Missouri Surveyor

A Quarterly Publication of the
Missouri Society of Professional Surveyors

Jefferson City, Missouri March 2016

MISSOURI SURVEYOR

CALENDAR OF EVENTS

2016

April 28-30, 2016
Board Meeting, Golf Tournament, and 38th Annual Spring Workshop
Lake Ozark, MO

July 16, 2016
Board Meeting
Jefferson City, MO

August 24-26, 2016
Review Course,
Best Western Capital Inn,
Jefferson City, MO

October 13-15, 2016
59th Annual Meeting and Convention
Sheraton Westport Lakeside Chalet,
St. Louis, MO

December 3, 2016
Board Meeting
Jefferson City, MO

Cover photo: Missouri and Arkansas surveyors gathered in celebration at Missouri's First Corner on the 200th anniversary of Prospect Robbins setting the post (at NE Cor T21N, R1W) which would become the first USPLSS corner of Missouri, 5 December 2015. *(Photo by Joe Paiva)*

Donald R. Martin, Editor

Notes from the Editor's Desk

Donald R. Martin

Welcome to the March 2016 edition of *Missouri Surveyor*. This edition is one of those universal signs of spring known well by surveyors along with warmer days and skies crowded with "airborne platforms" logging the last leaf-off measurements for models, maps and manuscripts. Buzzing through the skies to gather the last "clean" data of the season they busily navigate their way with sensors sensing, pilots piloting and pistons pis…errr, never mind. This is the edition where we are updated on the doings of Tripod the three-legged groundhog and his February sashay out of his hole. The little land beaver climbed out, got caught with a phone call and wound up testifying about legislation. Ol' pard was as nervous as an honest man in politics but he did his duty. Stumbling to the lectern, stuttering out the reasons lawyers shouldn't write descriptions, stunning the Reps and lobbyist with reasoned logic, stealing away from the Capital, stopping at a watering hole to calm his nerves, straight with no chaser The Pod started home to return to his hole. It all left the winter weary woodchuck worried and wondering why, why, why me…

Onto *edition* talk…look for a theme of *impact beyond tradition*. If readers have ever passed over the *President's Message* as blather and boosterism, don't do that! In this edition President Mathis gives us a review of contemporary issues and MSPS activities through the telling of a corner search; it's good! I next share the sad news of the passing of *Missouri Surveyor's* great editor (you remember, back when we had a good one!), John Holleck. A career obituary, *A Survey's Eulogy* and *Remembrance and Reflection;* not to lament his death, but to celebrate his life and works. New Jersey surveyor and author Frank Lenik graces our pages once again with two entries. The first is *National Surveyors Week, what's it all about?* while later in this edition he tells of *Citizen Science, Surveyors and Geodesy,* a call for surveyor's to *have impact beyond tradition* through collecting GNSS data as a community service. Frank's first article is followed by *News from the National Geodetic Survey* with the next feature being *Data is the Crop: GNSS used by Surveyors and Farmers*. Written by surveyor/farmer Tim Burch this article is a wonderful illustration of surveying's *impact beyond traditional* focus areas of boundaries and building. A chapter subtitle of *The Farmer and the Surveyor* sounds like a tune from the musical *Oklahoma! (…one sows and reaps upon his grounds, the other measures metes and bounds, but that th'ar ain't no reason they can't be friends…)* Missouri's own Dr. Dick Elgin tells the tale of *Missouri's First Corner* and a birthday celebration with a ceremonial toast (photographic evidence enclosed!) held by surveyors at the corner.

MSPS member and self-styled Big Surveyor Ray Riggs reveals a raucous tale recounting riotous roars in the retelling of *"Subterfuge and Hydraulics 101"*. I do have a bias favoring and welcoming any writings by our members (Yes! That is your invitation to send in stories, articles, news, etc.) but this is a particular delight; a fun story from a master storyteller. Thank you Mr. Ray. Another journey into *impact beyond tradition* is found in *Cracking the code to speak Cherokee* by Dale Neal; don't miss the accompanying *Editor's Note*. Then onto a background piece for your next Terminalia holiday celebration, *Terminus: Roman God of Boundaries* (who knew?). *Century-Old Boundary Dispute Brings Omaha Tribe Before US Supreme Court* cites the customary need for surveying while posing a boundary dilemma *beyond tradition*. By Bill Kelly, this piece is supplemented with *Survey Notes* commentary. In the final pages *Missouri Surveyor* is proud to feature familiar faces and able associates with member profiles and Q & A from two of our leaders. *Meet Our Members!* Debrah Wolfe, Steven Patterson and Matt Thomas – get to know them because they are happy to be with MSPS and wish to serve. President Mathis and newest Director Brad McCloud respond in *Missouri Surveyor Q & A*. Our closing piece is an inspirational surveying story from Matt Thomas – what an adventure!

Enjoy this edition and remember *Missouri Surveyor* is your voice; I welcome that which you may have to say or write.

Donald

THE MISSOURI SURVEYOR

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President's Message

Jim Mathis III

What an independent, diverse and thought-provoking animal the "typical" Missouri surveyor can be, I thought as I bumped along the rough logging road in my old survey rig. *Some believe that we can never be a true profession until we require a four-year college degree. Some think as long as one can pass the test, no education at all should be necessary. Some are more middle-of-the-road, and feel that someplace in-between is our best bet - and almost all are adamant that their opinions be heard. Should the MSPS president provide better direction or simply serve as a sounding board for all these different opinions?*

The cold weather definitely soaks into my old bones a little deeper each year, I realized as I climbed out of the truck, grabbed a rover, pole and tape, and started off down the last slope to get to the calculated corner position. There was a skiff of snow on the ground and even though it was now midday and the sun was shining, it was still cold enough that nothing was melting.

And then there's the challenge of too few young surveyors entering the profession. With the typical surveyor rapidly approaching retirement age, who will fill our shoes? Is this the result of simply not demanding enough compensation to make the profession alluring – too many out there willing to do cut-rate work, or is it all of the new technology allowing the feasibility of one-man crews? And I'm not helping that scenario much right now - out doing corner search all by myself - should have brought along an assistant just for the sake of learning.

This corner represented the last necessary controlling corner I needed before subdividing the section and completing the survey, and I was relatively certain that some kind of evidence should remain. True, the last subsequent survey of record was in 1857, but the 1821 witness trees, both large pines, had been standing then and the corner, described as a "mound of stones" should fall in just the kind of terrain where evidence can last long after the trees decayed. *And that's an odd thing: the survey was made in 1857, but it was 1865 before it had been recorded by the next county surveyor, noting that his predecessor was "deceased." Oh wait: the 1860's – the civil war – maybe not so odd after all. Boy, what other profession brings together so many assorted disciplines: historical research, high-tech electronic equipment, law, mathematics, and now a bit of my favorite part – "archeology"? Makes these old bones ache a little bit less.*

And what about the constant attempts to change our licensing laws to allow non-surveyors to do what surveyors are best trained to do? Well, to be honest, if they're successful things will just return to the way they were a few years ago when anybody could write a property description. How'd we ever manage to get Chapter 327 revised in our favor to begin with? Maybe it would be best to compromise – maybe protect as our sole right the writing of metes and bounds descriptions? We'll need to kick that around bit, but then again, don't hope for consensus.

This was my second trip to search for the corner, but now I had refined the search location and felt more confident. On the first trip I had used autonomous GPS positioning to get me close. But my search being unsuccessful I'd left a nail tied with static GPS to work off of later. *Things have sure changed since I started doing this- remember when we'd have had to spend days traversing into here just to know where we were?*

I measured from my control point to my calculated position, revised now after noting that the 1857 survey had shown a long measurement to the south. The area was rocky,

(continued on next page)

John Holleck, MO PLS #2227: Rest in Peace

MSPS lost a good friend and Missouri lost a great surveyor recently. John Holleck of Raytown, a Past-President and longtime Editor of *Missouri Surveyor* passed away January 25th in Kansas City. A member of our Society for many years John was honored as our *Surveyor of the Year* in 1997, recognized for service to MSPS in 2000 receiving the *Robert E. Myers Service Award* and our first ever recipient of the *Lifetime Achievement Award* in 2014. Licensed in Missouri and Kansas John practiced surveying for the City of Kansas City from 1974 to his retirement in 2002. At the City he served as the Chief of Surveys and the City Surveyor where he oversaw development of one of the earliest municipal GPS networks and guided the implementation of a broad-based GIS.

Renowned as an instructor John taught in the Longview Community College Land Survey program from the mid-80's through early 2000's. Graduating from the University of Missouri-Kansas City where he was an underclassman and graduate major of History, John's education included an Associate of Architecture and the ongoing study of English and Literature. Acclaimed for his editorship of *Missouri Surveyor* from 1996 – 2013 Holleck volunteered to be Editor upon completion of his Presidency because he wanted an additional opportunity to serve our Society. Producing 70 issues during his tenure he brought recognition by the National Society of Professional Surveyors to the newsletter when awarded for "Excellence in Journalism".

MSPS Lifetime Achievement Award being presented to John Holleck in 2014.

A Surveyors Eulogy

John Holleck concluded his traverse the other day. It was a good effort that was just a bit shorter than we would have liked. With a great number of segments, John had to plot his course many times and clear the lines to take their measure. And along the way, when he may have wandered out on a long side-loop that left him unsure of where he was he did what surveyors do - he looked to the stars; to the heavens. You see, surveyors know that if you are lost in this world, if you are unsure of where you are on this world, you can find your place by looking beyond this world. You look up; up to the vault of heaven and by celestial measure a surveyor seeks and is given guidance. He then knows his position on earth and again sets his course to move on and ahead. Well, the loop is complete now; closure was made this January past. The precision? Well, for this one-in-a-million surveyor, it was 1:1,000,000. Not perfect, but it was getting awfully close. You traversed a good loop John.

