Missouri Surveyor

A Quarterly Publication of the
Missouri Society of Professional Surveyors

Jefferson City, Missouri

September 2021

What's in this issue...

CALENDAR OF EVENTS

2021

September 23, 2021
Webinar Series
Land Survey division of the Missouri Board for Architects, Professional Engineers, Professional Land Surveyors and Professional Landscape Architects

October 14-16, 2021
64th Annual Meeting and Convention
Tan-Tar-A Resort, Osage Beach, MO

December 4, 2021
Board Meeting
MSPS Office, Jefferson City, MO

Additional Dates for Spring Workshop
April 27-May 1, 2022
May 3-May 7, 2023
May 1-May 5, 2024

Cover: Affinis land survey team members Mark Nolte and Bill Bishop working in the field on a slope stabilization project determining how close a proposed ground model will get to the edge of an existing pond in rural Howard County, Missouri.

Donald R. Martin, Editor

Notes from the Editor's Desk

Donald R. Martin

Summer has passed and it is time for the September edition of Missouri Surveyor. More importantly, it means the MSPS Annual Meeting is almost here! October 14 – 16 at Tan-Tar-A in Osage Beach; it is our 64th convention. If possible, make time for the coming event.

This edition marks the "last call" President's Message for Earl Graham. Don't skip over his newsletter swan-song. Earl, you've been a good and faithful contributor to Missouri Surveyor, and more importantly, a fine President. Thanks for the year! Following Mr. Graham's note, I share a bit of an opinion in DEI as Risk Management. Agree or disagree, it is a cautionary tale of contemporary issues and a surveyor's response – and some not so welcome fallout. Next, one of our past presidents shares An Epic Story: 203 Years in the Making, Twelve Years in the Conception, Thirty Minutes in the Telling. Darrell Pratte tells the tale of a common corner to four sections with a complicated history. While reading the article, look for his funny parable comparing the similarities found between old surveyors and witness trees. I think Darrell got it right! Between our main articles, lookout for Surveying & Surveyors in the News with snippets from the world-wide web pertaining to our trade. In this edition we have news of the preservation efforts along the Mason-Dixon Line, a story recognizing the value of surveyors' talents, and a recounting of the surveying methods used by the ancient Egyptians. They all offer interesting stuff.

Another entry in Steve Weible's legacy of detailing the formative stages of land tenure in pre-statehood Missouri is included in Claims to Land and the District Court. Then one of the most important features we will publish all year, the Nominees for 2020-2021 Officers and Board of Directors. This is your opportunity to "meet" your fellow MSPS members willing to serve in the leadership roles for our society. In the latter portion of the newsletter, we have NSPS News & Views. Don't miss these snippets, they offer some good information! These updates are followed by News & Events from the NGS. This edition closes with How Ancient Babylonian Land Surveyors Developed a Unique form of Trigonometry — 1,000 Years Before the Greeks by Dr. Daniel Mansfield. A new look at an ancient artifact brings news enriching the history of surveying. You'll want to see this.

With that, I best break-it-down and bunch-it-up so I can start getting ready for the next edition …I'll get back with ya' then…

Donald

THE MISSOURI SURVEYOR

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President's Message

Earl E. Graham, PLS

Here it is! Summer is almost passed and my year as president is winding down; and this will be my last *President's Message*. As President, writing these messages has been the most intimidating part of the job. Thanks to our great editor for helping me not sound like a complete hick.

Such a strange year it has been. Starting last fall with everyone roaming the halls and facilities at our Annual Meeting areas wearing masks. I didn't even recognize some attending until I heard their voice. I wanted so badly to make a joke about "who was that mask man?", but I realized that probably no one under 40 had probably ever seen the Lone Ranger TV show and they likely wouldn't get it. Everyone involved was concerned about what kind of attendance we would have, but in the end, it is my understanding that we had as many people attending as was allowed under the rules in place at that time. The Spring Workshop was more of a normal occasion and in my mind, it was a success.

In December 2019 I thought Zoom was what I did in my hotrod on a deserted road. Now, *Zoom* and *Facetime* are a part of life making meetings and other communications far easier by saving time and requiring less attention to logistics. That said, being involved in a MSPS committee can now be much less complicated and time consuming. I encourage everyone to be involved especially those with a little color left in their hair.

I want to thank the Legislative Committee for their work on the Chapter 327 revisions. I believe they have come up with a good compromise that we can all support. Most importantly, if passed it would remove the requirement of four additional years between LSIT and PLS examination. This requirement was one of those things that may have sounded good at the time, but it has had some devastating, unintentional consequences. Once the proposed language is back from the Capitol "legal eyes" it will be circulated for all to look over.

I was sorry to hear that Curt Sumner was going to retire as NSPS Executive Director. I understand he is going to stay on part time until his replacement is ready. I have been acquainted with Curt for years and although he knows thousands of people across the country and around the world, he has always taken time to make me feel like I was important to him. He is a great speaker and has served the surveying community very well for many years. I have mixed feelings about this. Everyone who has worked hard deserves an enjoyable retirement, but I think Curt will be sorely missed. I would just like to say that a room is a better place when Curt is in it.

Thanks to everyone for giving me the honor of serving as your President.

Earl

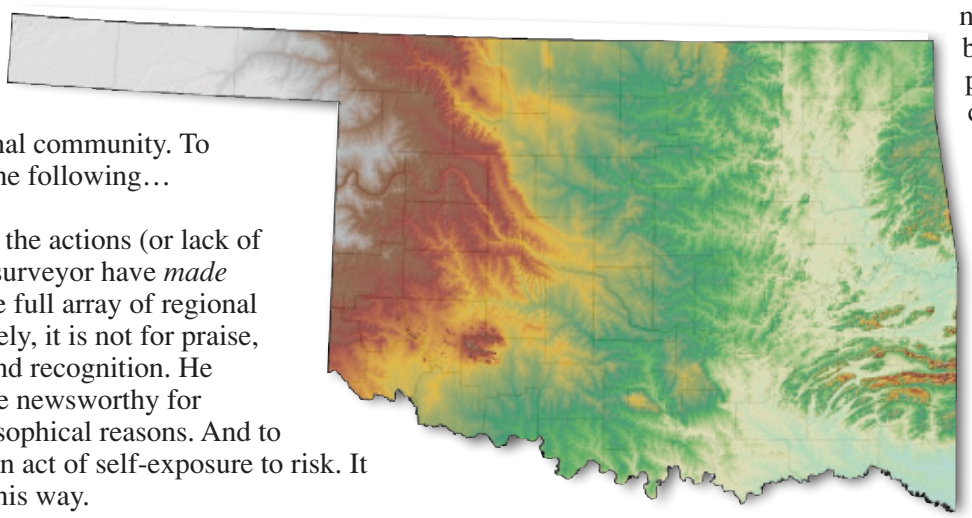
DEI as Risk Management

by Donald Martin

Very probably, most of you are familiar with risk management. It is the collection of strategies we use to identify and protect our endeavors from threats which will doom, damage and destroy. It is why we buy insurance; it is why we pay for technology maintenance agreements; it is why we wear fluorescent vests. Maybe not as familiar is "DEI," although you most likely know it for what each initial represents. **D**iversity, **E**quity, and **I**nclusion.

Let me be clear, I am not ignoring the importance of sincerely embracing and working to implement the understandings and activities necessary to normalize these concepts. That is what is most important, and what is most needed. But it is a reality of these times that failures to address DEI within our organizations and companies is to take risks.

Risks that can pose threats to a business, an association, a board, a professional community. To illustrate, I share the following…



In Oklahoma City, the actions (or lack of action) by a local surveyor have *made the news* across the full array of regional media. Unfortunately, it is not for praise, accomplishment and recognition. He instead has become newsworthy for political and philosophical reasons. And to some extent, it is an act of self-exposure to risk. It didn't have to be this way.

In that city is a church which although it has traditionally been small, it is large in service and heart. During the COVID-19 pandemic this church became an exemplary source of hope and necessities by provided free food, household items and school supplies for those hit hardest by hard times. As the little church's success in helping grew, so did the contributions from others wishing to donate. Indeed, donor generosity outgrew the storage and distribution capacity of the church. Room was needed - a new facility was to be built next door. So, the pastor found himself managing a construction project on the church's behalf to have a place to house and distribute the donations. For that project, the pastor needed a building permit.

A condition of the permit was a requirement for a land survey. The pastor therefore engaged the services of a local surveyor. Both parties executing a contract with the term of one month, but the surveyor agreed to have his work completed within two weeks to meet a submittal deadline imposed by the permitting authority. But the surveyor never made it to the project site. The land surveying services were never performed. Reasons for this were not communicated.

Now, there is a side story to all of this. During this time period, the state's legislature was debating a bill to prohibit the teaching of *critical race theory*. The pastor was a vocal opponent of the bill. The surveyor didn't like that. One day before the end date of the contract, the surveyor finally spoke with the pastor. He explained that the survey would not be provided because of the pastor's position on critical race theory. The surveyor went on to question the pastor about his stand on *slave reparations* as well.

Needless to say, this incident was all over the news. The Oklahoma Society of Land Surveyors stepped-up and helped get another local firm to take on the project – regardless of the minister's positions on matters. They even did it at cost!

Did this have to happen? Did it need to occur the way it did? We all have a right to our opinions and the right to participate in our civic arenas. But we also have responsibilities. Commitments are to be fulfilled, questions are to be answered, and risks must be managed. Recognize and address your own *DEI as risk management*. If you don't, you might make the news.

An Epic Story: 203 Years in the Making, Twelve Years in the Conception, Thirty Minutes in the Telling

by Darrell D. Pratte, PLS

The Common Corner of Sections 25, 26, 35, and 36, in Township 39 North, Range 1 East is one of the most vexing, perplexing, and bewildering corner investigations to have been involved in since, well since maybe ever. What makes this investigation different? It is a corner, reestablished in 1985, with evidence of the original government survey. Notice the use of the terms "reestablished" and "evidence of the original government survey" in the same sentence to describe the determination of the position of one Public Land Survey System (PLSS) Corner. The definitions of those terms preclude them being used in the same sentence. There is a lot about this corner that precludes definition by any of the well-worn terms in the retracement surveyor's lexicon.

This is a township where hardly anything measures out proportional to the original distances. The story begins in 1817. Lionel Browne and William H. Ashley were contracted by the United States General Land Office to subdivide forty-two townships spanning from Township 34 through 39 North, Ranges 1 through 7 East. This land mass takes in all of St. Francois County, most of Washington County, the western two tiers of ranges in Ste. Genevieve County, four and one-half townships in the northeast corner of Iron County, and the Southern two tiers of Jefferson County townships. Just to add a little confusion to the issue, Deputy Surveyor Henry Elliott weaves in and out of the story. He signs eleven of these forty-two preliminary township plats. In all but two townships, Townships 36 and 37 North in Range 6 East, the field notes indicate the surveys are under the Ashley/Browne contract dated April 15, 1817. Most of the plats of the eleven exceptions signed by Mr. Elliott state the work is under his contract dated March 23, 1817. This contract is to finish the standard parallel along the south side of Township 34 North, from Range 7 East, to the Mississippi River and to run a few Range Lines. A couple of the preliminary township plats do not mention a contract and the plat for Township 37 North, Range 7 East though, subdivided by Mr. Elliott clearly states the subdivision work falls under the Ashley and Browne contract dated April 15, 1817.

The story begins in 1817… Browne and Ashley were contracted by the GLO to subdivide forty-two townships spanning from Township 34 through 39 North, Ranges 1 through 7 East.

The only reason the previous paragraph is important is that a couple of surveyors in Missouri might take exception with a blank statement giving credit to Mr. Ashley and Mr. Browne. You see, Mr. Elliott's work is very good and retraceable. He began his work in Missouri as a Deputy Surveyor under Silas Bent, the first Principal Deputy Surveyor in the Missouri Territory. Elliott was a Deputy Surveyor with experience and integrity.

On the other hand, William H. Ashley's and Lionel Browne's resumes read a bit differently. Ashley was a politician and land speculator who served as a Brigadier General in the Missouri Militia during the Second War for American Independence in 1812. During that time, he would become acquainted with Illinois Militia General William Rector. Both men held their wartime commander Major General Andrew Jackson in high regard, becoming Jacksonian Democrats. Browne was a politician who served as Sheriff of Washington County in 1817. His father, Joseph Browne, is Secretary of the Upper Louisiana Territory from 1805 to 1807, and his uncle is former Vice President Aaron Burr, holding that office

(continued on next page)

An Epic Story *(continued)*

during the first term of the Jefferson Administration (1805-1809). So, Elliott was an experienced land surveyor while Ashley and Browne were political cronies of the newly named Surveyor General for the Territories of Illinois and Missouri, William Rector. Therefore, Mr. Ashley and Mr. Browne got the big contracts, while Mr. Elliott got the leavings. Such were the ways of St. Louis in the early days of the territory.

Many of the 42 Townships surveyed under the Ashley-Browne contract reflect a regard of the instructions for surveying the public lands more as recommendations than rules. The field notes read as field notes are supposed to read, beginning at the Standard Corner of Sections 35 and 36, through sixty miles of surveyed line later (plus another 30 miles of backtracking), ending at the Closing Corner of Sections 5 and 6. Placed were wood posts at one-half mile intervals, and taken were a couple of witness trees. It is in the minutia where the differences reside. In the field notes there are at least four types of nomenclature describing the work. Five, it you count those by Elliott. This means others may have been involved in running the lines and establishing the corners. Unfortunately, the early field notes do not name the members of the survey parties that headed to the woods to begin subdividing the Missouri Territory into sections, townships, and ranges. It is clear, looking at the results from retracing this early work that shortcuts were taken. Many of the closing and jog distances were not measured. The closing corners are there, but the distances from quarter corners to the township and range lines are not consistent and most jog distances are not measured. Whenever the closing and standard corners are recovered, the actual distance is nothing like the record distance!

