rum bread and conveniences. While he actually says here "the commissioners" were supplied, these are probably supplies for all the men. The funny thing about this bread is when he says "bread" he probably means ship's biscuit or we might term it in a later century "hardtack." And it is very much hard tack because he actually describes one of the commissioners losing a tooth chewing on his ship's biscuit!

Later on...yeah, he describes here a few pages later during the journey "Shoe Brush" (which is one of his names for one of the North Carolina commissioners) in champing on a biscuit which forced out one of his teeth which an unlucky flux had left loose in his head. Many times [they had] different sorts of diseases in the 18th century and specifically something like scurvy will loosen your teeth. So he already had a loose tooth and he busted it out. He was also complaining of gout and he had to walk two miles regardless of his gout. These men had a lot of different health complaints as they were going into the field. We don't hear about the health complaints of the of the woodsmen who were actually out there in the field the whole time.

Part of the places that they had to survey was this area known as The Dismal. It was a large swamp and the swamp was something like 30 miles long and 15 miles wide at the

point where it needed to be surveyed across. They were really concerned and as they sent these woodsmen out with provisions into the Dismal, Byrd writes on the 14th "this morning early the men began to make up their packs they were to carry on their shoulders into the Dismal. They were vittled for eight days which was judged sufficient for the service. Those provisions were the blankets and other necessaries [which] loaded the men with a burden of 50 or 60 pounds each. Orion", that's a name of I think the surveyor, "helped most of all of these loads [be] so heavy by taking his bed and several changes of raiment, not forgetting a suit for Sundays along with him." So here are the woodsmen, they've got their packs they've got their blankets, they've got their food, and the surveyor who's sort of... you know, the guy in charge, as they go out he says "no, I want to take along a bed." Their specifically, probably like a rope bed or something and he wants to take a lot of extra clothes. Why he needs Sunday clothes when he's in a swamp we don't know.

(continued on next page)



The Dismal, plotted on the Fry-Jefferson "Map of the Most Inhabited Places of Virginia" from 1755.

Who Decided the U.S. State Lines? *(continued)*

Here's a bit about what the Dismal was like. "Immediately we entered The Dismal - men clearing the way before the surveyors to enable them to take their sight. The reeds which grew about 12 feet high were so thick and so interlaced with briar's that our pioneers were forced to open a passage. The ground, if I may properly call it so, was so spongy that the prints of our feet were instantly filled with water. And among the reeds here stood white cedar commonly mistaken for juniper."



Reed covered expanse of The Dismal.

The commissioners sent off these men into The Dismal and they themselves went back to more or less civilization and stayed while complaining about their lack of work to do and how boring it was waiting for these guys to finish their survey of The Dismal. They went on ahead where they expected them to come out of the swamp and waited and waited. These men did not appear suddenly, and actually the commissioners were kind of fearful of them as they knew that they did not have enough provisions with them to last the time that they were spending in the swamp. So there was some concern about these men who were struggling through the swamp surveying up the line. So while these men are out in the swamp the commissioners actually sort of get extra supplies which other people send them along the Way. Let's see, Captain Meads sent a cart to the commissioners and brought to them two dozen quart bottles of excellent Madeira wine, a dozen pottle-bottles (those are half gallon bottles) of strong beer, and a half a dozen quarts of Jamaica Rum. Now the commissioners probably drank most of this themselves. They did send off some of the strong beer to the men into the swamp... so very kind to them I'm sure (sarcastically).

Byrd does go on to describe how the men survived in the swamp and particularly their sleeping conditions. He says the way the men would secure their bedding from moisture in The Dismal was by laying cypress bark under their blankets which made their lodging hard but much more wholesome. They had this problem with basically water being everywhere and so they had to sort of make little piles of bark to keep them up out of the water so that they could sleep without just laying in the mud. At an earlier point they were divided into differing groups of woodsmen and it had to be determined which would be separated out

and sent into The Dismal. Amongst the woodsmen they actually fought for places within that group so that that they could go. They exchanged lots and some of them kind of bargained their way into that knowing that there was some amount of glory to be had by undergoing the hardships of traveling through the swamp. After this part of the mission I'm not sure they were so happy that they fought for their right to survey the swamp itself!