-your student, D. Martin

President's Message *(continued)*

the snow a little deeper, and no rock cairns or set stones were obvious. I went in search of evidence of the witness trees. *Nothing obvious here, have I overlooked something? Too many stump holes and depressions over here – could have been any one of them. And the evidence gets a little scanter every year – will there come a time when surveyors will rather sit behind a computer and proportion? Button pushers and technicians - or are we there now?*

An hour later it was time to give up. *Well, we'll just have to spread out - go north and east to the first good corner so we can double-proportion. That one stump hole was certainly left by a pine, but to match it, the other would land on that big black oak. Did they call out the wrong species – no – black oaks just don't live that long*. I gathered my equipment and prepared to hike out. The sun was getting lower and there was still a good drive back. *Maybe about a hundred years ago an acorn rolled into the pine stump hole - hmmm*. And then I saw it: the remnants of the outer ring of an ancient pine stump barely sticking up through the dusting of snow and not far from the big black oak. Measuring backward, now I could make out the rock cairn. Its base was in place but its top had tumbled down the hill. *So obvious now - why didn't I see that earlier?!*

Not long afterward I crawled back into my cold truck. I felt so good about finding the corner that I'd forgotten about the numbing cold. *I wonder if there's any other profession which offers such a rich sense of accomplishment? Now, I remember why I truly love this job. Yes, Challenges to the profession remain, but by sticking together, MSPS will meet those challenges.*

Jim

Remembrance and Reflection; Recalling John Holleck

by Editor, Donald Martin

No one person can sum up the life of another. A life is too varied, too expansive, too mysterious, but mostly too precious – too precious to be passed over with mere words. Rather a life is to be remembered by those who shared, watched and admired. As we do so we are gifted living memories…memories alive. Unbound by life or death they continue on within us, the greatest gift our departed gives. Instead of summarize, I reflect; I remember John Holleck.

In January of 1994 I first met John as one of his students in Elementary Surveying at Longview Community College. He swept into the classroom in the full stride of life and in a full, long-legged stride of Big John. With boxer's ankle weights resting above his running shoes John arrived ready for a workout. And boy did he give one! Never lecturing from desk or lectern, he paced the front of the classroom with full gaits, preaching the gospel of compass and chain in a uniquely high voice for a big man as arms flailed about accentuating his words. Back and forth he hurried in ceaseless instruction, turning on his toes to return the volley of his owns shots. Having made the mistake of sitting in the front row I was soon spinning from the incessant turning required to keep up. It was like watch two Chihuahuas on meth play ping-pong – I needed a Dramamine by first break!

When I finally caught up I was witness to a truest of teachers, dedicated to education, devoted to students' learning. Natty in his bandana-for-an-ascot John would break a sweat and pant a bit from the vigor of his march. His action engaged; absolutely what student surveyors needed. Though stationed at our desks and bound to our notebooks we joined his walk and just as youth following Socrates through Athens learned from the master, we did too.

It was a relief to be sent outside (in January!) to perform our field labs. Left to ourselves with student groups becoming survey parties we stumbled, tripped and argued our way around the campus grounds taping lengths, turning angles and tempting John's patience. Then it was off on our own to summarize it all in a lab report. I read through mine now and observe my own progress under his tutelage. His grading notes which were mostly question marks on my first report, turned to an eventual "nice job" by mid-term, and finally in the most elegant, architect trained printing came his seal of approval, "A very good report!" scribed on my final lab entry. It wasn't until later I realized Holleck was not only checking my numbers and grading my procedure, he was watching my grammar and writing! John expected the complete package from us, but then he always gave his in turn. Always the best, and please, nothing less.

John Alan Holleck

That is how I remember him. Energy and verve for life and people with a sincere care for sharing experience and knowledge. I think paramount among his legacy is a surveying generation he fathered in and around Kansas and Missouri through teaching. So many of us learned from this big man who was only small when standing next to his own intellect. He was a teacher – he was a man of the mind.

That is how I remember him. And what a mind! A historian by inclination and education he knew the facts and the path to turning them into lessons learned. He was a master of looking back for the sake of knowing how to look ahead. So deep was his devotion to learning he made his way at all times accompanied by the most worthy companion a mind can have, a book. Possessed of an extensive home library his shelves were fully stocked as a pantry with food for nourishment and sustenance. Also a great fellow of language and literature these personal passions flourished in him even through the toughest times. In his later years, bedeviled by ill health and limited mobility it was not surprising to find that John was enrolled in the study of English and writing still. He was an intellect – he was a man of letters.

That is how I remember him. And not all serious and studied. John loved games. Never did a bookie or sportscaster follow the box scores and statistics pages more thoroughly than John. An unashamed home'r always pulling for the locals he gave his fanhood most to the Missouri Tigers. Devoted to MU as an institution of higher learning he adored his Tigers, reserving the football schedule for his own leisure. His rare pausing during lectures would be given to predictions of Tiger success on the court and the mastery of his idol Norm Stewart. So reluctant was he to miss a competitive event a television accompanied him to classrooms during the World Series. True! No lessons were lost, but nor were any plays missed. He was a fan – he was a man of sport.

(continued on next page)

Recalling John Holleck *(continued)*

That is how I remember him. And such an endearing friend! Although not one to keep many associates John took and gave friendship in the manner of quality over quantity. Jocular in public he was introverted in private, reserving his soul for sharing with the few while vehemently cherishing those lucky ones he welcomed to him. While gregarious among the crowd, person-to-person intimacy yielded him quiet and retiring. But when his companionship was made available it was delivered with hardy laughs and cleaver humor. He was a friend – he was a man of wit.

To go on would be to dwell in memory too long (tempting though it may be). John has gone. Like all I am left with memories long passed and words recently exchanged. I have his expression of "thanks" for seasonal greeting cards of the Christmas past, a note of gentle admonishment for an editorial blunder made in the edition immediate past, and reports from mutual friends that he was planning and hoping as it seemed his ill health was now past. Then he was gone. A telling item left during his final days was a whimsical test taken by John which yielded answer to the question "Which Shakespeare character are you?" John knowingly proclaimed his results; he was Hamlet's Horatio. How true. It was Horatio left to tell the story – to teach the lesson. It was Horatio turned to for answers – the intellectual. It was Horatio carefully watching the competing of plotters and usurpers – he saw the game. And it was Horatio staying true above all others – the quiet, faithful friend. It was John…John Holleck.

John Holleck, Editor of Missouri Surveyor.

Though we grieve the deaths of our loved ones, we accept them and hold on to our memories as precious gifts. Let us make the best of our loved ones while they are with us, and let us not bury our love with death. – Seneca, In the Presence of Death

Correction:

In the December 2015 Edition I included a report from MSPS Awards Committee entitled *Award Ceremony Notes*. This article shared the news of esteemed members chosen for recognition in 2015. Cited in the story was the fact that "…this year there is an additional special recognition for a Lifetime Achievement Award." Near the end of the article (p21) I published the incorrect statement referring to 2015 as the "first MSPS Lifetime Achievement Award". It was not! In 2014 John Holleck, my predecessor in title (get it?) was honored as the first recipient of the Lifetime Achievement Award.

Not only regrettable, my action in this case is embarrassing for a couple of particular reasons. First, John set the bench mark for editing this publication and now I have followed by not closing the loop within tolerance. Secondly, John was my first surveying course instructor. One of the initial concepts he tried to teach me was avoidance of errors and blunders. Dear readers, in this I have made a blunder but it is my wish that you and John will see it as an error. You see, unlike a blunder an error may be corrected for; I have now found my error and made its correction. John Holleck – I apologize for this and hope I have also made it right.

Metropolitan Community College – Longview

National Surveyors Week, what's it all about?

by Frank Lenik, PLS

We've all heard about National Surveyors Week – the weeklong celebration of the surveying profession that takes place annually in March. But who's actually celebrating, and how? What is the best way to use this event to the advantage of our profession?

Consider the main three goals of the program;

1. Public awareness of our profession through education;
2. Public awareness of our profession through the media;
3. Public awareness of our profession through public service

The education of the public, both adult and youth, is probably the number one goal of National Surveyors Week. The work we perform for the benefit of the public often goes unrecognized and we need to share our knowledge with them. The work being done by our Trigstar volunteers is incredible and should be highlighted during National Surveyors Week. There are volunteers doing outreach to Boy Scout and Girl Scout groups and resources are available for these programs. We can expand on this and offer to speak to the local Rotary or Lions Club. They are always willing to have a speaker at their meetings. How better to promote your profession and your business than to make a public appearance?

Reaching out to the public through the media and making them aware of our profession and our role in today's society is a goal whose value we all recognize. Over the last few years we have achieved this in a variety of ways including Presidential, gubernatorial, and municipal proclamations, newspaper articles, and radio spots highlighting National Surveyors Week. There is also a GPS Day Website, a National Surveyors Week Facebook page and a National Surveyors Week Twitter account. Each of these channels represents another way for the land surveying community to stay connected with a different section of the public.

Although the annual effort of contacting the President, members of Congress, your governor and your municipal leaders may seem trivial, remember that it serves to remind *them* that surveyors are important. It is an essential part of our awareness campaign and serves as an introduction to our senators and representatives when we visit them on the hill. Whenever a bill, law or ordinance is being contemplated which affects the public and impacts on our profession, these elected officials should know who to turn to for answers to their questions.