It has long been rumored that although deputy surveyors were the contractors, they weren't necessarily the people going to the woods and subdividing townships. PLS Norman Brown, Land Surveyor Emeritus, long spoke on this topic. Mr. Brown's knowledge of the early days of lore dealing with the Missouri PLSS is long, indeed. Regardless of how long that knowledge may be, it must have a source. In the public record there are court depositions that Mr. Brown has surely read. PLS Steven Weible too has done extensive research looking into the early deputy surveyors. These very depositions, brought to light by Mr. Weible are published in his blog, *Etienne Hayseed,* entry for December 2016. It appears as though Ashley seemed to favor a young man named Bartlett Sims while Lionel Browne turned to his younger brother Samuel. Sims and the younger Mr. Browne did go on to become deputy surveyors in their own right, but where do they learn the art? For that matter, neither Ashley nor the elder Browne brother had previous experience as surveyors. The answer could be Mr. Elliott. The first township subdivided in this contract is 37 North, Range 4 East. This township contains the present-day town of Bonne Terre, the Terre du Lac lake development, and at least 11 United States Surveys - the grants of land provided to settlers during the territory's colonial period. From the 15th through the 22nd day of April 1817, the first portion of the township was surveyed. A three-day break was then taken with work resuming on April 25. That was the same day Ashley and Browne began subdividing Township 35 North, Range 2 East and Township 34 North, Range 3 East, respectively.

Besides not measuring closing and jog distances, other shortcuts include setting quarter corners 40 chains east or west of whichever section corner was started from, without checking the alignment between section corners or even trying to figure out midpoints. In a few cases, quarter corners were set 40 chains north or south of section corners without benefit of continuing the lines to next section corners. These shortcuts made sure all corners were established, but not all the lines were measured. Thus, trying to recover the footsteps of the original surveyor in this type of township can be challenging. In Township 39 North, Range 1 East, it is estimated that 30 different one-half mile segments of line were not measured during the original survey. As well, 15 miles of line are not properly surveyed, and most of half-mile segments would have required the survey party to do some backtracking. Not looking for, nor measuring to standard corners along the north and west sides of the township saved considerable time because of sizable jogs. Not that Ashley or whoever went to the woods in his place knew the jogs were sizable, but the notes tying to the standard parallel do imply jog distances that are about half the distance of the actual jog.

Since 1997, seven separate requests for land corner investigations were received by the Missouri Land Survey Program (LSP) in Township 39 North, Range 1 East. Three Professional Land Surveyors shared some responsibility for the completion of the projects. Nearly every PLS, Land Surveyor in Training and Land Survey Technician that worked for the LSP between the years 1997 and 2019 contributed to the resolution of the investigations. The result of the investigations

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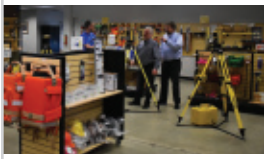



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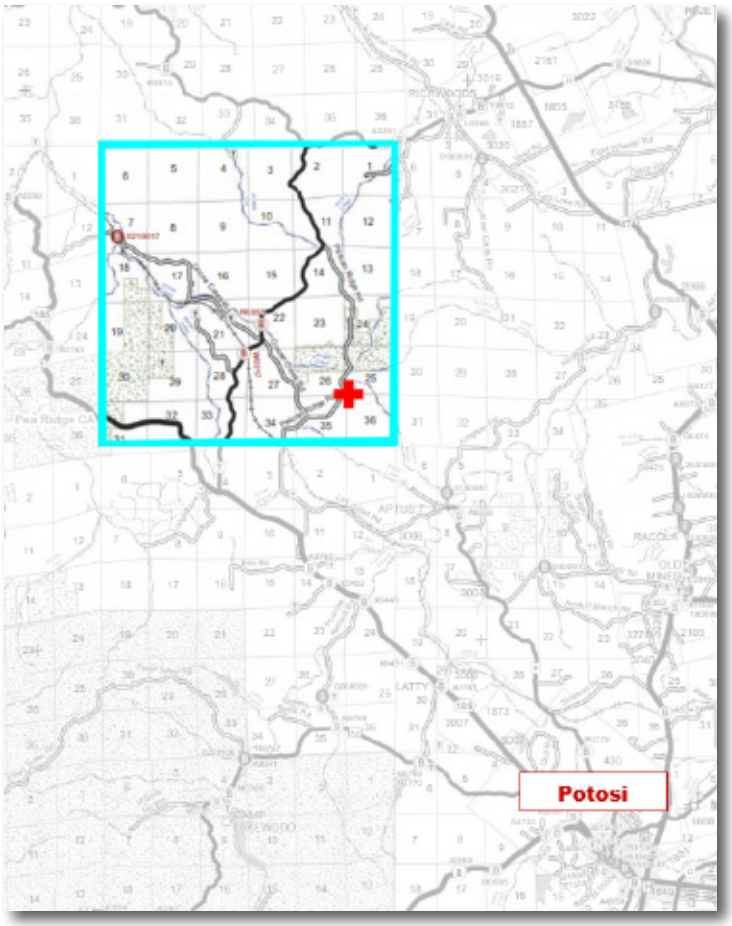
An Epic Story *(continued)*

culminated in a survey plat being filed with the LSP in 2019, showing the township in its entirety. Though the 2019 plat does not show record distances, the original government survey plat, and recently filed corner documents, can be studied. They reveal that many apparent shortcuts occurred. None of the investigations attempted to reestablish quarter section corners. Because of the nature of the original establishment of the quarter corners, determining the location of a quarter corner at midpoint might not match evidence recovered at a future date. Though every quarter corner was searched for thoroughly, every sixteenth corner established from a quarter corner was looked for as was any other evidence that might help locate a quarter section corner. Even though the information was examined rigorously, it still seemed too risky to just plop one in at midpoint.

When then project was all-said-and-done, of the 144 PLSS corners, 115 were recovered and restored, deemed obliterated and restored, or reestablished. That included standard corners along the standard parallel on the south side of Township 40 North, Range 1 East, and the standard corners along the Fifth Principal Meridian on the east side of Township 39 North, Range 1 West. Fifty-five corners have site evidence of the original government survey, with twenty-three restored from some other sort of evidence including measurement to other recovered corners. Twenty-six corners were reestablished while at nine of the corners there was not enough evidence to prove they are in the correct position. For these nine, a land corner investigation document is on file in the LSP with a statement regarding the validity of the positions. All nine are quarter section corners in the interior of the township.

Where PLSS corners are reestablished in such a township, finding evidence of the original survey at the reestablished position is the last thing one would expect to find. One of the first things most land surveyors know for sure is, if the corner is reestablished, it is not in the same location as the original corner. This corner, the common corner of Sections 25, 26, 35 and 36 (the subject of this article) was reestablished in 1985. First things first; the corner was established by Deputy Surveyor William H. Ashley in July of 1817, according to the preliminary plat submitted to Surveyor General Rector. The field notes are not signed. The original surveyor set a wood post (of the hardiest variety, piling stones around the post to help hold it upright), taking as witnesses a 14" pine at S.10°W. 45 links, and a 17" white oak at N 10° E, 20 links.



The common corner to Sections 25, 26, 35 & 36, Township 39 North, Range 1 East in Washington County, 11 miles NW of Potosi, south of the Hi Pointe Tract of the Pea Ridge Conservation Area.

Forty-one years after the establishment of the subject corner, County Surveyor Charles T. Manter set a stake and rocks for the corner and records three new trees in June of 1858. Manter noted a 30" pine bears S 67½° E, 51 links, a 10" black oak bears N 42½° E, 19 links, and a 12" black oak bears N 32° W, 32 links. He did not mention finding anything at the corner, nor does he mention any original witness trees. Most county surveyors did not give much of an explanation of what they found. Mr. Manter found the corner. It can be speculated he found the original witness trees as called for except the white oak that although standing, was not marked. Also, a black oak next to the white oak is marked but uncalled. The deputy surveyor took the white oak; the axe man marked the black oak. The other tress called out by Manter are uncalled for original witness trees. The instructions directed four trees (one in each

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An Epic Story *(continued)*

section) be marked with the bearing and distance to two of the trees being recorded. One of the more telling differences in the original note keeping in seven of the thirteen townships attributed to Ashley was that all four trees marked at the section corners are called out in the field notes as witnesses to the corner.

Eighteen years after Manter's visit, County Surveyor Frederick Will finds the old corner in January of 1876. He did nothing else to enlighten the record. Mr. Will's survey takes him to four other PLSS corners in the vicinity. In total, he mentions finding only one original witness tree although there was evidence of the original witness trees at three of the other four corners he examined during his survey. Will could have been trying to save space in the survey record book, but the likely explanation is that 50 years after the original surveys were finished in that area, there was still evidence everywhere a surveyor looked. Not finding a corner was bigger news! If the surveyor found a corner, the corner was found. The old witness trees were still standing, the stumps or stumpholes were quite apparent, and those that followed know these facts because the corner was found. Unfortunately, not all the information about the corner was noted on the county surveyor's plat and in most cases that is all the record that is left. The field notes may have contained more information.

In 1913, Deputy County Surveyor C.L. Griffith, working through the good offices of County Surveyor R.E. Hutchings found: a stonepile, the original white oak still standing, and a stumphole from the pine. He did not mention the trees taken by County Surveyor Manter. In May of 1968, County Surveyor Paul T. Johnson was in the area and he found a 30" white oak. Calling it the original witness tree, he records the corner as being in a "*hog pen*". Just south of the 30" white oak there is a woven wire enclosure measuring about 50 feet square which is enough area needed to "slop the hogs" in the 1968 vernacular of the Ozarkian farmer. The original white oak witness tree is north of the corner N 10° E, 20 links, placing the corner in the woven wire enclosure. If the present day enclosure is the hog pen, the 1968 the white oak is standing.

PLS Harold L. Koen called the corner lost in 1985, reestablishing the corner by measuring one-half mile in each direction where he recovered the quarter section corners. He placed a drill steel at the calculated position and takes four trees. He caused a bit of confusion taking a 24" pine at S 38° W, 4.5 feet. The confusion commences because the tree is a white oak…the same 30" white oak Johnson called in 1968 as the original witness tree, from which he recorded the corner being S 10° W, 20 links.

Description of original and subsequent surveys referencing this corner position:
(References shall include date of survey, surveyor of record, location of survey (book and page), monument, accessories and other information relevant to the location of this corner.)

JULY 1817: Original Government Survey, Volume 199B at Page 323, Lionel Browne, Deputy Surveyor.
"*Set post corner of 25, 26, 35 + 36 from which a pine 14 in diam Brs S 10 W 45 Lks + a W Oak 17 In Dia Brs N. 10 E 20 Lks.*"

JUNE 1858: Survey Record Book B at Page 125, Survey Number 149, Charles T. Manter, County Surveyor.
"*Set stake & rocks for cor. from which a Pine 30" dia brs S 67 1/2° E 51 + BO 10" dia Brs N 42 1/2° E 19 + BO 12" Dia Brs N 32° W 32lks.*"

JANUARY 1876: Survey Record Book C at Page 152, Frederick Will, County Surveyor. "*... Old Corner...*"

May 1913: Survey Record Book F at Page 26, R.E. Hutchings County Surveyor by C.L. Griffith Deputy.
"*Pile stones. One orig. tree standing. WO N10°E. 20, and hole of orig Pine, S.W.*"

May 1968: Survey Record Book H at Page 184, Paul T. Johnson, County Surveyor.
"*Began at the N.W. cor of sec 36 cor in a hog pen east of the Bear Hollow Look out Tower one old original BT Standing a white oak 30" N10°E 13 ft. ...*"

MARCH 1985: Missouri Land Survey Documents 750-22600 and 600-82009, Harold L. Koen PLS 280
"No corner evidence found. Reestablished corner by double proportionate measurement..."Set drill steel" Trees marked:...24" Pine bears S38°W, 4.50 feet...7" Pine bears S62°E, 48.10 feet...9" White Oak bears N47°E, 27.30 feet...11" Red Oak bears N28°W, 41.80 feet ..."

JUNE 1994: Plat Book 9 at Page 97, Jim Adams, PLS 1848.
"Old Pile Stones & Set Iron Rod. NEW WITNESS TREES: 30" P.O. S 32° W 4.5' 9" PINE S 63° E 47.6' 11" W.O. N 40° E 27.2' 10" B.O. N 26° W 41.5' "

The lineage of surveyor visits to the common corner in brief form as found on the Certified Land Corner Document (600-93826).

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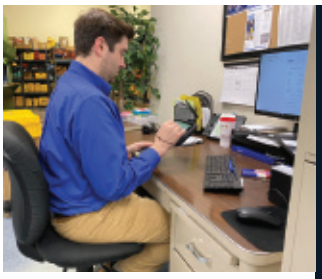

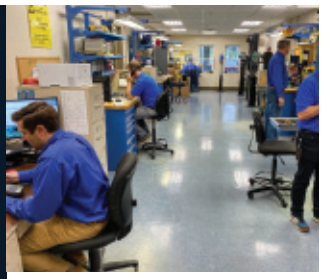

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An Epic Story *(continued)*

In 1994, Jim Adams found an old stonepile and set a 5/8“ rebar with an aluminum cap. He takes the same trees as Koen did in 1985, except the incorrectly cited 24” pine is then called by Adams as a 30” white oak. To sum-up; the corner is in place! The original government corner was there as late as 1913. It is, and has been a pile of stones. By 1968, the pile of stones was no longer visible, but there was a very large, 30” white oak growing in the area. According to the record, the white oak was still standing in 1913. County Surveyor Johnson pulled the correct bearing and distance, S 10° W, 20 links, from the white oak and states, “*…cor in a hog pen east of Bear Hollow Look out Tower…*” Johnson did not mention any sort of monument marking the corner. It being in a hog pen might be all the explanation Mr. Johnson needed as why the stonepile found by Griffith is gone.