This really gives us a great portrait of what life was like in the early Eighteenth Century in colonial America. It's difficult to get a good grip on exactly what that was like; this helps us a lot to understand what life was like back then. The life of regular people... common people and well-to-do people. A true picture of sort of what life was like. We can read a modern author and get a glimpse of that but if we want to get a truer picture reading these original narratives really helps. I want thank you for coming along on this journey as we traveled this line. We went back into The Dismal swamp and we can imagine how hard it was going and surveying that line and you get a picture of these people as they're doing it. I want to thank you guys for all your great comments and for watching our videos. Make sure to subscribe if you haven't already. We do a lot of videos...some just like this journal readings or colonial cooking videos and so on. There's always great new content out there and I want to make sure you get those notifications. So make sure to subscribe to the channel and thank you guys so much for all your great support watching our videos, commenting, all that great stuff. Thanks for watching today. 🇺🇸



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NGS News & Events *(continued)*

GRAV-D Data Collection Completed for Mainland Alaska

August 23, 2018

NGS completed airborne gravity data collection over mainland Alaska, part of the **Gravity for the Redefinition of the American Vertical Datum (GRAV-D) project**. Collecting gravity data in Alaska presents many technical, logistical, and weather-related challenges, and the achievement is the culmination of many years of surveying. The data collected will help improve mapping applications in Alaska, particularly for elevation and height information. GRAV-D plans on returning to Alaska in FY20 to complete surveys of the Aleutian Islands. GRAV-D is estimated to provide more than \$4.8 billion in socioeconomic benefits to the United States through improved floodplain mapping, coastal resource management, construction, agriculture, and emergency evacuation planning.



The pilot and co-pilot of a Navy-owned King Air aircraft prepare for takeoff on a data collection flight with GRAV-D instruments (fore and mid-ground) and a GRAV-D operator as their payload.

NOAA. What is GRAV-D? National Ocean Service website, <https://oceanservice.noaa.gov/facts/grav-d.html>, accessed 9/12/2018.