Newspaper articles, radio advertisements, and on line media can serve the same function for our profession, keeping us in the public eye. Rather than being hidden behind an attorney, title agent or real estate agent, we can use the media to highlight the value of our profession with our most important constituency our clients. The best way to get an article about surveying published in a newspaper is to contact a local reporter and let them know that you have a good lead on a community interest story. If that fails to attract their attention offer to write one yourself and submit it to the paper. State societies, society chapters and even private firms have written or sponsored articles or public service announcements which serve as advertising for our profession and their businesses.

In his inaugural address on January 20, 1961, President John F. Kennedy poignantly said "Ask not what your country can do for you—ask what you can do for your country". It is with this attitude in mind that we should attempt to give back to our nation and our profession and lay the groundwork for the future. We can lament the passing of the geodetic field parties of the past and the disappearance of the NGS monuments, or we can embrace the future, share our expertise and volunteer for a common cause. In doing this we can prepare the foundation which future surveyors and the public will turn to for their geodetic positioning. It will help us hone our skills and keep us current on changes in our own practice.

ELGIN'S NEW BOOK

MSPS Past President, Dick Elgin, and author of *"The U.S. Public Land Survey System for Missouri"* has written another book. Not about surveying, "***Shoulda Played the Flute***" is Dick's memoir about his adventure going through U.S. Army helicopter flight school, then flying in Vietnam as a 20-year old combat helicopter pilot (Americal Division, 1969). Through vignettes he describes his more interesting (and humorous) missions. The title? Having played the flute in the St. James High School band, during Basic Training he was offered a slot, to serve out his Army obligation playing the flute in an Army band. He said no thanks, opting to continue on to Army flight school and go to Vietnam as a helicopter pilot, as he had volunteered to do. As Dick describes in his book, there were times while flying in Vietnam when he thought "Shoulda played the flute!"

The book can be purchased on Amazon.com or through Dick ($20.00 plus shipping). He can be reached at elgin@rollanet.org. It is a great read for anyone with any interest in Vietnam or the Vietnam War.

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News from the National Geodetic Survey

Thursday, January 07, 2016

FEMA Relies on NGS' Images of Midwest Flooding

NGS' imagery of recent flooding in the Midwest is now online to assist the Federal Emergency Management Agency (FEMA), states, and localities with damage assessment. NGS collected aerial images around the Mississippi, Arkansas, and Meramec Rivers last week. FEMA is using NGS's oblique imagery-images taken at an angle rather than straight down-as its primary data source. Oblique images cover wider areas and improve the visibility of vertical structures like the sides of buildings. The cost-effective imagery will be used to help determine if levees are at risk of failing, to evaluate damage to property and the environment, and to support safe navigation. Priorities center on impacts to major ports, waterways, and infrastructure, coastlines, and coastal communities.

Thursday, December 17, 2015

Fall Meeting of the American Geophysical Union

An NGS delegation chaired sessions and presented talks in December at the American Geophsical Union 2015 Fall Meeting in San Francisco. Topics included assesing the results of a new airborne gravimeter used in GRAV-D-NGS's initiative to redefine the nation's vertical reference system by 2022-mapping the Arctic coastal zone, and providing presentations to the International Association of Geodesy following NGS's eight-year term as the association's Analysis Center coordinator. NGS also met with the National Geospatial Intelligence Agency, NASA, the International GNSS Service, and other industry partners.

Thursday, December 10, 2015

New Method for Leveling Across Rivers and Other Barriers

NGS recently developed an alternate method for surveyors and geodesists to perform leveling surveys across rivers, valleys, and other barriers, and a new chapter has been added to the NGS leveling manual to describe the updated techniques. The new method uses commonly available modern electronic theodolites-instruments used for precise astronomical observations-and addresses sources of error, such as atmospheric refraction and Earth's curvature, that are often encountered during river and valley crossings. The method also addresses instrument and observer errors associated with the use of theodolite instruments. The chapter addresses crossings of up to 1.2 miles [2 kilometers] long.

Thursday, November 19, 2015

European Comparison of Absolute Gravimeters

NGS recently compared measurements from its absolute gravimeter with those of 16 international institutions at the University of Luxembourg. As part of its Gravity for the Redefinition of the American Vertical Datum (GRAV-D) Project, NGS is using airborne sensors to map small spatial variations in Earth's gravity. The data will eventually be used to replace mean sea level as the "zero height" for all elevations in the United States. To calibrate the sensors, NGS operates the absolute gravimeter to tie airborne relative gravity values to an absolute gravity reference value. The reference value is then periodically tied to the worldwide gravity network by comparing NGS's gravimeter with other certified absolute instruments. In effect, these comparisons define the gravity standard and allow NGS to learn how "close" its instrument comes to the standard. The final results are expected to show agreement between the instruments to better than 3 parts per billion.

Thursday, November 13, 2015

NGS Provides Training to Geosciences Australia

An NGS representative is in Canberra, Australia, to become the next Analysis Center Coordinator (ACC) for the International GNSS Service (IGS). NGS has been the ACC for eight years; Geosciences Australia is expected to take over by January 2016. The ACC combines solutions from 12 international analysis centers, including the Massachussetts Institute of Technology, NASA, and geodetic offices around the world to create a definitive global reference frame for scientific, educational, and commercial applications.

Thursday, November 5, 2015

Demonstration of NOAA's Beechcraft King Air Aircraft Capabilities

NOAA Chief Financial Officer Mark Seiler and NOS Acting Deputy Assistant Administrator David Holst recently joined NOAA Corps pilots and an NGS sensor operator for a demonstration flight on NOAA's Beechcraft King Air coastal mapping and emergency response aircraft out of MacDill Air Force Base in Florida. The crew discussed the new topo-bathy light detection and ranging (lidar) system used to collect shoreline and bathymetric data in the nearshore environment, highlighting the aircraft's suite of camera's used to collect imagery in support of updating nautical charts and assesing damage caused by natural and manmade disasters.

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Data is the Crop: GNSS used by Surveyors and Farmers

by Tim Burch, GPS World, January 6, 2016

As technology continues to march forward, and storage and data evaluation use grows, the surveyor and the farmer will begin to use each other's skillsets to increase their own productivity. So how do we get there? First, we must establish how each side uses their prospective GPS tools.

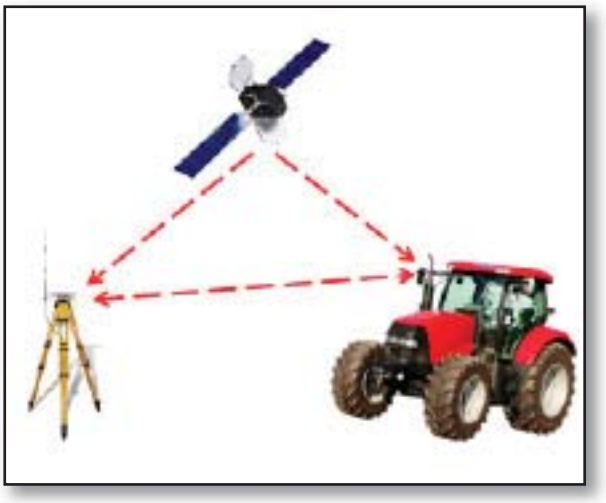
As a child, I spent several summer vacations at my relatives' farms in central Illinois. My early impression of working on a farm was one of long hours and hard work. Work and chores completed by my family members was very physical with no set hours to look forward to. My uncles didn't get to set the schedules for rain and sun and had no say in whether or not a piece of equipment would break down.

What I encountered as a child taught me that there was no technology in farming; it was nothing but hard work. The thought of using something as high-tech as GPS would have made most old-time farmers laugh you right out of the coffee shop.

My career as a land surveyor has had its share of hard work at times, but it has been the technology that has always fascinated me. When I began as a rodman, the electronic distance meter allowed surveyors to measure distances more than a mile instead of hand taping the entire way, and with much more accuracy. Along the way, I've watched computer technology grow, with total stations that incorporate cameras and video and GPS receivers that provide accurate locations instantaneously.

That brings us to our modern-day crossroads. As surveyors, we are constantly trying to find ways to incorporate our skills into other occupations to increase productivity. We also see the modern farmer moving away from small family operations with only several hundred acres, morphing into farm management corporations with tens of thousands of acres as well as millions of dollars of equipment.

Efficiency is what they are after, and they are spending significant amounts of money on technology to make it happen. My own curiosity and research has opened my eyes to how far the farming profession has grown, and in many ways surpassed the land surveyor with technology. But I think there is still common ground that needs to be explored, so let's start at the root of each profession.



The Farmer and the Surveyor

As different as the two professions may seem, farming and surveying have one large common link: data. More specifically, the tools, methods and procedures they operate to acquire the data used in their everyday jobs and projects.

The implementation of GPS equipment and the ability to collect location data has greatly improved the productivity of both professions, but for drastically different reasons. However, as technology continues to march forward, and storage and data evaluation use grows, the surveyor and the farmer will begin to use each other's skillsets to increase their own usefulness.

So, how do we get there? First, we must establish how each side uses their respective GPS tools.

The Land Surveyor

The land surveyor and his or her staff use GPS daily, with varying degrees of accuracy. Here are a few examples:

- *Mapping-Grade GPS Device (>= 3 meters)*
  This handheld unit is primarily used for mapping utilities and improvements that don't require high accuracy. The data and attributes acquired by this unit will be inserted into geographic information system (GIS) databases for inventory, and maintenance logs for future review and upgrade needs. Surveyors use these units for mapping items that require additional attributes and information necessary to improve the overall usefulness of a GIS database.