In 1985 Mr. Koen determined the corner was lost and properly reestablished the corner by double proportionate measure. The white oak was still standing in 1985. It was still standing in 2020. But it does not have the ancient look of a white oak that measured 17” in diameter in 1817. It is a tall, straight, mature tree. Not a gnarled, twisted, overly mature, hollow shell of its former self. It seems as though witness trees are a lot like surveyors. When young, they stand tall and straight, proud to be guardians of the PLSS. As the years begin to take their toll, the tree (and the surveyor!) begin to stoop, the knees (as on a cypress) begin to tighten, the limbs begin to weaken, they get gnarled, twisted and they just start to look old. Oh sure, the imaginative person can still see the strength hidden within while understanding it holds the knowledge of a lifetime spent as part of the PLSS. But most folk stare in wonder that it hasn’t just fallen over. All that is to say, this 30” white oak is still a straight tree, having spent most its life on the edge of a hog pen, so it received lots of nutrients. It does not have the look of an original witness tree from 1817.

Koen did not find anything marking the corner, and began measuring in the cardinal directions looking for additional evidence. He found evidence of the original survey one-half mile to the north and west. Found too was: an old pile of stones one-half mile to the south, the reestablished corner from 1913, and another pile of rocks one-half mile east. He placed a drill steel at the double proportionate position, piled up some stones for the corner and takes new trees. As well, he filed a document with the LSP. Adams recovered the drill steel in the pile of stones, and placed a 5/8” rebar with a 2” aluminum cap next to the drill steel. Mr. Adams called out Koen’s trees on his plat, only calling the 24” pine a 30” white oak. Neither Koen or Adam’s mentioned finding evidence of the original or subsequent surveys. They likely never looked. Mr. Koen reestablished the corner. He just marked a position every surveyor knows is a mathematical solution that is intended to provide an equitable location for a corner. This provided every landowner a share of the overage/underage errors and blunders made during the original survey. It is not a solution that is meant to locate the original corner position.

In October 2008, the LSP made its first visit to the corner by LSIT Jason Lortz and Land Survey Technician Scott Faenger (both are now PLS’s). Jason wrote in the field book, “*FOUND 5/8” IR w/CAP STAMPED LS 1848 IN OLD STONEPILE 30” W.O. STANDING, 9” PINE Cut 13” W.O. STANDING 13” B.O. STANDING*”. Lortz and Faenger found what one would expect. This is what the corner is and has been since 1985. With the exception of the 24” pine being a 30” white oak. The next sentence is a little more of a headscratcher, “*FOUND SH’s AT MANTER’S POSITIONS AND N10E 20 Lks HOWEVER WITH THIS Corner Being Double Proportioned in, They SURELY are COINCIDENTAL*” Yes, it would be unusual to find evidence of the original and subsequent surveys at a reestablished corner. Mr. Lortz was asked to draw a line through the last statement. From the part about finding stumpholes, through coincidental. The surveyor in responsible charge would need to take a look at the evidence before unleashing such a statement into the record.

It is 2016 before the surveyor in responsible charge is able to pull away from other pressing duties and find his way to the corner. In the interim Lortz and Faenger have met all of the qualifications for licensure as PLS in the State of Missouri. Neither have a desire to return to Washington County. Jason Beasley however, just received his LSIT certificate, and is eager to participate! Mostly because he does not have a choice. The following is from the field note book:

> “*FOUND OLD STONE PILE WITH A 5/8” REBAR AND ALUM. CAP BY J. ADAMS & A DRILL STEEL BY H.KOEN. THE PINE CALLED FOR BY MR. KOEN @ S.38°W. 4.5’ OCCUPIES THE*

(continued on page 14)

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An Epic Story *(continued)*

SAME POSITION AS THE WHITE OAK @ S.32°W. 4.5' TAKEN BY MR. ADAMS. THE WHITE OAK & BLACK OAK TAKEN BY BOTH SURVEYORS ARE GREEN & STANDING. THE SMALL PINE IS A STANDING SNAG.

MR. KOEN STATES THIS CORNER DBL PROPORTIONED HOWEVER THERE IS A WELL DEFINED WHITE OAK STUMPHOLE @ N.10°E. 20 LKS. A WELL DEFINED PINE STUMPHOLE @ S.67½°E 51 LKS AND WELL DEFINED BLACK OAK STUMPHOLES @ N.42½°E 19 LKS & N.32°W. 32 LKS. THE STUMPHOLE OF THE ORIG PINE IS NOT AS EVIDENT, IT FALLS WITHIN THE CONFINES OF A HOG PEN CALLED OUT BY P. JOHNSON. MR. JOHNSON'S POSITION BRS S.7°W. 16.5 FEET FROM THE KOEN/ADAMS COR. HIS "ORIG" TREE IS THE WHITE OAK (CALLED A PINE BY KOEN & A WHITE OAK BY ADAMS) THOUGH IT IS A WHITE OAK, IT IS NOT AN ORIG TREE."

The whole *pine v white oak* thing is just a typo made by Mr. Koen when he filed his document. His field notes probably called for a white oak. At least he filed a document! Mr. Johnson is not being called out either. He found a very large white oak, a very large white oak that is reported as green and standing 55 years prior to his visit. If Mr. Johnson is guilty of anything it is of being over-zealous in his search for original evidence. At least he was looking!

In 1985 the 30" white oak still stood, and the hog pen was visible. It is still visible today as a woven wire enclosure. Perhaps Koen was not aware Johnson made a visit to the corner in 1968. It would have saved him a lot of traversing to have agreed the white oak is the original witness tree. Then, unless someone became skeptical on the age of the tree and decided to count rings, Mr. Johnson's position would be accepted from here on out. Only if the corner was determined to be lost, because the white oak is not old enough to be an original witness tree, would someone have the fleeting thought to reestablish the corner by double proportionate measure. Not that anyone would ever make that type of determination, especially if the 1968 and the 1985 positions are in the same location. That needed to be said because if the corner was determined to be lost, then it would be placed about 18.5 feet east of the location determined by Koen, about 26.2 feet, at N 51° E, from Johnson.

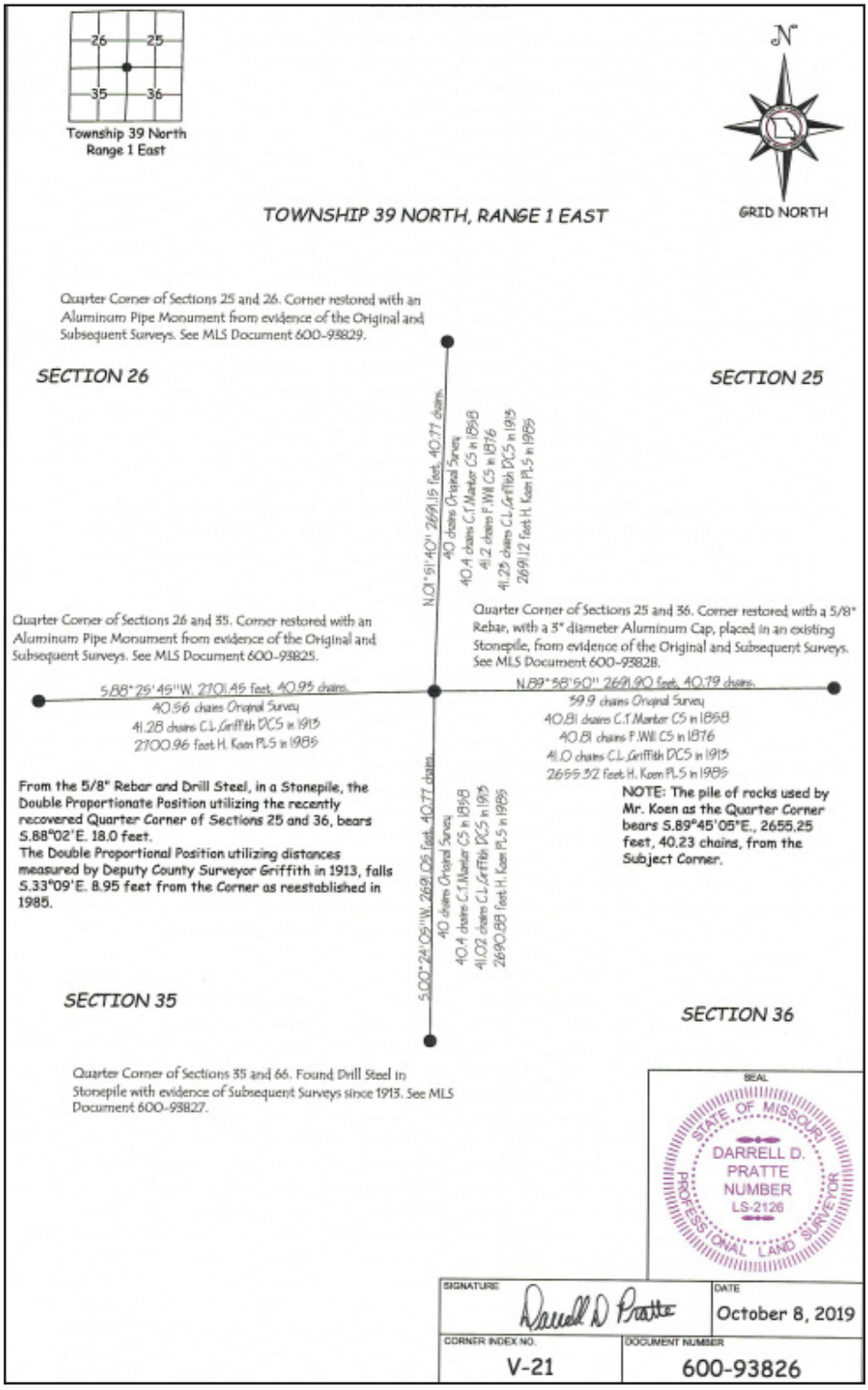
Mr. Koen's measurements and math are correct. Using the positions for the quarter corners to the north, south, east and west as used by Mr. Koen, anyone would come out at his position. The problem lies in the quarter corner to the east. There are three different piles of rock, and using one of them places the corner at Koen's position. Using the stonepile with stumphole evidence of the original and subsequent surveys, which is about one-half chain farther east than the pile of rocks utilized by Koen, places the mathematical position of the corner about 18.5 feet East of Koen's corner position.

There is one more way to look at the evidence. The 1913 survey by Deputy County Surveyor Griffith. Mr. Griffith found the same corner locations to the north, south, east and west. Remember, there is evidence of the original survey and the 1913 survey at the quarter corners to the north and west. The stonepile recovered at the quarter corner to the south has stumphole evidence of the 1913 survey. The quarter corner to the east has evidence of the original survey, the 1858 survey, and the 1913 Survey. Mr. Griffith measured to all these corners. Using his distances to restore an obliterated corner places the corner S 33° E, 9.0 feet from the existing stonepile with the drill steel and the capped rebar. Mr. Griffith saw the original white oak in 1913 and his measurements placed the corner within a realistic error ellipse of the expected precision of a compass and chain survey. In other words, measuring in from the corners recovered by Griffith, giving his measurements a plus or minus of a 12.5 links, 8.25 feet, creates a search area 16.5 feet in diameter from the obliterated corner. Finding evidence of the original corner within 9 feet of that position is reasonable.

Serendipitously, although Mr. Koen did not find the section corner, he did find the quarter corners used by Deputy County Surveyor Griffith in 1913 to the north, south and west. He went east, but found a pile of rocks 33 feet west of the original location of the quarter section corner. This mistake causes him to reestablish the section corner 18.5 feet farther west, placing his position at the location of the original corner. Wait, can that even happen? Come-on, is this a real thing? More importantly, why would anyone bring this to light? The evidence is compelling, and there is a monument that has been in place, and used as the corner since 1985. The corner is there; no one is arguing. Mr. Koen, and Mr. Adams filed documents.

In 2019, Mr. Adam's aluminum cap was removed from the 5/8" rebar and replaced with a 3" Department of Agriculture aluminum cap. A witness post and sign was placed 1.5 feet east of the corner. Another document was filed, and a state plane coordinate was published. The 2019 document shows a stumphole found at the location of the white oak taken in 1817 and the stumpholes of the trees recorded in 1858. The last sentence on the document states; "*Though I am hesitant to call this an Original Government Corner, it should be treated as the proper reestablishment of a lost corner.*" Geez, some people just cannot see an original corner! What does this surveyor need, a neon sign?

It is amazing what one can find, if one just looks.



Claims to Land and the District Court

by Steven E. Weible, PLS, July 2021

Congress had passed its "*Act for the final adjustment of land titles ... in the territory of Missouri* " on April 12, 1814, chapter 52 (U. S. Statutes at Large, Vol. 3, pg 121), and the opinions of the recorder of land titles had been confirmed by the Act of April 29, 1816, chapter 159 (U. S. Statutes at Large, Vol. 3, pg 328). The business was finally finished ... except that it wasn't.