NGS Participates in International Geodesy Discussions

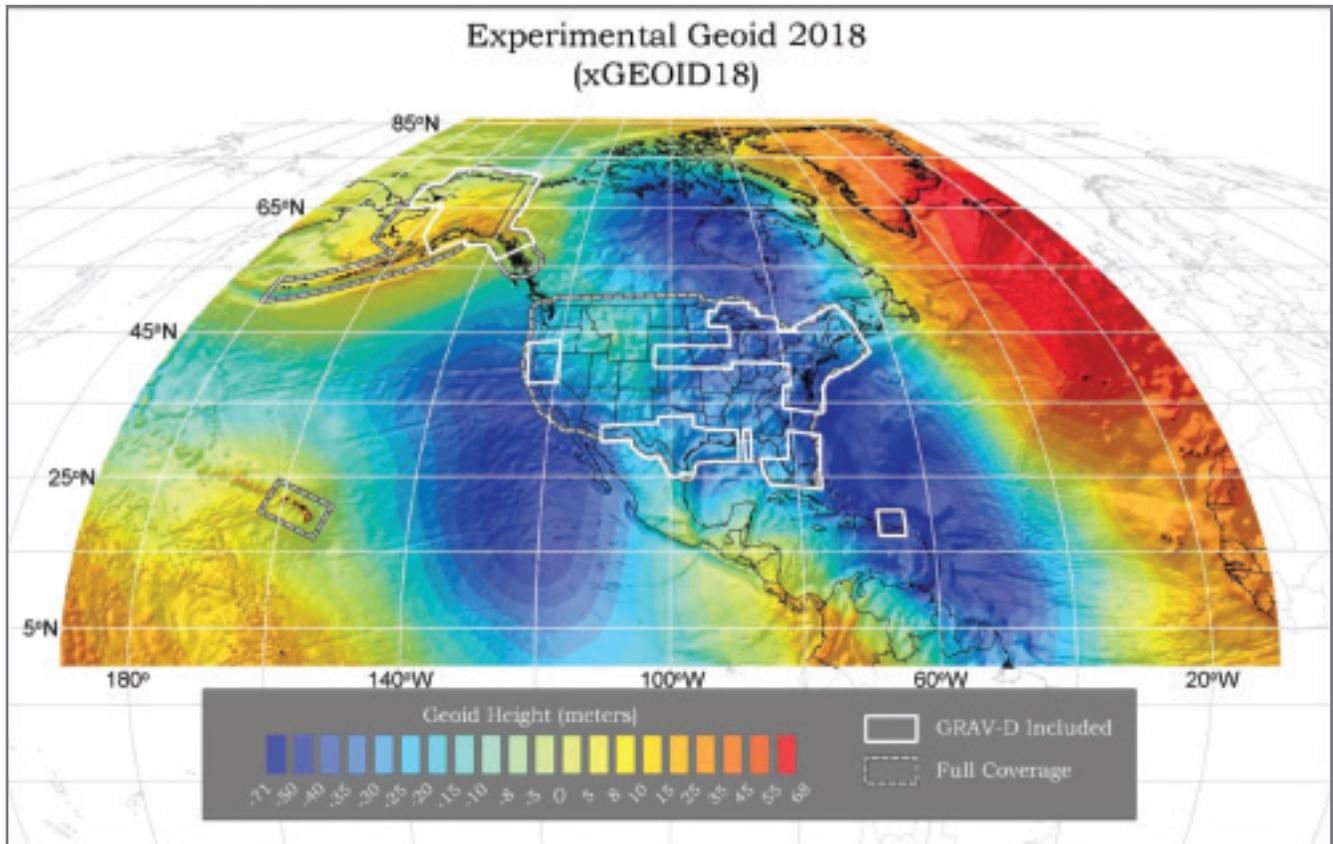
August 16, 2018

NGS took part in **international geodesy policy discussions** at the United Nations Headquarters in New York City. The UN recognizes the growing demand for precise positioning services, the economic importance of a global geodetic reference frame (GGRF), and the need to improve global cooperation within geodesy. The GGRF is a framework that allows users to precisely determine and express positions on the Earth and to quantify changes of the Earth in space and time. Most areas of science and society at large depend on being able to determine these positions at a high level of precision

NGS Releases Annual Experimental Geoid Models

Friday 10 August, 2018

NGS released its **2018 experimental geoid models**, xGEOID18a and xGEOID18b. A geoid is a reference surface. It defines zero elevation, providing the foundation for measuring precise heights. Accurate heights are critical to numerous scientific endeavors, including understanding and protecting low-lying coastal ecosystems. The **xGEOIDS** provide a preliminary, but increasingly accurate, view of the changes expected from the scheduled 2022 release of a new geopotential datum. This year, both geoid models expand coverage beyond previous ones, extending from the equator to the North Pole and including the areas around American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands.



NGS. Experimental Geoid 2018 (xGEOID18). NOAA website, <https://beta.ngs.noaa.gov/GEOID/xGEOID18/index.shtml>, accessed 9/12/2018.