- *Differential GPS (<= 1 meter)*
  Differential GPS provides live positional solutions for applications that require more accuracy than mapping-grade GPS, at a reasonable equipment and operational price.
  These systems are used by aeronautical companies for mapping assistance, logistics companies for asset tracking, and emergency operations for 911 systems. These systems are also used by hydrographic surveyors for use in mapping lake and river bottoms as well as surveyors working in open pit mines, producing existing condition maps and volumetric surveys.
- *Survey-Grade GPS*
  Surveyors began implementing GPS equipment into their measuring repertoire in the mid 1980s with the introduction of data collection by static methods. This technique allowed for long-distance measurements with good accuracy and precision, but it came at an incredibly expensive cost.

> ***"As surveyors, we are constantly trying to find ways to incorporate our skills into other occupations to increase productivity."***

By the mid 1990s, real-time kinematic (RTK) equipment was introduced, and gave the land surveyor a new gateway into long-distance measurement with shorter occupation time and less cost. Additional enhancements to RTK systems included on-the-fly initialization, increased data-collector capability, and cellular/long-distance radio networks.

These improvements allowed increased data-collection productivity, including mobile collection on all-terrain and survey vehicles. A topographic survey of a 40-acre parcel that would take several days of walking now is completed in less than 6 hours on an ATV. Boundary retracements of large parcels that used to take weeks of traversing the perimeter can now be done in a few days.

Many credit GPS technology and functionality for greatly improving land surveying production as well as increasing accuracy and precision of the work.

The Farmer

Farming has been passed down from generation to generation for hundreds of years. History tells us this has been a hard life for many of these families as manual labor was at the root of the occupation. Livestock and family members were used to pull the necessary implements for planting each year's crop, with most harvesting being done by hand.

The Industrial Revolution brought the tractor and planting and harvesting equipment. After World War II, equipment manufacturers retooled their factories to increase the size and capacity of tractors. Even with the reduced manual labor that a farm tractor allowed, it was still a physical burden on the farmer planting crops and driving the miles of rows necessary to plant fields.

Also, many agricultural areas became more organized, with local farm bureaus and associations being formed to help the farmer. These organizations provided information on how to increase yields in their crops; this data became the basic form of a GIS database for soils and drainage mapping well before digital mapping. These databases provided the initiative for the farmer to analyze planting methods and rates; herbicide, pesticide and fertilizer applications; and to review crop yields for notable increases and deficiencies.

In the 1980s, yield monitoring equipment became a new tool for the forward-thinking farmer to invest in, analyzing how well his crops were producing. The only negative was the inability to accurately map the location of the various yield rates that would occur in the harvest. The farmer was forced to spend more time reading the yield analyzations in smaller parts of his fields in order to identify where adjustments were needed for increasing the output. Many farmers didn't see the return on investment for this system, and those who did purchase such a system soon gave up.

In the early 1990s, Rockwell International debuted the Vision System, a GPS unit using a U.S. Coast Guard correction system paired with a yield monitoring unit to map the location of yield rates during field operations. Trimble, John Deere and others were soon developing their own systems. All of these systems were expensive, delicate and too complex for most farmers to justify installing in their tractors.

However, new discoveries in GPS technology during the late 1990s brought sweeping changes to this new tool for the farmer. While the term "precision agriculture" had floated around for a while, it wasn't until the introduction

(continued on next page)

Data is the Crop *(continued)*

of high-accuracy GPS that the statement reflected correctly on the industry.

- *Differential GPS (<= 1 meter)*
  John Deere began its pursuit of GPS technology in the early 1990s along with many others, but the company's decision to continue pursuing this competitive edge is what led to several advancements for the farming industry. Deere's work with Stanford University and NASA led to the revision of differential corrections for GPS locations to gain additional accuracy for a guidance system for Deere equipment.

By 1998, John Deere presented a differential GPS system that provided 1-2 meter accuracy to assist farmers with smaller tolerances of precision field planting and harvesting. Innovations such as this led to many more advancements in the farming industry.

- *Real-Time Kinematic (<= 2.5 centimeters)*
  Today's precision farming is more accurate than ever, with RTK networks providing a bulk of the coverage necessary to supply the farmer with corrections. In places where a local correction provider is not available, the farmer has choices of setting up his own base for correction or subscribing to other real-time networks via cellphone coverage. These systems allow for highly accurate mapping and guidance systems so the farmer has more control and information on his field and crops than ever before. Farmers now using GPS control in precise methods have more tools for increasing yields and production, including crop planning, soil sampling, pesticide/herbicide/fertilizer application and harvest analyzation.

Crop planning used to be strictly in the hands of the farmer who drove his tractor in his field in an effort to follow the lay of the land. Today's farmer uses topographic maps, aerial photography and mapping software to create planting patterns that make farming more efficient. By maximizing the planting configuration, this is also an opportunity to minimize fuel consumption. Soil sampling and weed mapping are now staples of many farmers' activities.

The farmer uses these methods to reduce the number of contaminants within the crop. He can also analyze the field's health in order to apply the appropriate amount of necessary chemicals. These procedures are now computer controlled to vary the rate of application depending on the location within the field.

Harvest analyzation has become the biggest source of data collected. Yield monitoring equipment was the first tool introduced into the electronic farming age. Now, coupled with GPS mapping of yield rates and volumes, farmers can accurately predict spot, regional and overall crop production from their fields. This data, along with soil mapping, is reviewed after the harvest and is used to determine a strategic plan for the next year's planting.

The biggest improvement, in most farmers' opinions, is the implementation of steering-guidance systems. Initially produced to be strictly a guide to the driver, systems are now automated into the steering system to follow a predetermined path within a 1-inch tolerance. This frees the driver to monitor planting, spray application and harvesting operations.

"Together, the farmer and the surveyor can create a successful partnership that can increase crop production worldwide."

By turning the driving over to an automated system, field row overlap is reduced by up to 30 percent. This decreases double coverage of seed and spray application and it minimizes fuel consumption. This system also allows for less driver fatigue with the ability to work around the clock as needed or conditions dictate. Coupling this steering system with variable rate planters and sprayers, the farmer has a system that allows him to be more effective in managing and monitoring operations.

Bringing the Two Occupations Together

Both of these noble professions are using a highly accurate form of measurement and data recording, but we must review further how they can help each other. To do that, we must analyze what each is doing with the technology.

- *Surveyors and GPS Use*
  Roles of the surveyor are to measure land, provide his professional knowledge regarding parcel boundaries, and collect data for engineering and drainage purposes. A majority of this data is now collected by GPS methods and is in NAD83 state plane coordinates with NAVD88 elevations. This information can be supplemented by county and state GIS data as well. Surveyors also have knowledge of existing monuments by local, state and federal authorities tied to these coordinate systems/ datums so all future surveys can be related to each other geographically.
- *Farmers and GPS Use*
  Farmers who have embraced GPS technology now

have the power not only to map and collect data, but to also utilize previous data for crop efficiency. This ability to run a more efficient farming system is happening now for many farmers. The farmer is educated in regard to seed germination, weed and bug prevention, and maximizing crop yields so collecting this data has become a necessary task.

The Farmer and the Surveyor — Harvesting Data

The farmer and the surveyor can use their knowledge in many ways for the mutual benefit of increasing crop yields, efficiently working the land, and maximizing production.

The surveyor's knowledge of topography and drainage can assist the farmer with shaping of land to minimize water runoff and loss of key nutrients in the soil. This loss is estimated to be an average of two to three tons of soil per acre per year. Installation of drainage tile in addition to grading can be a critical part of minimizing soil loss, and the surveyor can help with this analysis.

Accurate boundaries allow the farmer to know the limits of his property. The surveyor can provide this information so the farmer can maximize his planting configuration, yet not encroach on the adjacent property. The surveyor can also help with the creation of land-management systems to help farmland owners plan for financial decisions and tax strategies.

The biggest opportunity for the surveyor is to offer assistance to the farmer who has little or no knowledge of data collection. This geospatial data can be confusing to those not familiar with this information. Farmers who become educated in analyzing and reading crop data can increase production and yields.

Surveyors have the math skills and background to assist with the management of the data from a location standpoint. This effort will help the farmer know soil conditions, germination, spray application and harvesting to maximize the cost effectiveness of his investment in the land.

Together, the farmer and the surveyor can create a successful partnership that can increase crop production worldwide. Data is the crop that brings them together, and planted with the right amount of care and nurturing, this data can become more valuable than ever.

Article appears with the authorization of ***GPS World****.*

Missouri's First Corner

by Dr. Dick Elgin

THE BEGINNING

After Prospect K. Robbins and Joseph C. Brown established the Initial Point to the 5th Principal Meridian (5th PM) in a swamp in what is today eastern Arkansas, they said their goodbyes and began the surveys they had contracted to accomplish. The date was November 10, 1815. Brown ran west, surveying the Base Line to the Arkansas River. Robbins ran north, surveying the Principal Meridian to the Missouri River. They both surveyed "true" lines, both setting the "standard side" of their respective lines, a corner set every 40.00 chains. Thus began the first surveys of the U.S. Public Land Survey System (USPLSS) west of the Mississippi River, only 12 years after the Louisiana Purchase, in what was then Missouri Territory.

Prospect Robbins reached the Missouri River, near what is today Washington, MO just before Christmas, 1815. With the 5th PM surveyed, the further GLO surveys began immediately, preparing the public lands for sale. By treaty, some lands of the Native Americans had been acquired by that time. And, confirmation of the pre-America French and Spanish land grants had begun in St. Louis (and would continue into the 1860's).