John Scott, the delegate of the Territory of Missouri to the U.S. House of Representatives, wrote to Josiah Meigs, the Commissioner of the General Land Office, on January 27, 1817, expressing the hope "*that Government will again at a proper time give to those people whose claims are thus rejected another opportunity to perfect their titles, and I even indulge the hope that provisions will be made to embrace claims that have never been notified, or filed with the Commissioners or recorder* " (*Territorial Papers*, Vol. 15, pg 238). Meigs responded on January 30, 1817 that "*I cannot agree with you in the Idea that a door should be opened for more claims, I think the Govt have been liberal, very liberal, both in time & conditions*" (*Territorial Papers*, Vol. 15, pg 239).

Meanwhile, the U.S. House of Representatives had been inundated with memorials and petitions regarding the unconfirmed land claims in the Territory of Missouri. On April 16, 1818 the House passed a resolution instructing the Secretary of the Treasury, William H. Crawford, to draft a plan for their final adjustment and settlement (ASP:PL Vol. 3, pg 348).

On April 30, 1818 the President announced by proclamation the first sales of the public lands in the Territory of Missouri (*Territorial Papers*, Vol. 15, pg 385). John Scott promptly wrote to Secretary Crawford on May 5, 1818, requesting that directions be given to the register and receiver of each land office to withhold from sale those private claims that had previously been examined, but not confirmed (*Territorial Papers*, Vol. 15, pg 388). Secretary Crawford referred the request to Josiah Meigs, who responded on May 11, 1818, stating that he considered the unconfirmed claims as invalid and subject to sale (*Territorial Papers*, Vol. 15, pg 391).

Secretary Crawford was still working on the plan requested by the House of Representatives, so he wrote to Josiah Meigs on June 10, 1818, directing him to have the recorder of land titles in the Territory of Missouri furnish descriptive lists of the unconfirmed claims to the register and receiver of the land offices at St. Louis and Franklin, where sales of the public lands had been authorized. These unconfirmed claims were to be withheld from sale for the time being (*Territorial Papers*, Vol. 15, pg 399).

Samuel Hammond, the receiver at the land office in St. Louis, reported to Josiah Meigs on July 20, 1818 that the recorder of land titles, Frederick Bates, had furnished a list of the unconfirmed claims, but the information was not sufficient to determine actual locations on the township plat (*Territorial Papers*, Vol. 15, pg 419). In June 1818 Frederick Bates had complained to Meigs that it would be impossible for him to give specific descriptions, since he had no connected plat (*Territorial Papers*, Vol. 15, pg 401). William Rector, by then the Surveyor of Public Lands in the territories of Missouri and Illinois (*Territorial Papers*, Vol. 17, pg 332), suggested having the Deputy Surveyors make some connection to the unconfirmed claims while in the field, so that they could be represented on the township plat (*Territorial Papers*, Vol. 15, pg 402). In August 1818 Josiah Meigs informed Rector that there was no provision for surveying the unconfirmed claims. He had supposed that a reservation of a right angled tract of the appropriate quantity in the correct vicinity would be sufficient (*Territorial Papers*, Vol. 15, pg 422). This uncertainty of location, however, cast some doubt on what lands could actually be sold (*Territorial Papers*, Vol. 15, pg 419, 427).

In December 1818 Secretary Crawford submitted his plan to the House of Representatives for the final adjustment and settlement of the unconfirmed claims. He noted that "*it is conceived to be extremely improbable that there should be, at this time, any considerable number of claims entitled to the liberality of the Government, which have not yet been submitted to either of the different tribunals that have, from time to time, been constituted for that purpose ... Considering, then, that the titles to lands ... in the Missouri Territory, so far as they are derived from, or dependant upon, any act of Congress, are correctly and finally settled, nothing more is necessary than to prescribe a rule by which the validity of titles, not dependant upon the acts of Congress, may be promptly and legally determined."* He then presented a draft bill that would allow anyone with an unconfirmed private claim to present their case to the district court (ASP:PL Vol. 3, pg 348).

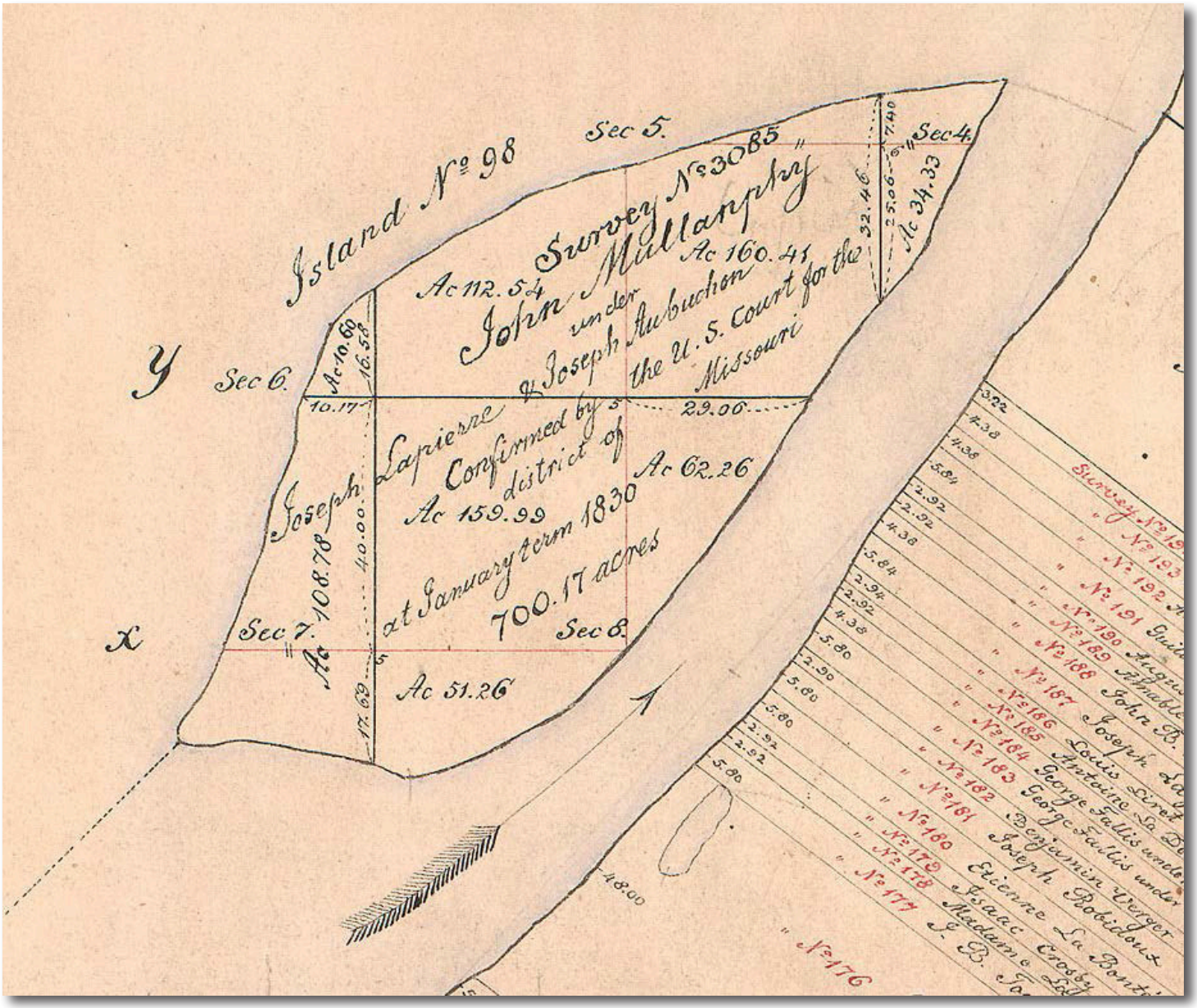


Figure 1. General Series Survey # 3085 in Township 47 North, Range 6 East was confirmed by the U. S. Court for the district of Missouri (courtesy of the Missouri State Land Survey).

In January 1819 Congress was presented with a memorial from the General Assembly of the Territory of Missouri, urging the enactment of comprehensive legislation that would ensure final justice once and for all to those unconfirmed claims that had originated under the French and Spanish governments (*Territorial Papers*, Vol. 15, pg 489).

The U.S. House of Representatives took further time to examine the matter, including the instructions given by the Secretary of the Treasury to the Board of Commissioners in 1806 (ASP:PL Vol. 3, pg 355) and the Spanish regulations for granting lands issued by Alexander O'Reilly in 1770, Manuel Gayoso de Lemos in 1797 and Juan Ventura Morales in 1799 (ASP:PL Vol. 3, p 432 and Vol. 4, pg 3). At the conclusion of their examination Congress passed the Act of May 26, 1824, chapter 173, *An Act enabling the claimants to lands within the limits of the state of Missouri and territory of Arkansas to institute proceedings to try the validity of their claims* (U. S. Statutes at Large, Vol. 4, pg 52).

(continued on next page)

Claims to Land and the District Court *(continued)*

(The Territory of Arkansas was created as an entity separate from the Territory of Missouri by the Act of March 2, 1819, chapter 49 (U. S. Statutes at Large, Vol. 3, pg 493). The admission of the State of Missouri into the Union of the United States of America was declared complete by proclamation of President James Monroe on August 10, 1821 (U. S. Statutes at Large, Vol. 3, pg 797).)

Section one of the act permitted any person or persons, or their legal representatives, to petition the district court of the State of Missouri to examine the facts and to decide the validity of their claim to land. The act was intended to apply to those claims that were protected by the treaty between the United States of America and the French Republic, dated April 30, 1803, and to which complete titles would have been perfected had the Province of Louisiana not been transferred to the United States. That is, "*any French or Spanish grant, concession, warrant, or order of survey, legally made, granted, or issued, before the tenth day of March, one thousand eight hundred and four, by the proper authorities*."

Section two of the act directed that the proceedings for each petition were to be conducted according to the rules of a court of equity. The district court was to have the full power and authority to settle the question of validity of title for each claim. The judgment or decree of the district court was to be final and conclusive, unless appealed to the Supreme Court of the United States within one year. The decision of the Supreme Court would then be final and conclusive.

Section five of the act allowed claimants two years from the passage of the act to bring their petitions before the district court. If by reason of neglect or delay by the claimant the case was not prosecuted to a final decision within three years, the claim was to be barred from further action in any court.

Section seven of the act declared that any claim finally denied by the court or barred from further action in any court was to become a part of the public lands of the United States.

If the court decided in favor of the claimant and against the United States and the claim exceeded one thousand acres, section nine of the act required the attorney of the United States for the district to notify the attorney general of the United States. If the attorney general considered the decision of the district court to be in error, he was to direct that an appeal be made to the Supreme Court of the United States. He was then responsible for prosecuting the appeal.

If a claimant was successful in validating his claim in the district court or Supreme Court and all or part of the claim had already been sold by the United States, section eleven of the act permitted the claimant to select from the public lands a like quantity in parcels conformable to sectional divisions and subdivisions in any land office of the state of Missouri. If the total quantity of land to be selected was not conformable to the smallest sectional subdivisions authorized for sale, the claimant was permitted to purchase at the rate of one dollar and twenty-five cents per acre the additional quantity of land to make one half quarter section.

For the convenience of petitioners, section twelve of the act required the judge of the district court to hold sessions at St. Louis, Sainte Genevieve and Jackson. Section twelve also specifically excluded from the provisions of this act a claim of the representatives or assignees of Jacques Clamorgan, deceased, to a tract of land lying between the Missouri River and Mississippi River and covering parts of St. Charles County and Lincoln County.

Section fourteen of the act extended the provisions of the act to the territory of Arkansas in which the superior court of the territory would have jurisdiction.

The Act of May 22, 1826, chapter 157, *An Act for the relief of Phinehas Underwood, and for other purposes* (U. S. Statutes at Large, Vol. 6, pg 355), extended the time for filing petitions until May 26, 1828.

Claimants who had been anxiously awaiting this opportunity rushed to file their petitions. The first case was taken up in November 1824, but by February 1828 only three cases had been prosecuted to a final decision. All three had failed. Two of the cases had been appealed to the U.S. Supreme Court, but were still waiting to be heard. These disappointing results, accompanied by the expense and delay of the court proceedings, dampened the initial enthusiasm. Rather than fail in court and be barred from further consideration, some chose to withdraw their petitions, while others were discouraged from filing

at all. Thus, the remedy was not as satisfactory as the claimants had hoped. A petition was sent to Congress from citizens of the State of Missouri, requesting an amendment that would secure to them the final confirmation of their claims. If that could not be done, they at least needed another two year extension of the deadline for filing a petition with the district court. The outcome of the first appeal to the Supreme Court, which had yet to be heard, would influence any decision to press on in the courts (ASP:PL Vol. 5, pg 458).