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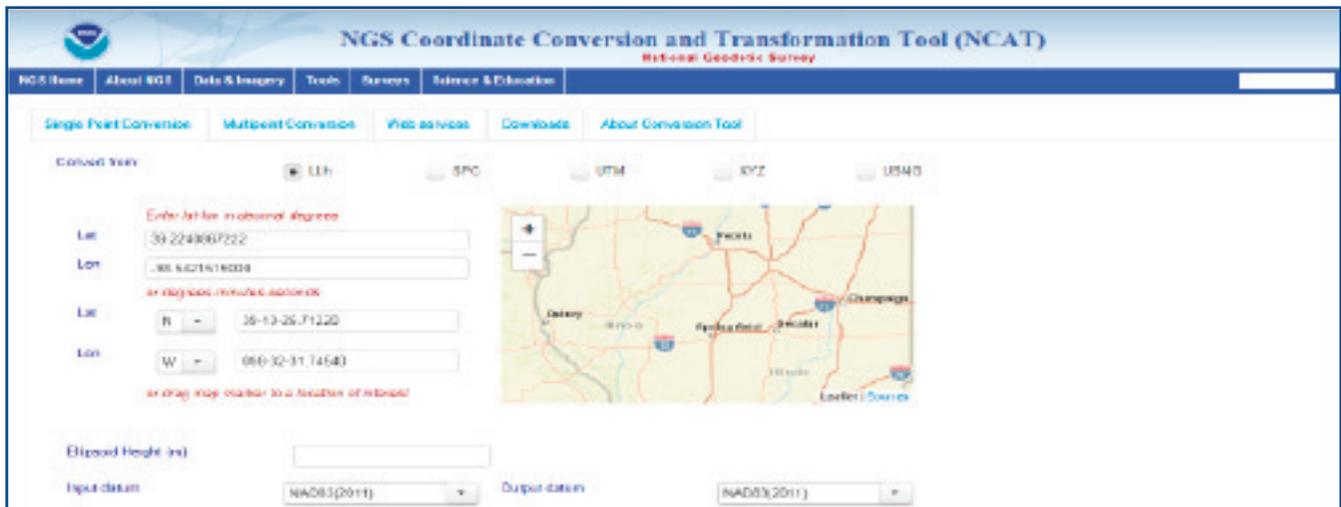


NGS News & Events *(continued)*

Improving Access to the National Spatial Reference System

Thursday August 2, 2018

NGS updated the [NGS Coordinate Conversion and Transformation Tool](#), improving access to the National Spatial Reference System and fostering efficient use of NGS positioning products. This one-stop tool makes it convenient to convert and transform geographic coordinates for a variety of geospatial applications. It is available both as a web service and to download for offline processing.



NGS Presents Plans for North America's Positional Reference Frames

Monday, July 27, 2018

The NGS chief geodesist presented "Regional Reference Frames for North America: Current Status and Future Plans of Regional Sub-Commission "SC1.3c" at the [Commission on Space Research \(COSPAR\) Reference Frames for Applications in Geosciences \(REFAG2018\) meeting](#) in Pasadena, CA. COSPAR promotes scientific research in space on an international level, emphasizing the exchange of results, information, and opinions, and providing a forum open to all scientists to discuss problems affecting scientific space research. Reference systems and frames are of primary importance for research in the geosciences, satellite orbit determination, precise navigation, and numerous practical geo-spatial applications.



Promoting the Importance of Modernizing the Nation's Vertical Datum

Friday, June 29, 2018

NGS recently underscored the significance of modernizing the nationwide vertical datum at the world's largest and most comprehensive floodplain management conference, [the Association Of State Floodplain Managers \(ASFPM\) national conference](#). NGS gave presentations on vertical datums and shared program updates with the conference's coastal issues committee. The conference featured more than 120 speakers and 1,200 participants. The association is the world's leading voice for sound floodplain management, comprising more than 18,000 practitioners, 10,000 certified floodplain managers, 36 chapters, and 73 corporate and agency partners worldwide.