THE FIRST CORNER

On December 5, 1815, surveying north along the 5th PM, Robbins set a post at the Northeast Corner of T21N, R1W. (That's 126 miles and 252 corners in 25 days from the IP.) He didn't know it at the time, but the post he set would become the first corner to the USPLSS in what would become the State of Missouri. What a momentous corner to Missouri Professional Surveyors, unknown to Mr. Robbins at the time.

When Missouri became a state in 1821 (after several failed petitions), its south boundary was specified as 36 degrees, 30 minutes north latitude. In 1823 Robbins' "co-surveyor" of the 5th PM IP, Joseph Brown surveyed the "36-30" State Line from west to east. He found and crossed Robbins' 5th PM, tying the Township Corner. Brown's survey of the state line was eventually rejected and in 1845 it was surveyed again, this time by Bazil Gordon, from east to west. He too found and crossed the 5th PM and at that point he tied Brown's previously-surveyed "Old State Line," 26.56 chains to the north. Later the GLO subdivided the Missouri townships from north to south, closing on Gordon's state boundary line and the Arkansas

(continued on page 18)

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Missouri's First Corner *(continued)*

townships were subdivided from south to north, closing on Gordon's line. Thus, today there are double corners along the state boundary in this area.

"FIRST CORNER" REMEMBERED

The "first corner" was declared lost by Ripley County Surveyor Johnson in 1914. By single proportion measurement (along the 5th PM) he reestablished the corner, setting a stone and marking two witness trees. The corner position and stone sat unloved and forgotten until 2006 when Ripley County Surveyor Troy Ayers recovered Johnson's stone and planted a DNR Land Survey Program aluminum monument.

With Arkansas surveyors celebrating the 200th anniversary of the establishment of the 5th PM IP, and MSPS commemorating the life of Joseph C. Brown (who, after surveying the Base Line, had a remarkable career surveying such lines as the Osage Line, the west and south boundaries of Missouri, the Santa Fe Trail, lines of the USPLSS in Missouri and numerous surveys in what is today St. Louis and Ste. Genevieve areas), the "First Corner" finally got the recognition it deserved. On Saturday, December 5, 2015, 200 years to the day from when Prospect Robbins trudged up the 5th PM and set the post, about 23 surveyors from Missouri and Arkansas gathered to hear the story of the "First Corner" in Missouri.

State Surveyor Darrell Pratte, aided by Professional Surveyors Bob Shotts, Jerry Bader, Dick Elgin and Tom Webb (of Arkansas), all combined to enlighten the enthusiastic gathering of surveyors with the details of the 5th PM, the state lines and the subsequent surveys in the area.

Concluding, under clear skies and a warm breeze, the group raised a glass of their favorite adult beverage, said a toast to Robbins (who is buried in a Ste. Genevieve cemetery) and had lunch. It was a great day for the history of Missouri surveying.

Semiretired, Dick Elgin works for Archer-Elgin Surveying and Engineering in Rolla. He wrote the book, "The U.S. Public Land Survey System for Missouri."

Bob Shotts mans the compass and staff as Dr. Dick Elgin lectures.

Darrel Pratte of the Missouri Association of Registered Land Surveyors.

MSPS Board member Chuck Quimby views the exhibits.

Exhibit with transcribed field notes of corner and accessories.

MSPS past Presidents (l to r) Darrel Pratte, Mike Flowers, Bob Shotts, Dick Elgin, Dan Govero and Rich Barr join current President Jim Mathis in toasting Missouri's First Corner!

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"Subterfuge and Hydraulics 101"

by Ray L. Riggs

You would suspect certain government agencies to be involved in subterfuge. The CIA is all about trickery...intrigue... craftiness. The FBI? I'd say they've done their share of deceptions, guises and ploys. But who would suspect the meek and lowly Missouri Department of Conservation of such chicanery?

In the early 1990's, I was the Crew Chief on a four-man survey field crew, working in the Peck Ranch Conservation Area. It was in the late fall, rainy...muddy...overcast, just right for something to go wrong. We were in two trucks, (myself in the lead, of course) driving into the area where we were going to begin traversing. I had talked with the agents at the Peck Ranch headquarters and they had given specific directions on how to access the trail to our beginning point.

Included in these directions is the subject of this whole story. The trail we needed to drive down began at a small camping area with a gravel parking lot. The parking area had guard posts or bollards around the parking lot to keep people from driving into the camping area (which really makes a lot of sense.) These guard posts looked like short telephone poles with rounded tops and were firmly set in the ground. Here is the sneaky part...one of the posts was NOT set firmly in the ground. The Department had made a concrete post hole, about two feet deep, just the size of the post. A post was cut to just the right length so that when it was put into the post hole, it looked just exactly like one of the other (firmly set) posts! Our directions were to remove the post, drive through the opening, replace the post in the post hole and proceed through the camping area to the old trail.

We followed the directions to the letter. Since I was leading, I pulled the post out of the concrete post hole, set it to the side, drove on through and radioed to the guys in the truck behind, "Just drop that post back in the hole when you're clear". One of the guys (I'll just call him Bob) wrestled the post back to

the post hole, tipped it up and positioned it above the post hole...And dropped'er in!

I really haven't forgotten our lesson in Hydraulics 101. Pascal's Law states that the "Pressure applied to any part of a confined fluid transmits to every other part with no loss. The pressure acts with equal force on all equal areas of the confining walls and perpendicular to the walls." Remember what kind of a day it was...rainy... wet. The post was loose enough in the concrete post hole to allow water (fluid) into the post hole (confined space). Along with the water, there were sundry other things that had made their way into the post hole... decaying leaves, mud, insects....which made kind of a black, smelly soup in the bottom of the hole. When Bob dropped the post into the post hole, it applied equal pressure on this black-smelly-soup...and since it really was not fully confined, the black-smelly-soup shot up the sides of the post and right into Bob's face!

Now...None of us were witnesses to the "equal pressure applied to a confined fluid" but we certainly saw the effects! Bob had leaves in his hair...in his nose...in his ears...down his shirt, black gunk on his face...in his hair... in his mouth...and he had acquired a certain amount of ire! His first comment to me (when he could talk without getting more black goo in his mouth) was "WHY DID YOU TELL ME TO DROP THE POST BACK IN THE HOLE?!?". In between guffaws of laughter, I said "Bob... Bob...I didn't mean for you to DROP it back in the hole, just ease it down so it wouldn't...Do what it did!!" He was hot for awhile but in a few hours we were able to laugh about it, marvel at the subterfuge of the Missouri Department of Conservation and discuss the darker side of Hydraulics 101...

Elk in the wild at Peck Ranch. (Mo. Dept. of Conservation)

Cracking the code to speak Cherokee

January 5, 2016 by Dale Neal, Ashville Citizen-Times and Greenville News

EDITOR'S NOTE

The following article very well may illicit many responses of "what does this have to do with surveying?" It would be an understandable reaction. Linguistics, cultural preservation, software development – each a significant element of the story. But I invite readers to consider the surveyor's relevance to this report far beyond the mere fact that the principal subject's father was a land surveyor.

Surveyors, their practices and their concepts have impacted our country far beyond measuring and marking. Surveyor journeys into the native forest and mountains converted wilderness to settlement…they made ground into *land*. From this was born a bedrock condition of the American realm; *land tenure*. With *freedom* and *equality* the ability to *"hold" the land* (work upon it, reap its rewards, secure our worldly belongings on it, and trade or bequest it) is a right which defines us and our country. What greater sense of hope may any people have than that of having a place to plant a tree from which your progeny will harvest fruit long after you are gone? This core trait of property ownership available to many is not surveying yet its genesis was made in the initial pulling of chains through timbers and across the fields of *this land*.

Beyond our land and forward in time we have now a world being developed by surveyors and their methods far beyond our core roles in boundaries and building. A query of international news in emerging countries reveals peers playing key roles in:

- Real estate fraud prevention in Senegal
- Settlement planning with affordable housing in Tanzania
- Spatial infrastructure development/operation for disaster relief worldwide
- Rainforest timber protection in South America and Indonesia
- "Nation building" in Malaysia (*Missouri Surveyor*, March 2014)

So as you peruse the article, look for the application of a defining tenet of land surveying. The key to "cracking the code" in this case was surveying's prevailing mantra, its universal instruction, its *path* to success…and if your still not sure get out your Clark, Surveying and Boundaries (2nd, 1939).

John Standingdeer stands with a display of artifacts inside of the Museum of the Cherokee Indian on Monday. Standingdeer has broken down the complex Cherokee language into 16 basic sounds and found a pattern with words that he hopes will make the language easier to learn.(Photo: Angeli Wright)

John Standingdeer Jr. grew up on the Qualla Boundary, proud of his people and their past. He learned to play stickball as a kid and became a cultural ambassador dancing with the Warriors of AniKituhwa.

"Everything about me was Cherokee except for the language," Standingdeer said.

Standingdeer came from a family who spoke only English instead of the native Tsalagi or Cherokee. And as a boy, he didn't pay much attention to any fluent speakers on the reservation. As an adult, he tried immersion classes, but to Standingdeer, it was all about memorizing meaningless phrases, empty sounds that frustrated him.

There had to be an easier way to learn the language of his ancestors.

Standingdeer took advice from his father, a land surveyor. When the deeds or papers conflict over a piece of property, it's best to follow the evidence on the ground, he said.