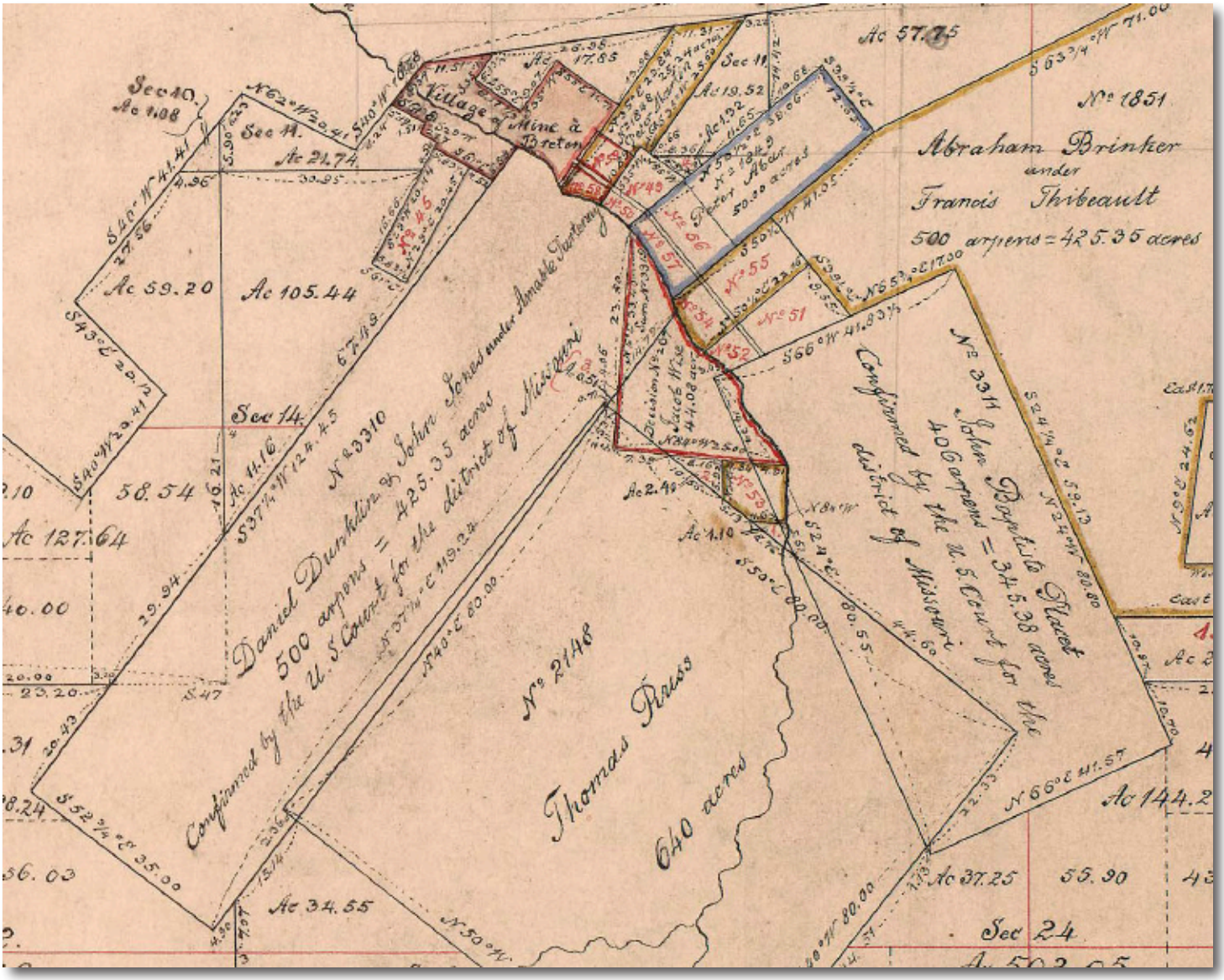


Figure 2. General Series Survey #s 3310 and 3311 in Township 37 North, Range 2 East were confirmed by the U. S. Court for the district of Missouri (courtesy of the Missouri State Land Survey).

The General Assembly of the State of Missouri sent a memorial to Congress in January 1827, urging the passage of an amendment to the law that would result in a speedy and final determination of the claims not yet confirmed. They suggested the formation of a new board of commissioners to further investigate the unconfirmed claims and to examine claims that had not yet been considered. At the very least, they urged that the right of preference to purchase be given to those whose claims were ultimately denied, so that they could purchase the land encompassing their improvements (ASP:PL Vol. 4, pg 880).

The State of Missouri and Territory of Arkansas were not alone in grappling with this issue of unconfirmed claims that had originated from some other entity than the United States. The States of Louisiana, Illinois, Mississippi and Alabama

(continued on page 22

Nominees for 2021-2022 Officers

President – Bradley McCloud

Brad McCloud is currently President-Elect for the Missouri Society of Professional Surveyors. He is currently working on starting his own surveying business. He previously worked for Missouri Department of Conservation where he was responsible for the land boundary and engineering survey programs. Prior to this Brad was the Land Survey Coordinator/Photogrammetry Manager for Missouri Department of Transportation. While in this role he served as the department's expert for photogrammetric compilation and mapping as well as represented the department to state board of registration, surveyors' society, and state land surveyor's office. Also, while in this role he was part of the MODOT VRS network implementation team. During his career he has worked on a vast array of surveys including boundary, highway corridor, photogrammetry, LiDAR, engineering, hydrology, and caves.

President-Elect – Ray Riggs

Ray Riggs is a fifth generation resident of Howell County, Missouri and a first generation land surveyor. He attended rural elementary school in Howell County and graduated from the West Plains High School in 1982. Ray has worked within the surveying profession since graduating from high school; as a rodman, instrument man and crew chief. He has been a Project Manager and Project Surveyor with Riggs & Associates, Inc. since 1989 and beginning in 2018 has served as Survey Vice-President of Florabama Geospatial Solutions. Beginning in 1999 and continuing until 2001, Ray completed the required coursework for licensure as a Professional Land Surveyor in Missouri. These courses were completed by distance learning from the University of Wyoming and the University of Maine. He obtained his Missouri Professional Land Surveyor's license in 2003, his Oklahoma license in 2005 and his Mississippi license in 2011. Ray has been a member of the Missouri Society of Professional Surveyors for many years, has served on committees and has submitted several humorous articles to the Missouri Surveyor. In 2007, Ray was appointed to serve on the Land Survey Advisory Committee and continued until the committee was dissolved in 2012. In 2019, Ray began serving his local community as a member of the Howell County University of Missouri Extension Council. Ray is an active member of the Junction Hill Pentecostal Church, is an ordained minister within the Ozarks Pentecostal Holiness Fellowship and has been the Youth Leader of this fellowship for almost three decades. Ray has been happily married to Tami for over 30 years and they have a married daughter, Tabitha. Ray enjoys reading, local history research, spending time with family, traveling and writing on his blog, bigsurveyor.blogspot.com. However, Rays most important task is serving as "Pawpaw" to his grandchildren, Lucas and Liam!

Vice President – Bob Anderson

Robert J. Anderson (Bob) is a fourth generation land surveyor. In 1993 he started his career working summers as a rodman for Anderson Survey Company. Following high school, he continued his career working full time and started taking classes at Longview Community College to pursue his professional career as a surveyor. In 2000, he was promoted to crew chief and he became a Land Surveyor in Training in 2004. Continuing to gain practical experience and knowledge, he obtained his Professional Land Surveyor license in Missouri in 2010 and Kansas in 2016. He currently serves on the membership and legislative committees and is a director on the board of the Kansas City chapter of the Missouri Society of Professional Surveyors.

Secretary-Treasurer – Chuck Quinby

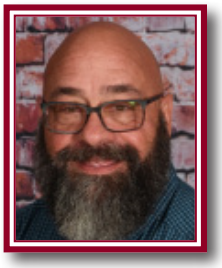
Chuck Quinby originally From Northeast Ohio, Chuck joined the Army as a Field Artillery Surveyor at age 18. He earned his High School Diploma from Saint Louis High School in Hawaii, an Associate in Arts and A Bachelor of Science from the University of Maryland while on active duty. Progressing through the surveying "ranks" ranks as Chainman, Recorder, Instrument Operator, Computer and Party Chief he served in South Korea, Germany, Fort Bragg North Carolina, Fort Stewart Georgia and Fort Sill Oklahoma. He attained the position of Chief Surveyor in the 3rd Armored Division, customarily an E-7 positions while still an E-5. His service included being an instructor of Surveying and Land Navigation as well as a Training Developer before closing his Army career in 1993. Chuck began his civilian surveying career in Snyder Oklahoma as an Instrument Operator. Working his way back to Ohio he returned to school to enhance his transition from Army surveying to civilian land surveying at Columbus State Community College. An opportunity with ABNA Engineering brought him to St. Louis in 2001. He is presently Surveyor of Record at Engineering Design Source Inc. in Chesterfield Missouri. A four time President of the Saint Louis Chapter of MSPS, and their current Vice President.

Secretary-Treasurer – Mark Wiley

Mark Wiley is a Second generation Surveyor. He began his carrier prior to 1978 working for his father during the summers and on weekends and has continued in this profession ever since. Licensed in Missouri in 1991 and Illinois in 2004, he has done course work at St. Louis Community College, Mineral Area Community College, and the University of Missouri Rolla in Surveying related courses. Working for himself in Ste. Genevieve from 1994 to 1999 he set a precedent in prescriptive Road Cases. He has worked in Metro St. Louis and in the Springfield area, as well as Jefferson, Ste Genevieve, St Francois, Franklin, and Washington counties during his 40+ year career. For the last 22 years Mark has been managing the Surveying Department for Heideman + Associates Inc. Mark has enjoyed presenting several MSPS workshops: Survey Cost Analysis, Understanding the Boundaries of the Profession, Ethics and the Professional Surveyor, Reading and Writing Boundary Descriptions, Safety for Surveyors. He was awarded the Surveyor of the Year in 2019 from MSPS. Mark serves the Son Light Parish as a Commissioned Ruling Elder serving the congregations of Ironton, Hillsboro and Park Hills Presbyterian Church (PCUSA). He is also the President of the Belews Creek Watershed Partnership, a group of local folks who are working to make a difference in the Watershed by both cleaning and stabilizing the creek. He enjoys roller skating, camping and relaxing at their lake property and tinkering with old tractors with his father. Mark lives in Hillsboro with his wife Deb. They have 4 children, two of which are working in the surveying field.

Nominees for 2021-2022 Board of Directors

Bart White

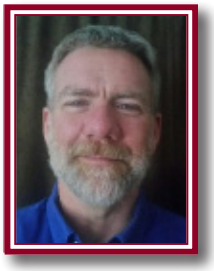


Alvin Bart White is a Senior Credit Analyst at MA Bank in Macon Missouri. Bart was born and raised in the mountains of Colorado, after graduation from Northwest Kansas Technical College in 1984, went to work for WK Clark and Associates in Colorado Springs in the drafting department and then transferred to a field crew as a rodman, instrument man and crew chief. In 1987 Bart moved to Kansas City and worked for Black & Veatch in the Transportation division where he was involved in GPS mapping project, later moving to the St Louis area where he worked for the Sterling Company and pursued his surveying license. In 2002 he received his Missouri Professional Land Surveying license. Through a chain of events Bart ended up in Macon Missouri and now serves as a Senior Credit Analyst and a local Bank, where he reviews title commitments and appraisals, reviewing property descriptions and surveys to ensure accuracy of surveys and property descriptions and the relationship to collateralized property, also works closely with Title Companies to resolve any titling issues. Bart has 37 years of surveying and engineering related experience. Bart has served on the Legislative, Standards and the Annual Meeting Committees. Bart enjoys hunting and fly fishing and builds custom flyrods in his spare time.

Scott Faenger

Scott Faenger is a Professional Land Surveyor for the Missouri Department of Agriculture's Land Survey Program, Cadastral Section. Scott was introduced to the profession in the early 90's when he answered a laborer want ad in Houston, Texas and spent that summer locating pipeline for a surveying/engineering firm. He went on to become a party chief with that same company. He continued to gain experience through his work for land surveying firms in Arkansas and Missouri and has been with the Missouri Land Survey Program for 18 years. Scott started with the Land Survey Program in 2003 as an Instrument Man with the State Parks Survey Crew. In 2005, Scott transferred into the Cadastral Section and has been a part of numerous township wide, county line and state line projects that involve restoring or reestablishing corners of the United States Public Land Survey System. He received his Professional Land Surveyor License in 2015 and is currently a Project Surveyor in the Cadastral Section of the Land Survey Program. Scott is a member of the Missouri Society of Professional Surveyors and serves on the History Committee and the Public Relations/Sales Committee. He currently resides in Rolla with his wife, Patty.

Matt Thomas



Matthew P. Thomas (Matt) is a sixth generation Missourian and a second-generation Land Surveyor. He's currently the County Surveyor for Boone County, Missouri. Matt has been surveying full time since 1988, obtaining his Professional Registration in 2000. He is the second of two sons in the surveying profession of Price S. Thomas, PLS 847. He first "surveyed" working for his father at the ripe old age of 10. That first experience convinced him that this is what he wanted to do for a career. He is also a second-generation County Surveyor following in his father's footsteps as a former Cole County Surveyor. He has worked for the City of Columbia, Brush & Associates, Miller Associates, Crockett Engineering Consultants, and A Civil Group. He has also volunteered his professional services traveling to Africa with Engineering Ministries International on three separate occasions, visiting 8 different countries including Sierra Leone, Tanzania, Zambia, Zimbabwe, and South Africa. He has been a member of the Missouri Society of Professional Surveyors for nearly 20 years and is the Immediate Past President of the Missouri Association of Professional County Surveyors. Matt is a member of the National Association of County Surveyors and currently serves on for MSPS. Matt lives in Chamois, Missouri where he is an active Mason and enjoys hunting, fishing, camping, floating, photography, geocaching, genealogy research, and spending time with his family.

Bart Korman

Bart graduated in 1999 with a BS in Agricultural Systems Management and a BS in Agricultural Engineering the University of Missouri, Columbia. While in Columbia, Bart worked for the City of Columbia's Public Works Engineering Department as an Inspector and Plan Reviewer. He also interned at Anheuser-Busch in St. Louis as a Project Manager. After a busy college he joined Lewis-Bade, Inc. in Warrenton, MO as a project engineer on 2000. During his early engineering career he completed land survey classes at Florissant Valley Community College and UMR. He obtained his Professional Land Surveyor license in was appointed Montgomery County Surveyor in 2005. Bart completed his Professional Engineer license in 2007. Bart primarily works with the design of all different aspects of engineering projects, including concept, sewer, waterline, street, storm drainage, grading, commercial site layout, wastewater treatment and water treatment plans and specifications. He works with many residential and commercial subdivision developments in East Central Missouri. Bart married Sarah (Young) Korman of O'Fallon, Missouri in 2008. They currently live near Warrenton in rural Warren County with their three children, Wyatt, Grant and Alice. The family are active parishioners at Holy Rosary Church in Warrenton. Bart coaches youth basketball and baseball and enjoys hunting and fishing when time allows.