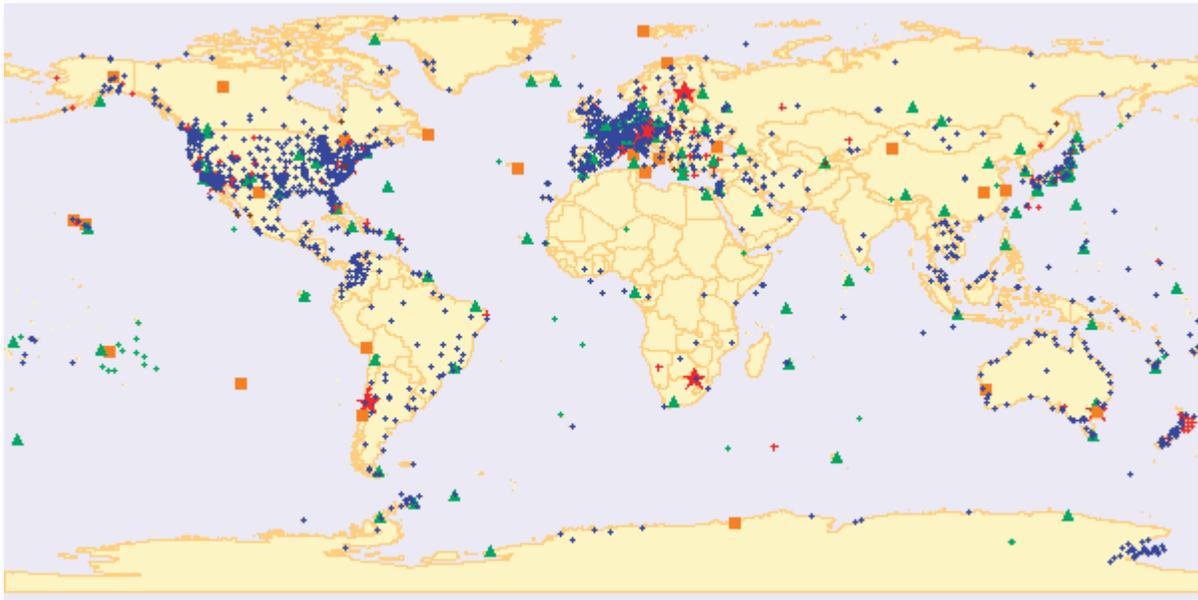
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NGS News & Events *(continued)*

NGS Surveys Site to Improve International Terrestrial Reference Frame

Friday, June 22, 2018

NGS surveyed a site at the International Earth Rotation and Reference System Service (IERS) location on Kauai, Hawaii, to measure the geospatial relationship between reference points associated with an International GNSS Service (IGS) tracking station. The results will be shared with the IERS in an effort to improve the **International Terrestrial Reference Frame (ITRF)**. The IGS is a voluntary federation of more than 200 self-funding agencies, universities, and research institutions in more than 100 countries working to provide the highest-precision GPS satellite orbits in the world. The IGS has ensured open access, high-quality GNSS data products since 1994. These products provide access to the definitive global reference frame for scientific, educational, and commercial applications—a tremendous benefit to the public and a key support element for scientific advancements.



Map plot of ITRF worldwide network of control stations.

New Datums: Replacing NAVD 88 and NAD 83!

NAD 83 and NAVD 88 will be replaced in 2022, and there are many related projects to make sure the transition goes smoothly. Visit <https://www.ngs.noaa.gov/datums/newdatums/index.shtml> for more information. NAD 83 and NAVD 88, although still the official horizontal and vertical datums of the National Spatial Reference System (NSRS), have been identified as having shortcomings that are best addressed through defining new horizontal and vertical datums.

Specifically, NAD 83 is non-geocentric by about 2.2 meters. Secondly, NAVD 88 is both biased (by about one-half meter) and tilted (about 1 meter coast to coast) relative to the best global geoid models available today. Both of these issues derive from the fact that both datums were defined primarily using terrestrial surveying techniques at passive geodetic survey marks. This network of survey marks deteriorates over time (both through unchecked physical movement and simple removal), and resources are not available to maintain them. The new reference frames (geometric and geopotential) will rely primarily on Global Navigation Satellite Systems (GNSS) such as the Global Positioning System (GPS) as well as an updated and time-tracked geoid model. This paradigm will be easier and more cost-effective to maintain. 🗺️

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