So, Standingdeer followed in the footsteps of Sequoyah, the man who invented a written language for the Cherokee in 1821. Sifting through the 85 characters in Sequoyah's syllabary, Standingdeer saw that the symbols in two columns could be boiled down to 16 basic sounds.

"Sixteen is easier to memorize than 85."

As he tracked the sounds, he began to uncover the patterns of how words are formed in the complex language. "Every word is like a math equation, and this equation is the same for every word." he said.

Now, Standingdeer has patented computer software and a revolutionary way to master an ancient language at risk of disappearing.

Keeping a language alive

Even though Cherokee has been preserved in writing through Sequoyah's syllabary, it still risks becoming a dead language, Standingdeer warned, if no one uses it in everyday conversation.

Rob Daugherty, director of cultural programs for the Cherokee Nation in Oklahoma, estimated that only about 1 percent of the 300,000 members are fluent. "We're losing on the average 10-15 speakers a month," Daugherty said at a February live-streamed conference dealing with problems with teaching Cherokee language. "We're not replacing speakers as our elders die."

The problem may be more pressing among the Eastern Band, North Carolina descendants of Cherokee who fought the 1839 Removal to Oklahoma.

In 2005, a survey found 460 fluent speakers among the Eastern Band's 13,000 enrolled members, most over the age of 50. Today there an estimated 200 speakers, again mostly elderly.

Who Knew?
Terminus: Roman God of Boundaries

Who knew the Romans had a god of boundaries? They did and his name was Terminus. The whorship of Terminus dates back to eight centuries BC shortly after the found of Rome by Romulus. As the protector of boundary markers it is believed Terminus was initially invoked to prevent violent boundary disputes. Holding a special place of honor among gods, only Terminus was not dismissed from the temple when Jupiter dismissed the others gods – Terminus stayed his position, never to be moved and abiding his location without influence from others. He was the only god to which Jupiter bowed.

The ancients understood the importance of boundaries such that they attributed peace and justice to the god of the stones (*termini*) which marked lines' ends. The placing of these stones was seen as an important act of religious significance. As such there was great celebration and sacrifices made to the stones. Adjoining property owners would decorate the marker with garlands and cover with blood of a tribute lamb (they must not have had "flagging"). They also understood clearly marked and recognized boundaries served to protect them and preserve their *place* on earth from taking by others.

From these adjoiner celebrations of their bounds evolved a greater festival celebrated throughout Roman lands called *Terminalia*. Involving ceremonies replicating those performed when placing stones this celebration also served as an annual renewal of the foundation of Roman deities. Household members would gather around boundary stones and make offerings of food and wine. It was all a bit more elaborate than the State Land Surveyor's instructions for monumentation of corners! The ancient poet Ovid noted the following prayer to Terminus in *Fasti* (The Festival); "Thou dost set bounds to peoples and cities and vast kingdoms; without thee every field would be a root of wrangling. Thou courtest no favour thou art bribed by no gold: the lands entrusted to thee thou dost guard in loyal good faith….What happened when the new Capitol was being built? Why, the whole company of gods withdrew before Jupiter and made room for him; but Terminus, as the ancients relate, remained where he was found in the shrine, and shares the temple with great Jupiter. Even to this day there is a small hole in the roof of the temple, that he may see naught above him but the stars. From that abide in that station in which thou hast been placed. Yield not an inch to a neighbour, though he ask thee, lest thou shouldst seem to value man above Jupiter. And whether they beat thee with ploughshares or with rakes, cry out, 'This is thy land, and that is his."

Beating the Bounds.

Beating the Bounds- a tradition with its roots in *Terminalia*, a Roman festival held in May which included beating and sacrifices to *Terminus*. It was adapted by Christianity and held during Rogationtide- the fifth week after Easter. Villagers walked their community boundary to bless their crops, pray and ritually beat a landmark with switches and sticks. The children of the parish would also be whipped against the boundary marker. It was considered important to imprint the village boundaries on the youth to ensure neighboring parishes wouldn't encroach in ensuing generations.

OnLine Course

CVT 242 Land Records: Researching and Rules of Construction

by Joe Paiva and State Technical College of Missouri

Course Description:
This course teaches elements that provide the student with the fundamental knowledge to perform property boundary surveys. The student will examine evidence of ownership, historical information, property descriptions and legal requirements for recording documents. Applications of the Missouri Minimum Standards, American Land Title Association (ALTA)/American Congress on Surveying & Mapping (ACSM) Surveys and FEMA Certifications are also studied. 3 credits.

Course Objectives:
Upon completion of this course, students will be able to:

- Analyze deviations between recorded information and found evidence.
- Correlate technical, legal and administrative facts.
- Evaluate the reliability of all evidence discovered.
- Apply prescribed standards and historical values.
- Provide a reasonable conclusion of title boundary locations of real property.

Required Books, Tools, and Other Materials:

- Interpreting Land Records (2nd Edition) by Donald A. Wilson (2014)
- Supplemental materials including the Missouri Minimum Standards for Land Surveying and handouts related to ALTA/ACSM and FEMA will be provided by the instructor.
- A valid student e-mail account and either home access to the internet or time to access the internet from on-campus sources is required.
- Scientific calculator (including trigonometric functions).

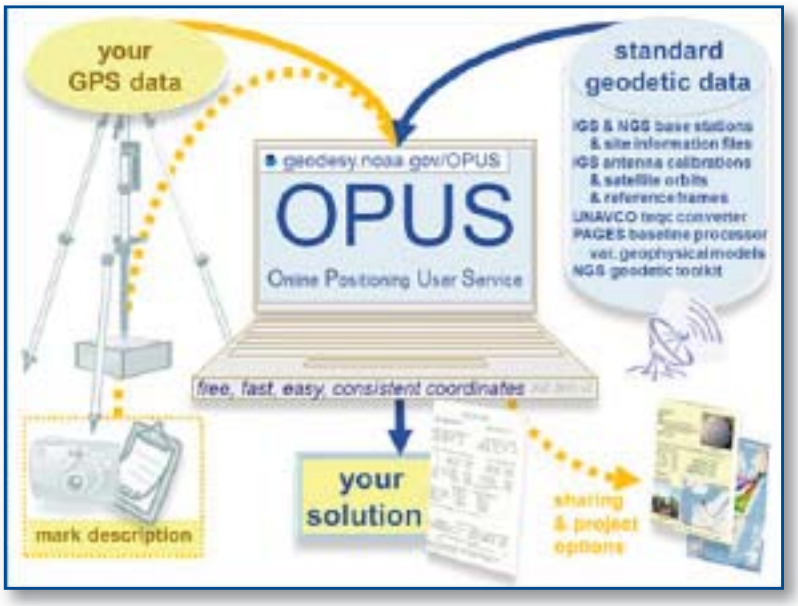
FOR MORE INFORMATION CONTACT:
christy.fick@statetechmo.edu or
cynthia.cox@statetechmo.edu

Citizen Science, Surveyors and Geodesy

by Frank Lenik, PLS

Citizen science is a term which has recently come into vogue, but which has been practiced for many years. It is the term which is used to describe the activities of ordinary people, participating in scientific work to augment research or to contribute data for analysis by professional scientists or scientific institutions.

I first participated in a citizen science project in 1971 when I took part in my first National Audubon Society Christmas Bird Census. At the age of twelve it was an adventure for me to try to identify and count all of the birds in fifteen mile diameter circle. Today, ornithologists and ecologists can look back over 114 years of continuous bird count data to see real trends in populations. Measurable scientific data, available to everyone because of one person's vision and the work of many dedicated volunteers.



The experience of land surveyors in the United States over the last few years collecting GNSS data during National Surveyor's Week has been an outstanding example of citizen science. The work of many dedicated individuals was gathered and shared for the good of the community. Under the auspices of the National Society of Professional Surveyors hundreds of OPUS Shared Solution points were collected by the land surveying community and put into the hands of scientists at the National Geodetic Survey (NGS). Today, those scientists are incorporating those data, along with data from many other sources to create a new geodetic reference frame for the country. That model will serve not only the land surveying community, but all of the citizens of these United States.

Next year National Surveyors Week will be celebrated from March 21 – 26, and we will have another opportunity to contribute data for incorporation into the new reference frame. The more data we contribute the better the model will be. So let's prepare ourselves for another GNSS field campaign to collect more OPUS Shared Solutions than ever before (http://www.geodesy.noaa.gov/OPUS/view.jsp). Theodore Roosevelt said "Every man owes a sacred obligation to the profession which gives him his livelihood." Stand up and be counted. When NGS introduces the new datum in 2023, I want to say that we were a part of that process.

Frank Lenik is a licensed land surveyor from New Jersey. He is employed by Leica Geosystems and has been a member of NSPS since 1988.

Oxford English Dictionary
citizen science n. scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions.

Century-Old Boundary Dispute Brings Omaha Tribe Before US Supreme Court

January 19, 2016 by Bill Kelly, NET News

The United States Supreme Court is scheduled to hear arguments in a case pitting the Omaha Indian Nation against its uneasy neighbors in the Village of Pender, Nebraska. The legal battle stretches back 130 years to when the tribe chose to sell 50,000 acres located on its reservation.

Poster advertising sale of reservation lands, typical of the early 1900s.

The case has "huge implications" for Indian tribes across the country, according to Jessica Shoemaker, a tribal law specialist with the College of Law at the University of Nebraska-Lincoln.

If a majority of the court rules against the Omaha Tribe it could raise questions about governance of non-Indians on tribal lands, where native people now share authority with state and local governments.

The most recent conflict began in 2006 when the Omaha Tribe attempted to license and tax bars and liquor stores on reservation land in Thurston County.