Claims to Land and the District Court *(continued)*

and the Territories of Florida and Michigan were dealing with similar issues with unconfirmed private claims that had originated from Great Britain, France and Spain. To address these unresolved issues the Committee on Private Land Claims in the U.S. Senate was tasked with examining the facts and recommending a solution for the trial and decision of these claims to land. The Committee reported to the Senate on January 9, 1828, suggesting two possible alternatives (ASP:PL Vol. 5, pg 350).

The first alternative was for the United States to sell the land covered by the unconfirmed claims subject to the claims of individuals. The claimants would then be left to litigate their claim with the purchaser. Although this was an alternative, the Committee recognized that it was not a good one, since it may only serve as a relinquishment of interest without any certainty of title. This would not be a favorable outcome for the claimant, the purchaser or the government.

The second alternative was to establish a special tribunal for the trial and decision of the yet unconfirmed private claims. The Committee suggested that the tribunal's sessions should be conducted in the City of Washington, where the public records were kept and where competent agents were available to represent the rights of the claimants. The Committee felt that this alternative would "*best promote the interests of the public, while it will effectually protect the just rights of the claimants.*"

The time allowed for claimants to obtain a final decision in the district court was extended to May 26, 1830 by the Act of May 24, 1828, chapter 90, *An Act to continue in force for a limited time, and to amend an act entitled "An act to enable claimants to lands within the limits of the state of Missouri and territory of Arkansas, to institute proceedings to try the validity of their claims"* (U. S. Statutes at Large, Vol. 4, pg 298). Section two of the act stated that a confirmation by the court served only as a relinquishment of title by the United States and did not impair any adverse claim. Section three of the act permitted those whose claim was ultimately rejected by the court and who were actual inhabitants and cultivators of the soil to claim the right of pre-emption at the minimum price for public lands for the land covered by their improvements within the limits of the rejected claim.

It appears that there were only three claims confirmed by the court of the United States for the district of Missouri. These included an island in the Missouri River claimed by John Mullanphy under Joseph Lapierre and Joseph Aubuchon (General Series Survey # 3085)[Figue 1], a tract of 500 arpents claimed by Daniel Dunklin and John Jones under Amable Partenay (General Series Survey # 3310)[Figure 2] and a tract of 406 arpents claimed by John Baptiste Placet (General Series Survey # 3311)[Figure 2].

The first appeals to come to the United States Supreme Court were heard at the January term in 1830. The whole subject of Spanish titles was a new one for that court, one that had never undergone a judicial investigation upon which the court could base a conclusion. As a result, decisions on these cases were postponed to allow time for further consideration. Similar cases from Florida were brought before the court in succeeding terms and the court became more informed about the Spanish laws, usages and customs of granting land, but further postponed final decisions until the subject could be thoroughly examined. The primary difficulty for the court was determining what powers to grant lands were actually vested in the governor general, the intendant, the sub-delegates of the intendant and the local commandants (ASP:PL Vol. 8, pg 516).

Three cases are reported as having been decided by the U. S. Supreme Court at the January term of 1835. A claim of one league square, or 7056 arpents, was confirmed to Charles Dehault Delassus, claiming under his father Pierre Dehault Delassus Deluzieres (General Series Survey # 2969)(ASP:PL Vol. 7, pg 728)[Figure 3]. A claim of 1281 arpents was confirmed to the heirs of Auguste Chouteau (General Series Survey # 2976)(ASP:PL Vol. 7, pg 730). And a claim of one league square, or 7056 arpents, was confirmed to the devisees of Auguste Chouteau (General Series Survey # 2971) (ASP:PL Vol. 7, pg 731).

Three more cases are reported as having been decided by the U. S. Supreme Court at the January term of 1836. A claim of 10,000 arpents was denied John Smith, T. (the T. stands for Tennessee to distinguish him from all of the other John Smiths) under the concession of James St. Vrain (ASP:PL Vol. 8, 515). A claim of 800 arpents was confirmed to the widow and heirs of James Mackay (General Series Survey # 3033)(ASP:PL Vol. 8, pg 518). And a claim of 10,000 arpents was

confirmed to the widow and heirs of Antoine Soulard (General Series Survey # 3016) subject to the lands already sold by the United States prior to August 22, 1824, the day on which the petition was filed with the district court (MoSLS: Y9900723.pdf). For the lands that had already been sold, the claimants had the right to select the same quantity from the public lands (ASP:PL Vol. 8, pg 519).

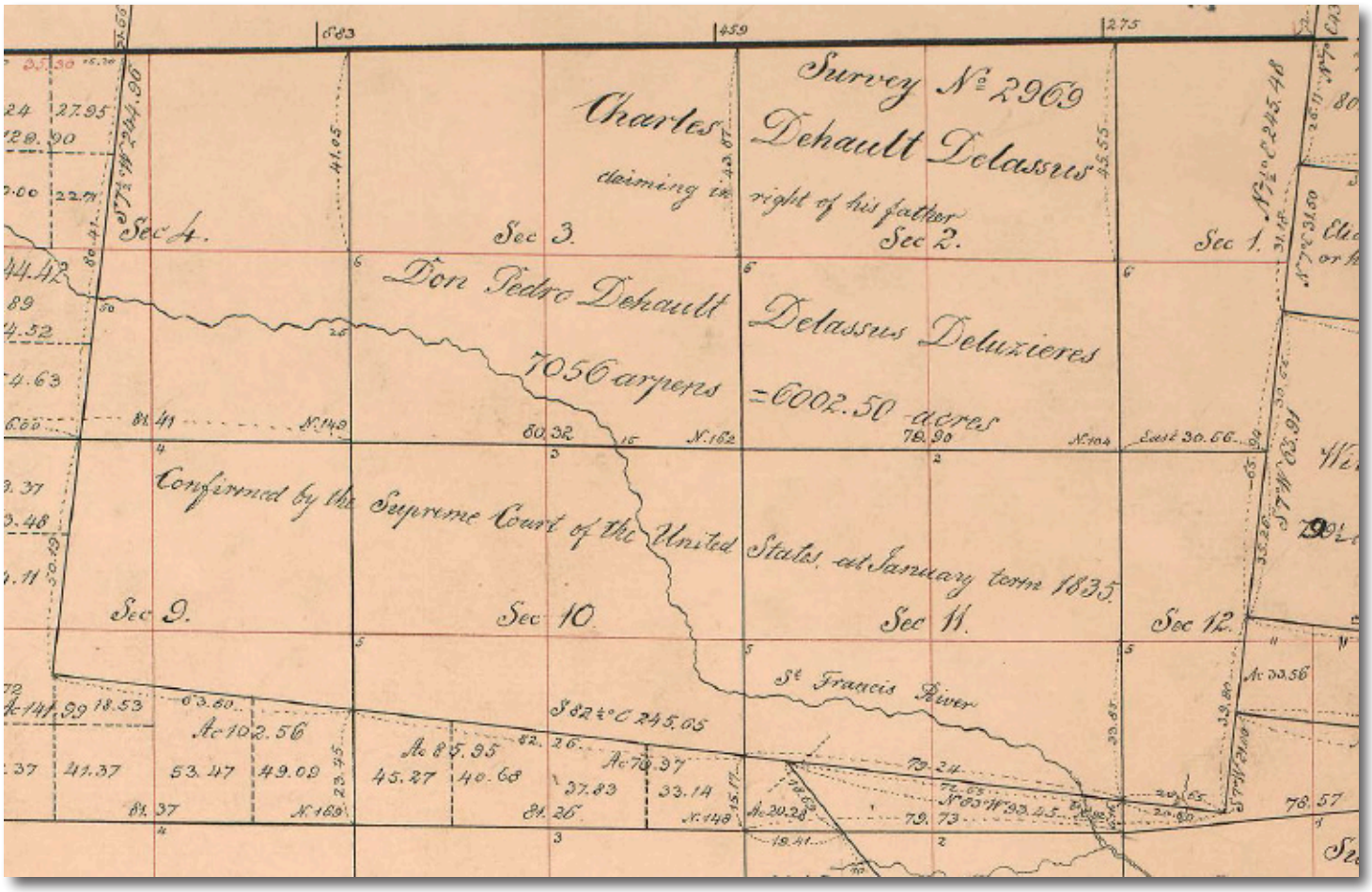


Figure 3. General Series Survey # 2969 shown in Township 35 North, Range 5 East was confirmed by the Supreme Court of the United States (courtesy of the Missouri State Land Survey).

In January 1831 the General Assembly of Missouri again sent a memorial to Congress, asking for a speedy and final adjudication of the private land claims. The memorial stated that "*It is now near twenty-eight years since the adoption of the treaty with France, by which these claimants conceive they were guaranteed in their rights to these lands ... If the individual claimants have any just rights, they ought to be confirmed in them; if they have none, the pretence of claim ought to be silenced, and the land brought into market for the benefit of the United States, the State of Missouri, and the neighborhoods in which they lie*." They objected to the ordinary courts of law as a tribunal for adjudication, "*because their expensive, tedious and technical modes of proceeding are unsuited to the nature of these claims and to the rights of the claimants*." They again recommended the creation of a board of land commissioners endowed with sufficient powers to achieve full and final justice between the government and the claimants. They believed that this tribunal should "*adopt as its rule of action, to confirm every claim which the government of either Spain or France would have confirmed had no transfer of the territory been made*" (ASP:PL Vol. 6, pg 300).

SOURCES

American State Papers: Public Lands (ASP:PL)
The Territorial Papers of the United States, compiled by Clarence Edwin Carter, 1948
U. S. Statutes at Large

Surveying & Surveyors in the News

Stolen, vandalized, buried, lost: Mason-Dixon Line markers are getting surveyed to be saved
by William Ecenbarger, June 24, 2021, The Inquirer (Philadelphia, PA)

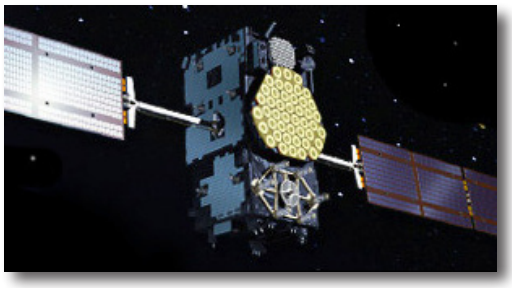
Surveyor Eric Gladhill with Mason-Dixon line marker No. 85.

A good brief on the history of the Mason-Dixon Line is a side note in this feature telling the story of a modern-day effort to preserve the monuments of the 1767 survey.

From the article: "*Now, Gladhill and others are working to make sure that* [being lost] *doesn't happen. He is leading a volunteer group of 20 surveyors from Pennsylvania and Maryland who are documenting the location and condition of the stones as the first step in getting them placed on the National Register of Historic Places. Once the stones get historic status, organizations could then get grants to maintain and preserve them."*

https://www.inquirer.com/news/mason-dixon-line-pennsylvania-philadelphia-maryland-survey-historic-register-20210624.html

Surveyors, not the tools, define the profession
by Tim Burch, May 5, 2021, GPS World



For a good work explaining that the value in surveying is derived not from the tools and technologies, but from the talents of our fellow practitioners is featured in this article by Illinois surveyor Tim Burch. Published by *GPS World*, the feature includes the following:

"Professional surveyors are no different from doctors, accountants, and lawyers in these examples. They rely on data collection obtained by experienced staff trained to operate sophisticated instruments and data collectors…

…[legal opinions on the location of land and parcel boundaries] *is solely on the shoulders of land surveyors, who are licensed specifically in that jurisdiction to apply legal principles and case law to boundary issues."*

https://www.gpsworld.com/surveyors-not-the-tools-define-the-profession/

What's a Rope-Stretcher?
by Emily Pierce, August 15, 2021, The American Surveyor

Have you ever wondered how the ancient pyramids of Egypt were staked? By surveyors of course – or as they were known in old Egypt, rope stretchers. Find out more about the work and methods of our earlier professional forbearers in Ms. Pierce's article in *The American Surveyor*.

Excerpt – *"As most surveyors know, Egypt likely produced the first known surveyors, known as "Rope-Stretchers" . They earned that name because one of the tools used in surveying was a calibrated rope. These ropes were specially-treated to hold their length by being stretched out taut between stakes and then rubbed with a mixture of beeswax and resin."*

https://amerisurv.com/2021/08/15/whats-a-rope-stretcher/

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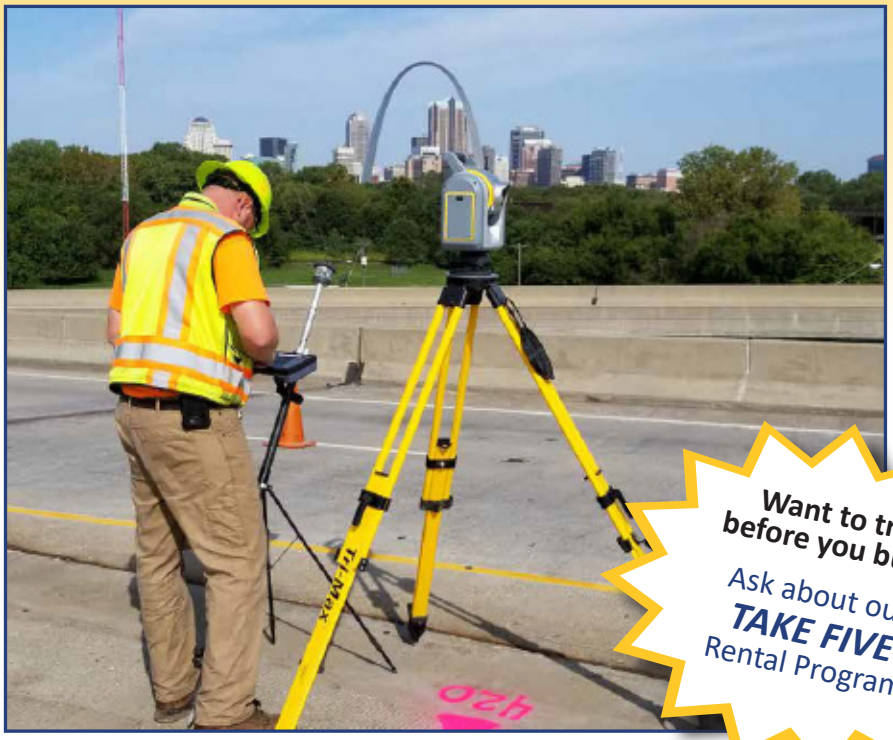

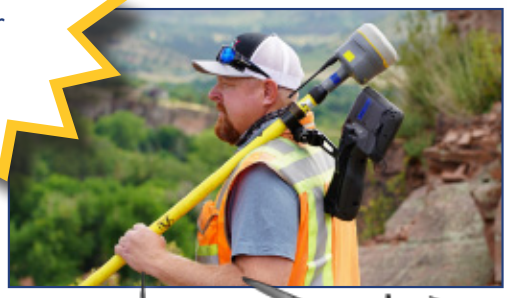

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NSPS NEWS & VIEWS
National Society of Professional Surveyors

President Biden Signs into Law Reverse Auctions Reform Bill

NSPS, July 29, 2021

NSPS scored a legislative victory when President Biden signed into law Public Law 117-28, the **Construction Consensus Procurement Act of 2021** (H.R. 26). The bill prevents the federal government's use of reverse auctions for complex design and construction services. Reverse auctions allow the sellers to bid down the price of a project. Use of reverse auctions typically results in the contractor with the lowest bid winning the contract. In the case of complex design and construction projects, a reverse auction fails to factor in several substantial variables about the project.

One Hundred Seventeenth Congress
of the
United States of America

AT THE FIRST SESSION

Begun and held at the City of Washington on Sunday, the third day of January, two thousand and twenty-one

An Act

To amend the Consolidated Appropriations Act, 2021, to correct a provision on the prohibition on the use of a reverse auction, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Construction Consensus Procurement Improvement Act of 2021".

SEC. 2. AMENDMENT.

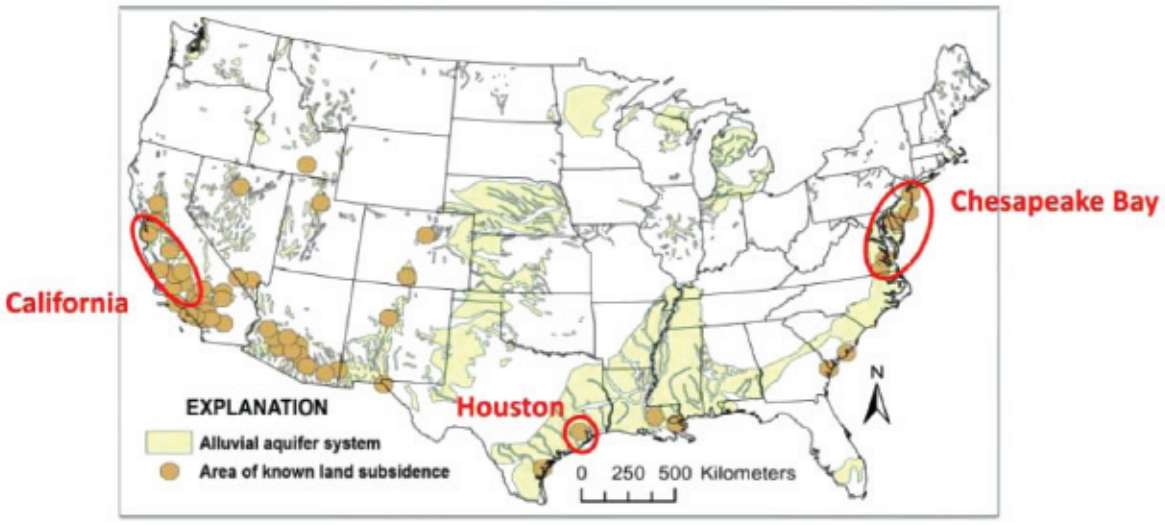
Section 402 of title IV of division U of the Consolidated Appropriations Act, 2021, is amended to read as follows:

"PROHIBITION ON USE OF A REVERSE AUCTION FOR THE AWARD OF A CONTRACT FOR COMPLEX, SPECIALIZED, OR SUBSTANTIAL DESIGN AND CONSTRUCTION SERVICES

Land Subsidence Amendment Filed to Boost USGS NLLC Map

NSPS, July 29, 2021

A bipartisan group of members of the House of Representatives last week filed an amendment to H.R. 4502, a "megabus" fiscal year 2022 spending bill comprised of seven appropriations bills, including the funding for the Department of the Interior. This amendment would **provide $5 million for the U.S. Geological Survey (USGS)**, with support from other agencies, including NASA, the National Geodetic Survey, and U.S. Army Corps of Engineers to begin development of a National Land Level Change (NLLC) Map to identify areas of the nation prone to subsidence.



Senate FLAIR Act Introduced, NSPS and NDSPLS Quoted

NSPS, July 29, 2021

Sens. Kevin Cramer (R-ND) and Martin Heinrich (D-NM) last week introduced the Federal Land Asset Inventory Reform (FLAIR) Act (S. 2433), a bipartisan **bill to create a single database for lands owned by the federal government**. Both Senators introduced the FLAIR Act in May 2019, and at their urging, the Senate Energy and Natural Resources (ENR) Committee held a hearing a hearing on it in September 2020. Local and national groups involved with and affected by federal mapping efforts issued statements in support of the FLAIR Act's reintroduction. "The National Society of Professional Surveyors (NSPS) commends the leadership provided by Senators Kevin Cramer (R-ND) and Martin Heinrich (D-NM) for their bipartisan introduction of the Federal Land Asset Inventory Reform (FLAIR) Act of 2021."

117TH CONGRESS
1ST SESSION

S. 2433

To require the Secretary of the Interior to develop and maintain a cadastre of Federal real property.

IN THE SENATE OF THE UNITED STATES
JULY 22, 2021

Mr. CRAMER (for himself and Mr. HEINRICH) introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

A BILL

To require the Secretary of the Interior to develop and maintain a cadastre of Federal real property.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Request Both of Your U.S. Senators Cosponsor S. 2166, the RETAIN Act

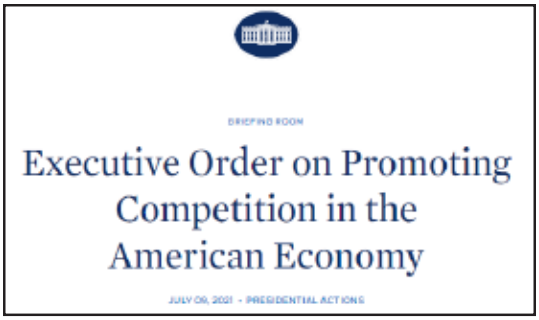
NSPS, July 22, 2021

NSPS has endorsed the RETAIN Act (S. 2166) introduced last month by Sen. Jim Inhofe (R-OK), pictured here with NSPS Executive Director Curtis Sumner. Current cosponsors include Tammy Duckworth (D-IL), Mike Rounds (R-SD), and Jack Reed (D-RI). Please contact both of your U.S. Senators to request co-sponsorship of **this legislation which tackles the issue of GPS interference by Ligado** (formerly Lightsquared).

Curt Summer and Sen. Jim Imhofe (R-OK)

Biden Executive Order Targets Occupational Licensing

NSPS, July 22, 2021



BRIEFING ROOM

Executive Order on Promoting Competition in the American Economy

JULY 09, 2021 • PRESIDENTIAL ACTIONS

President Joe Biden recently issued a new executive order aimed at cracking down on anti-competitive practices in technology, labor, and numerous other sectors. The sweeping order, which includes 72 actions and recommendations that involve more than a dozen federal agencies, is intended to reshape the thinking around corporate consolidation and antitrust laws, according to a White House fact sheet. Among the **activities the White House claims to be anti-competitive is occupational licensing**. "Overly burdensome occupational licensing requirements that impede worker mobility and suppress wages also restrict competition. Today, almost 30% of jobs in the United States require a license, up from less than 5% in the 1950s.

(continued on next page)

Subsidence Seen as Possible Factor in Florida Condo Collapse

NSPS, July 1, 2021

NSPS has been assisting the U.S. Geological Survey (USGS), in conjunction with the National Aeronautics and Space Administration (NASA), National Geodetic Survey (NGS) of the National Oceanic and Atmospheric Administration (NOAA), U.S. Army Corps of Engineers (USACE) and others on the development of a National Land Level Change (NLLC) map. This small scale national map would help identify areas of the U.S. that are prone to subsidence. A national subsidence program was authorized by Congress in the National Landslide Preparedness Act (Public Law 116-323), that was signed into law by President Trump on January 5, 2021, before leaving office earlier this year. NSPS was a strong advocate for the legislation. News reports on the **tragic high rise condominium collapse in Surfside, Florida has led scientists and engineers to identify subsidence as a contributing factor to the structural failure**. NSPS lobbyist John "JB" Byrd is discussing with members of Congress funds for USGS to begin a NLLC map to track areas of subsidence, which will stimulate more precise and accurate large scale surveying and mapping on a site specific basis in subsidence-prone locales.

NSPS Participated in RETAIN GPS & SatCom Act Introduction in the U.S. Senate

NSPS, June 24, 2021

NSPS Executive Director Curt Sumner participated in a news conference on Wednesday to mark the introduction of S. 2611, the RETAIN GPS & SatCom Act by Senator James Inhofe R-OK). The legislation offered in the U.S. Senate would mitigate any spectrum interference with GPS signals by any entity, particularly Ligado (formerly LightSquared), by requiring such an entity to financially compensate parties injured by such interference. The legislation will require Ligado to cover the cost for correcting any interference their operations create for the public or private sector. While the April 2020 Federal Communications Commission (FCC) order that provided conditional approval of Ligado's spectrum operation mandates that the firm upgrade or replace government devices that are impacted by the order, it does not specify what those costs are and is silent on covering private sector GPS users. This bill specifically outlines that all the areas of potential costs that must be borne by Ligado, including but not limited to engineering, construction, site acquisition, research, personnel or contracting staff, labor costs, etc., and specifically notes that these apply to those impacted in the private sector, such as surveyors, as well.

Federal Regulatory Agenda Released

NSPS, June 17, 2021

The Biden administration has published its first regulatory agenda, a list of forthcoming rules which aims to advance in support of some of the President's top goals, including climate change, racial and social equity, and helping small businesses. Some of the specific goals of the agenda include increasing pipeline safety, easing requirements for small businesses to refinance their debt, and reducing greenhouse gas emissions. **A proposed rule on requiring federal contractors to pay their employees a $15 minimum wage is expected.** This is in response to the executive order Biden issued in April. The regulation priorities mirror the president's budget proposal for fiscal 2022 released on May 28 as well as his executive orders and other actions the administration has taken since assuming office in January.

Celebrating the 80th anniversary of the Founding of the American Congress on Surveying and Mapping- ACSM - June 16th, 1941

NSPS, June 17, 2021

According to Walt Dix, ACSM Past President (1962-63) and Secretary Emeritus, perhaps the most important factor in its formation was the 1930's depression. Surveyors, professors/universities, students, and instrument manufacturers were seriously concerned. Another concern was wide disparity in standards and quality of early surveys.

College-sponsored summer surveying camps became a meeting point for discussions about the profession. From these discussions came the realization that surveyors and educators could learn from each other, as well as recognition of the need to develop and upgrade techniques and standards of practice.

It was during such a surveying camp (Iowa State College Professor Jack Dodds' Summer Surveying Camp at Rainy Lake, Minnesota) that ideas crystalized into a movement to form a national congress on surveying and mapping.

The inaugural meeting convened at the U.S. Department of Commerce auditorium in Washington, DC on June 16-18, 1941, offering morning, afternoon, and evening technical sessions along with formation activities and the first business meeting. The meeting was sponsored by several organizations having related interests, and all with national status. Included were the Committee on Surveying and Geodesy, Society for the Promotion of Engineering Education; Surveying and Mapping Division, American Society of Civil Engineers; American Society of Photogrammetry; Federal Board of Surveys and Maps; and the National Geographic Society.

Originally named the National Congress on Surveying and Mapping, the name was soon changed to the American Congress on Surveying and Mapping to encompass members from Canada and South America.

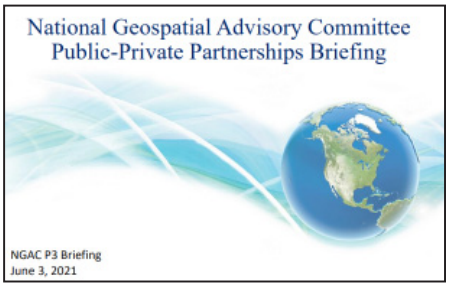
As a result of the merger of ACSM into the National Society of Professional Surveyors in 2012, NSPS now represents surveyors at the national level in the USA, as well as internationally. 2021 marks the 40th anniversary of NSPS.