"The tribe has always had jurisdiction within the boundaries of the reservation," said Vernon Miller, the chair of the Omaha Tribal Council. "Before the state of Nebraska was a state, our tribe has always been here. It has always been our land. The village was founded on a reservation."

SURVEY NOTE

The Tribal Chair's assertion of "always had jurisdiction" is historically recognized. Indeed, it is the basis of the transfer of rights occurring per terms of treaties between American Indian tribes and the United States. Popularly misconceived as the granting of rights to tribes, treaties actual constitute the conveyance of rights held by tribes to the federal government. While this construct does embrace the notion of there being rights which existed "always", it also provides the process of extinguishing title of the tribes and authorizing governance by the United States of the formerly Indian lands.

In 1854 the United States Congress agreed to a treaty which set aside approximately 300,000 acres for the Omaha Tribe. The area that would become Pender was within that block of land. Over the years there were divisions and sales (including setting aside thousands of acres for the Winnebago Tribe reservation) with the approval of the tribe.

One of those sales, suggested by the tribe and made possible through an Act of Congress in 1882, opened up land to the rush of non-Indians arriving in the hopes of making a new life in the rich farmland of the Great Plains. The Omaha, in the hopes of collecting much needed funds at the time, wished to sell land west of a railroad right-of-way that divided the reservation. The sale required the approval of Congress and, after much debate, was granted.

Selling off that land to the settlers in the years that followed the 1854 agreement gave rise to the lawsuit filed in 2007 by the businesses in Pender.

The Pender businesses won their case at a trial in Thurston County District Court. When the case moved to the federal courts all other rulings have favored the tribe. The Omaha prevailed in the officially sanctioned Tribal Court, later in Federal District Court and under appeal to a three-judge panel in the 8th Circuit Court of Appeals.

The Pender businesses, with the support of the Nebraska Attorney General, asked the U.S. Supreme Court to hear the case. Oral arguments, in response to the briefs filed over the past year, will be heard Wednesday.

"The three courts below (the Supreme Court) got this right," said the Attorney General of the Omaha Tribe, Maurice Johnson.

The justices are being asked to determine whether the settler's purchase removed the land from the reservation's governance or if the non-Indians move onto tribal land keeps them under the sovereign authority of the Omaha's council.

"The key issue, the only issue, is what are the boundaries of the Omaha Reservation and is Pender, Nebraska within the boundaries of the reservation," said Nora Kane, part of the team that represented the Omaha Tribe as the case made its way through the federal courts.

SURVEY NOTE

Kane makes an interesting selection of words in defining the "key issue". Thought of in a strictly spatial sense boundaries are understood to be located somewhere leading to the question *where are the boundaries?* Kane states that a solution to the matter lies in understanding "…what are the boundaries…". Understood in the practice of surveying is the concept of where boundaries may fall is determined by interpretation of evidence including extent of title and description thereof. In this case, *what are the boundaries* extends beyond location and includes understanding the *bundle of rights* conveyed and retained.

If Pender falls within the reservation, the tribe, according to lower court rulings, has the authority to collect a tax on taverns and liquor stores.

In the past, the Supreme Court dealt with similar disputes involving other tribes. "It's an area of law that has been relatively well settled in the past couple of decades," said Shoemaker, the UNL tribal law specialist, adding "we've had a pretty clear test" guiding whether century-old treaties and laws diminished specific areas of land held by Native Americans.

Patricia Zieg, who helped prepare and argue the case in the federal courts, explained "ordinarily you would look at a map and call a surveyor to ascertain the boundaries of a given property."

SURVEY NOTE

Surveys of and on Indian trust lands are managed by the US Department of the Interior. Their Bureau of Indian Affairs (BIA) funds surveying under terms of a Memorandum of Understanding with the Bureau of Land Management (BLM). The BLM executes surveys through the program components of; the BLM Indian Land Surveyor program, the Certified Federal Surveyor program and the Enhance Public Lands Survey System in Indian Country.

(continued on next page)

Century-Old Boundary Dispute Brings Omaha Tribe Before US Supreme Court *(continued)*

When the question is whether a reservation has been diminished, "you don't start with a map, you start with the language of the statute," Zieg said. "What did Congress intend when they passed the statute?" In this case, Zieg argued "the law is crystal clear."

SURVEY NOTE

Regardless of the treaty terms and the subsequent action by the Omaha Tribe (with required congressional approval) to sell off part of their lands some ambiguity in title as understood by the Omaha and the people of Pender exist. The court will be seeking to understand the *intent* of the laws and from transfers so long ago. Surveyors understand such a challenge – analyzing what past parties intended when conveying property is not a simple matter. Misunderstood by those believing intent is determined by an imaginary trek through time to suppose the thoughts, aspirations and words of predecessors a surveyor's consideration of intent is much more a process than a guess. Indeed supposition of this sort would be comparable to accepting verbal evidence as sufficient for the conveyance of land. It is not.

For the surveyor, like the Supreme Court in this case, analyzing intent is called for when ambiguities exist. In its most basic form it occurs when the writings found in the land's description contain conflicting elements. The surveyor then considers the order of conflicting elements, governing rules and surrounding circumstances. A conclusion is reached without the bias of pondering party intentions; it is actually a process of determining the intent of the conveying instrument guided by precedent and practice. It relies on understanding the rules and laws at the time of conveyance. The matter of the Omaha tribe is complicated by the fact that over time the Court's interpretations of law and treaties have evolved.

After examining the documented wording of actions taken by Congress, the court reviews the perceived intent of the government, examining comments made in floor debate. Finally, other matters of history are considered, including actions of the tribes, governments, and residents which might highlight how the lands were governed and tended to by all involved.

This article is published with the permission of NET News, Lincoln Nebraska. Abridged by Missouri Surveyor the full story and broadcast are available at http://netnebraska.org/article/news/1005047/century-old-boundary-dispute-brings-omaha-tribe-us-supreme-court

SURVEY NOTE

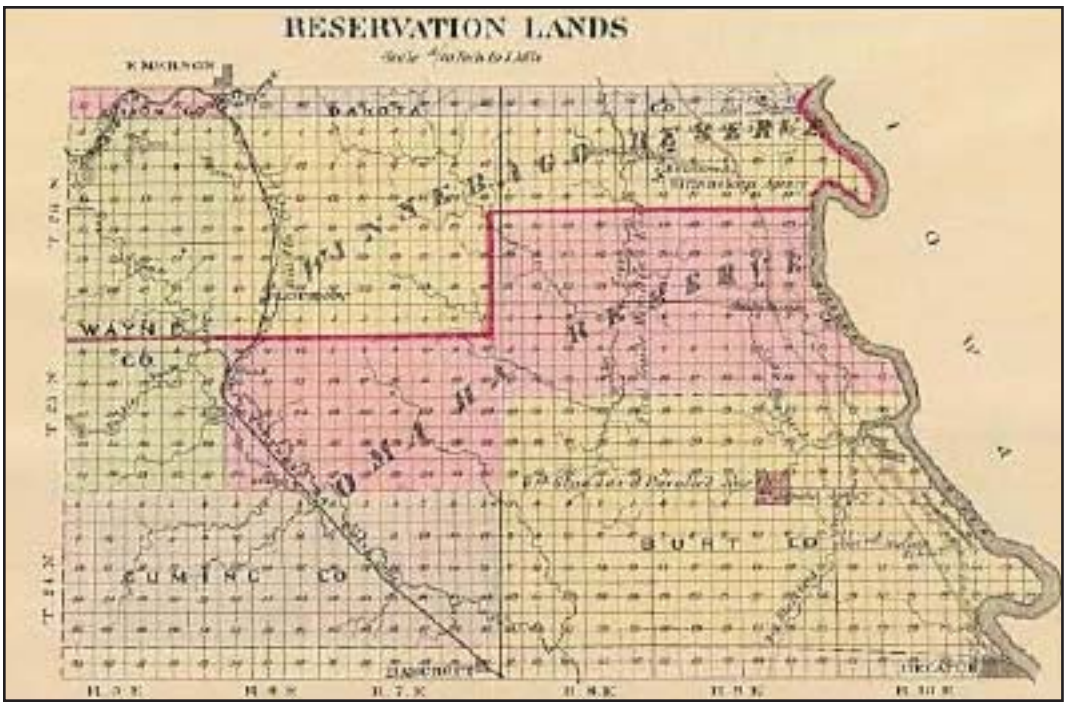
The interpretation of federal law regarding American Indian tribes was established by what is known as the "Marshall trilogy", three cases ruled on by the Court of Chief Justice Marshall. While there have since been many other rulings in this matter these three serve as the basis for the power/sovereignty paradigm between the United States and the organized tribes of its first peoples:

Johnson v. McIntosh (21 U.S. (8 Wheat.) 543 (1823)), ruled tribes could not convey land to private parties without the consent of the federal government.

Cherokee Nation v. Georgia (30 U.S. (5 Pet.) 1 (1831)), ruled against the Cherokee Nation's claim of being a *foreign state*. In ruling Marshall described tribes as "domestic dependent nations" lacking the attributes of sovereignty that the word "nation" normally implies.

Worcester v. Georgia (31 U.S. (6 Pet.) 515 (1832)), ruled the laws of states have no effect in tribal territories establishing exclusion of states in enforcing their jurisdiction in Indian lands.

Source: From Marshall to Marshall: The Supreme Court's changing stance on tribal sovereignty, Philip J. Prygoski, professor of law at the Thomas M. Cooley Law School, Lansng, Michigan. Available on americanbar.org



1885 map of the Omaha Tribe's reservation.

Sources used for writing Editor's Notes:

- *United States Forest Service, FS-600, April 1997*
- *Bureau of Indian Affairs, Division of Real Estate Services, Cadastral Services, available at indianaffairs.gov*
- *Brown's Boundary Control & Legal Principles*

Meet Our Members!

LS Member
Debrah Wolfe
Seymour, Missouri

Position:
Land Surveyor,
Electrical Transmission Division,
Toth & Associates, Inc.

Focus of survey practice:
Boundary surveys, subdivisions, elevation certificates, public improvement projects, easements for electrical transmission lines.

Most memorable project:
I actually have two and they share the same traits of being for the community and available for the public's access and enjoyment. The first was a project for the City of Springfield Parks Department. They were adding a "new" type of park and in this case new meant complicated and challenging. More than a simple park of paths and playgrounds this one was to have a beautiful water feature as well as several other intricate elements. The precision required for all of the "new" on this project was both exciting and frustrating. The second one was when the Dickerson Park Zoo undertook an expansion project. It is very satisfying to know that as a surveyor I had a part in creating these venues of fun and giving the public things to enjoy.

Likes about surveying:
Each surveying project is different. The variety and challenges each project presents helps to get my creative juices flowing. Whether it is creating new tracts or following in a previous surveyor's footsteps, I enjoy the process.

Why a member of MSPS:
I believe it is important for members of a unique profession like surveying to support each other. You do not stop learning once you receive your license. I learn from talking and listening to other surveyors – MSPS is a group where I can do this. I want to continue to grow in my profession.

Associate Member
Steven Patterson
Lebanon, Missouri

Position:
Associate Attorney
Allen & Rector, P.C.

Focus of survey practice:
I started surveying in 2007 while working for Craig Ruble of Salem, Missouri. Focused on boundary surveys large and small we also did mine reclamation projects by engr/topo surveying. I attended law school at the MU School of Law from 2012 - 2015. After graduation and passing the bar exam I began working at Allen & Rector, P.C. in Lebanon. I have a small-town general practice but I am working on focuses of real property law, business law, and estates and trusts. I intend to use my surveying experience to develop an expertise in boundary law.

Most memorable project:
Working on large boundaries for the Forest Service, Conservation Commission, Fish & Wildlife and Corp of Engineers with GLO retracements of townships was interesting and challenging. Mining reclamations were also memorable, showing how a versatile surveying company could add value and provide solutions for engineering and construction.

Likes about surveying:
I enjoyed my time surveying! I liked being outdoors, helping people achieve goals, solving their problems, digging through the history of a tract, perpetuating work which has been centuries in the making - it is fulfilling!

Why a member of MSPS:
I joined while at Ruble Surveying Co. working toward my LSIT license, granted in 2012. I have continued my membership because I hope to take the LS exam someday. Also, I am focusing my legal career on real property issues, specifically boundary, easement, title, riparian, and land use problems. Being involved with MSPS will allow me to provide a different perspective to its members on issues related to land surveying practice.

Meet Our Members!

LS Member
Matt Thomas
Sturgeon, Missouri

Position:
Boone County,
Surveyor

Focus of survey practice:
County related surveying, whether it be writing descriptions for required easements or leases, topographic surveys as needed by our engineering staff, review of surveys and plats completed by private firms, or participating in the State Land Survey Office/County Surveyor Coop Remonumentation Project whereby I remonument 10 PLSS corners each year.

Most memorable project:
A topographic survey in rural Africa for design improvements to a small hospital. This facility had previously been occupied back-and-forth between opposing forces in a civil war! Scars of that conflict remained with bullet riddled walls enclosing the humble clinic. Surveying to create a detailed map of the site and an adjoining mine camp my efforts were complicated by the site being consumed by the jungle since abandonment during the war. But concerns or barriers of the encroaching jungle feel away as my mission was aided by a corps of local volunteers, particularly the young men clearing jungle with machetes – what a survey party! That little five acre project didn't take long to map thanks to all of the help. In the end it was those good people and the need we served together which helped me! It helped me realize my most memorable survey.

Likes about surveying:
As someone who disliked, even argued the relevance of history while in school, I enjoy the research aspect of surveying the most…trying to decipher intent while weighing evidence both in the field and on paper.

Why a member of MSPS:
To meet, connect, learn from, and grow with others with a passion for our profession.

In to Africa *by Matt Thomas*

The September 2008 issue of *Missouri Surveyor* featured an article by Adam Teale about a mission/survey project he had undertaken in Africa. While not written TO me specifically it seemed to be written FOR me. I was searching for a "greater purpose" of this gift we call "Surveying." That article led me to missionaries (all design professionals) called Engineering Ministries International (eMi). I signed up for their newsletter and in a few weeks they contacted me with a project in Sierra Leone. Before knowing the project scope or where Sierra Leone was, I said "Yes, absolutely!" And then…panic; what is the project and where am I going? Sierra Leone is a small West African country…and one of the stars of the movie "Blood Diamond" with some guy named Leonardo DiCaprio as a diamond smuggler. Our project took us to a small village in the Mokanji District of Sierra Leone….some 180 miles into "The Bush" from Freetown, the nation's Capital. It took 8 hours to drive to the village. Some paved miles but many we surveyors would call "goat paths"- nothing more than ruts made by wagons and mining trucks during the rainy season. On site we were greeted by the Chiefs of the three tribes living in the area as well as the locals….and by "greeted" I mean a small party was thrown to show appreciation for us being there to help.

The scope was to design improvements to an "existing" hospital…a hospital that, 10 years before was shelter to either rebel or government fighters during a civil war for control of diamond mines. The hospital still had scars from fighting with bullet holes in the exterior walls and little to no necessities found in a hospital. The bathrooms were pit stalls outside the main building…with needles thrown in them. The morgue was easy to spot….the small building with a window air conditioner. The main facility still served as a birthing center and clinic run by a couple of nurses. Serious care required travel of 6 hours on the "goat paths" to a facility near the town of Bo. That trip usually proved fatal due to the seriousness of the patient and the time it took to travel.

I was to map the site and a portion of the adjoining, mine camp…which had been abandoned during the civil war and consumed by the jungle since. Thanks to local volunteers eager to help and six young men armed with machetes, mapping the abandoned mining camp didn't take too long …of the 10 days on site, just 2 completed my topographic survey of the 2 acres. The remaining 8 days were spent walking around the village to the call of "Poomwee," meaning "White." Shouted by village children shortly after the announcement of my arrival, a parade of kids would follow behind me! In the end we presented host missionaries a design concept of the site.

Since this trip in 2009 I have traveled with *eMi* to Tanzania in 2012 for the design of a new orphanage. I'm currently keeping a watchful eye on the eMi website (http://www.emiusa.org) for my next trip!

Missouri Surveyor Q & A: President Jim Mathis

(Mo Surveyor) *What inspires you to serve as President of MSPS?*

(President Mathis) As I approach my 40th year as a member of MSPS, I look back and realize how much we rely on our professional society to help us keep abreast of technological innovations so central to surveying today, to new rules and regulations, and to many of the business opportunities presented by industry and government. By becoming involved one can not only keep up with - but can also help in subtle ways to shape the future of - our profession. Serving as president this year is the culmination of a commitment made many years ago to give back in small measure to the profession which has been so good to me.

(Mo Surveyor) *What does leadership mean to you?*

(President Mathis) To me leadership of a professional society means leading by example: presenting oneself as a professional in both dress and manner; balancing the promotion of the surveying profession with our primary obligation to the general public; listening to and channeling the many diverse and opposing viewpoints and ideals from our officers and members; and confronting the constant outside challenges to our autonomy and fiscal health.

(Mo Surveyor) *What issues are the most important for MSPS to address?*

(President Mathis) In my opinion the issue which currently looms largest over the surveying profession is our dwindling numbers and lack of younger people entering the field.

Throughout the United States statistics show that the average licensed surveyor is rapidly approaching retirement age. With so few of the younger generation to fill our shoes, this trend does not bode well for the future of surveying.

(Mo Surveyor) *What is the most important quality for an association president to have?*

(President Mathis) After conducting my first Board of Director's meeting in December, I have come to appreciate those who have so admirably filled the position of president in the past. Conducting a meeting comprised of so many distinct and independent individuals is, from a country boy's perspective, a bit like trying to drive a herd of cats, so at this stage of my term of office, perhaps the most important attribute for a society president seems to be patience and forbearance.

(Mo Surveyor) *What do you consider your most important contribution to MSPS?*

(President Mathis) MSPS has always offered seminars and presentations to help its members keep up with a rapidly changing profession and meet continuing education requirements. I hope that by participating in these presentations, I have in some small way shared the perspective of a private practitioner working in a much larger context within our great profession.

Missouri Surveyor Q & A: Director Brad McCloud

(Mo Surveyor) *What inspires you to serve on the Board of Directors of MSPS?*

(Director McCloud) Being able to give back to the profession that has given me so much and make it something that future generations of surveyors will be proud of.

(Mo Surveyor) *What issues are the most important for MSPS to address?*

(Director McCloud) As the numbers in our society are declining I feel we need to address how we are going to attract new surveyors and support them like so many have done for us.

(Mo Surveyor) *What do you think is the most important quality a board should have?*

(Director McCloud) To listen to it's members and promote it's profession.

(Mo Surveyor) *What is the most important quality for a board member to have?*

(Director McCloud) The ability to put the needs of the group in front of one's own gains.

(Mo Surveyor) *What do you consider your most important contribution to MSPS?*

(Director McCloud) My experience with government agencies, along with their survey policies and processes.

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