Note: In 2002 ACSM hosted the XXII International Federation of Surveyors (FIG) Congress in Washington, DC. More than 4000 surveyors from around the world were in attendance. For nearly 20 years no FIG annual conference has been held in the Americas. NSPS will host the 2023 FIG Working Week from May 28 to June 1 in Orlando, Florida. FIG currently represents over 250,000 surveyors in 120+ countries worldwide. NSPS is the FIG Member Association representing professional land surveyors in the USA.

* information from *Recollections of the American Congress on Surveying and Mapping 1941-1991*, Walter S. Dix.

FGDC Explores Public Private Partnership Models

NSPS, June 17, 2021



The Federal Geographic Data Committee's (FGDC) National Geospatial Advisory Committee (NGAC) held an informational **briefing on Public-Private Partnerships** on Thursday, June 3, in which NSPS Government Affairs Consultant John Palatiello was a participant. The purpose of the briefing was to share the results and recommendations from the NGAC's recent paper, "Advancing the National Spatial Data Infrastructure Through Public-Private Partnerships and Other Innovative Partnerships," adopted in December, 2020. The NGAC also adopted a set of use cases that outline a variety of partnerships – with examples involving the private sector, State, local, and regional government, and international examples. The briefing included an overview of the findings and recommendations in the paper, as well as examples from the partnership use cases. Go to *https://www.fgdc.gov/ngac/p3-presentation-public-event-20210603.pdf#* for the meeting summary and click here for the NGAC P3 briefing presentation.

(continued on next page)

As this edition had gone to press, we got the news that MSPS past President Joe Clayton passed. We remember Joe with the following:

The Surveyor's Eulogy.

Joe Clayton 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, Joe 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 on this world, if you are unsure of where you are on this world, you can find your place by looking beyond the 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 August 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 Joe.

D. Martin

NSPS News & Views *(continued)*

MAPLand Act Heard by House Committee

NSPS, June 10, 2021

The House Committee on Natural Resources held a hearing this week on the **Modernizing Access to our Public Land (MAPLand) Act, H.R. 3113**. The bill standardizes the digitization and dissemination of mapping and other information regarding recreational access and allowable activities on millions of acres of federal public lands throughout the U.S. by using geospatial and GPS data, including for BLM, Forest Service, USACE-managed property and assets. BLM testimony focused on geospatial data management, the FGDC, and the GeoPlatform while Forest Service testimony focused on GIS, easements and Rights of Way. During the hearing, Rep. Bruce Westerman (R-AR), ranking member of the committee, commented that he was happy to serve as a cosponsor of the FLAIR Act in past Congresses. The news release by Reps. Blake Moore (R-UT), Joe Neguse (D-CO), Kim Schrier (D-WA), and Russ Fulcher (R-ID) includes a quote in support of the bill provided by NSPS Executive Director Curtis Sumner.

"NSPS stands ready to help with the objectives of this important Federal land and ownership data reform legislation, and strongly encourages Congress and the President to enact the MAPLand Act into law." -Curtis Sumner, Executive Director of NSPS."

National Geodetic Survey

Positioning America for the Future

NGS Upgrades Geodetic Infrastructure in Manhattan

July 30, 2021

The **NOAA Continuously Operating Reference Stations (CORS) Network** - managed by NGS - provides Global Navigation Satellite System (GNSS) data and supports three dimensional positioning, meteorology, space weather, and geophysical applications throughout the United States. Last week, NGS Field Operations Branch staff upgraded the NGS-owned CORS station NYBP, which is located at the U.S. Coast Guard (USCG) office on the southern tip of Manhattan in Battery Park. The NGS team replaced the GNSS antenna and receiver as well as data cables, cellular modem, and back-up battery. Through careful coordination with USCG staff, and remote support from NGS CORS staff, the team was able to complete station upgrades in one day. The CORS station, which was previously offline, is now back online with modern hardware and software upgrades.

Participates in International Young Surveyors Conference

July 2, 2021

Four NGS staff members participated in the **International Federation of Surveyors (FIG) Virtual Working Week 2021**. This worldwide virtual conference's theme was "Smart Surveyors for Land and Water Management - Challenges in a New Reality." NGS Director Juliana Blackwell also participated in the FIG Director Generals Forum, where attendees discussed IT governance. In five separate 90-minute sessions, NGS staff supported the efforts of the FIG Commission 5, which focuses on meeting the highest level of accuracy for positioning and measurement. These sessions raised surveyor

(continued on page 34)

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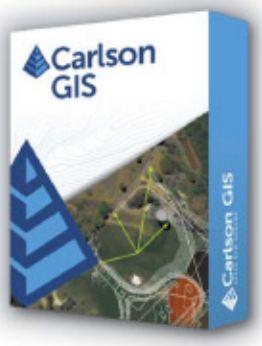

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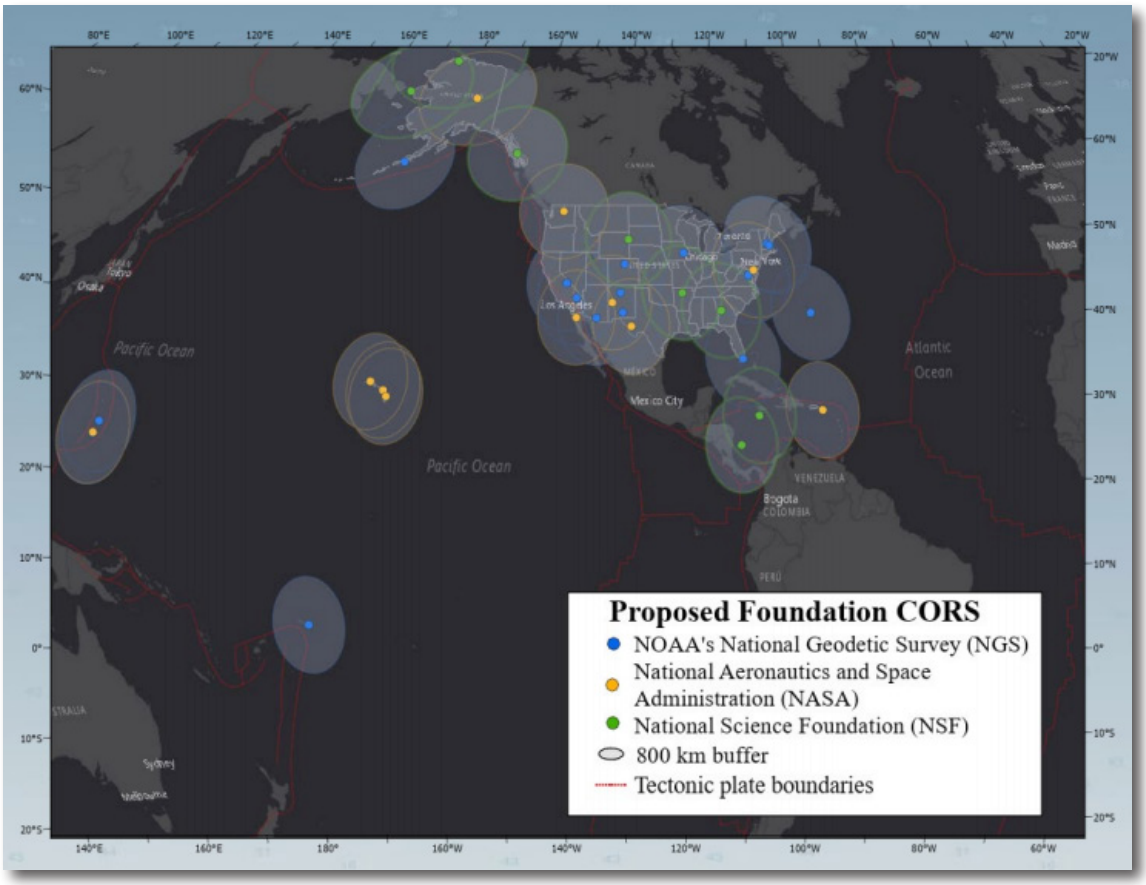
awareness of cutting-edge technology, techniques, and procedures for using geodetic data and enhanced global cooperation and standardization in conformance with the ideals expressed by the United Nations resolution for a Global Geodetic Reference Frame.

NGS Identifies New Locations to Co-Locate Geospatial Technologies

June 25, 2021

The NOAA Continuously Operating Reference Stations (CORS) Network, managed by NGS, provides global navigation satellite system data, supporting three dimensional positioning, meteorology, space weather, and geophysical applications throughout the United States. NGS has identified locations to install high-quality **Foundation CORS** braced monuments at Very Long Baseline Array (VLBA) facilities - the VLBA is a network of 10 observing stations located across the United States. Three monuments will be installed in Pie Town, New Mexico, and another three at the National Radio Astronomy Observatory facility near Fort Davis, Texas. This is a joint project between NGS and the National Geospatial-Intelligence Agency. The plans also include the placing of radar corner reflectors to calibrate synthetic aperture radar satellites, improving the monitoring of the surface movement at and between CORS. Co-locating the Foundation CORS at the radio observatories will improve connections between space geodetic techniques, improving future realizations of the International Terrestrial Reference Frame and the accuracy of the U.S. National Spatial Reference System.



NGS Participates in White House Working Group

June 18, 2021

NGS presented a technical briefing in June to the **White House Office of Science and Technology Policy (OSTP)**, describing NGS's interest in linking state-of-the-art atomic clocks over continental distances. By creating a linked network of field-portable clocks and measuring the tiny differences in their tick rates, NGS would be able to continuously monitor real-time changes in geoid height at the 1-cm level. The presentation was part of an interagency working group formed as part of a national strategy to promote quantum information science, which combines the study of information science with quantum effects in physics. By leveraging similar, aligned interests in federal agencies, the working group is working to foster the development and application of novel quantum sensors.

NGS Helps Restore Survey Benchmarks in Oahu

June 10, 2021

The **NGS advisor for the Pacific region provided onsite consultation to a digital leveling crew** replacing destroyed survey benchmarks on the island of Oahu, Hawaii, for the state Department of Transportation. NGS regional geodetic advisors provide expert guidance and assistance to constituents who are managing geodetic activities tied to the National Spatial Reference System (NSRS). Replacement and restoration of the destroyed survey benchmarks will strengthen the passive controls in the NSRS and improve the accuracy of NSRS data for Oahu. Consultation and guidance on geospatial and geodetic projects are available free of charge to constituents upon request.

NGS Participates in Canada's Geodesy Convocation

June 4, 2021

NGS staff attended the virtual annual meeting of the **Canadian Geodetic Reference System Committee**, where provincial and federal geodesists met to discuss the challenges of unifying local, national, and international reference frames, as well as emerging issues and opportunities. The NGS representative gave an update on related efforts in the United States. Collaboration with Canada and Mexico on geospatial science enables better coordination for North American commerce, engineering, transportation, and science.

NGS Participates in International Young Surveyors Conference

May 28, 2021

NGS Director Juliana Blackwell gave a keynote speech at the **International Federation of Surveyors' Young Surveyors Conference**, in a session for the North American region. The conference theme was "Challenges in Our New Reality: Reimagining a Sustainable Future." The event included sessions focused on four different global regions; hundreds of young surveyors attended from around the globe. NGS staff also participated in a panel discussion on overcoming challenges related to the pandemic. Participation in events like this is part of the ongoing NGS effort to serve as good stewards to the next generation of surveyors and geodesists.

How Ancient Babylonian Land Surveyors Developed a Unique form of Trigonometry – 1,000 Years Before the Greeks

by Dr. Daniel Mansfield, August 4, 2021

Si.427 shows a surveyor's plan of a field. Author provided.

Our modern understanding of trigonometry harks back to ancient Greek astronomers studying the movement of celestial bodies through the night sky.

But in 2017, I showed the ancient Babylonians likely developed their own kind of "proto-trigonometry" more than 1,000 years before the Greeks. So why were the Babylonians interested in right-angled triangles? What did they use them for?

I have spent the past few years trying to find out. My research, published today in Foundations of Science, shows the answer was hiding in plain sight.

Si.427

Many thousands of clay tablets have been retrieved from the lost cities of ancient Babylon, in present-day Iraq. These documents were preserved beneath the desert through millennia. Once uncovered they found their way into museums, libraries and private collections.

One example is the approximately 3,700-year-old cadastral survey Si.427, which depicts a surveyor's plan of a field. It was excavated by Father Jean-Vincent Scheil during an 1894 French archaeological expedition at Sippar, southwest of Baghdad. But its significance was not understood at the time.

Si.427 shows a surveyor's plan of a field. Author provided
It turns out that Si.427 — which has been in Turkey's İstanbul Arkeoloji Müzeleri (Istanbul Archaeological Museums) for several decades and is currently on display — is in fact one of the oldest examples of applied geometry from the ancient world. Let's look at what makes it so special.

A brief history of Babylonian surveying

The ancient Babylonians valued land, much as we do today. Early on, large swathes of agricultural land were owned by institutions such as temples or palaces.

Professional surveyors would measure these fields to estimate the size of the harvest. But they did not establish field boundaries. It seems those powerful institutions did not need a surveyor, or anyone else, to tell them what they owned.

The nature of land ownership changed during the Old Babylonian period, between 1900 and 1600 BCE. Rather than large institutional fields, smaller fields could now be owned by regular people.

This change had an impact on the way land was measured. Unlike institutions, private landowners needed surveyors to establish boundaries and resolve disputes.

The need for accurate surveying is apparent from an Old Babylonian poem about quarrelling students learning to become surveyors. The older student admonishes the younger student, saying:

> *Go to divide a plot, and you are not able to divide the plot; go to apportion a field, and you cannot even hold the tape and rod properly. The field pegs you are unable to place; you cannot figure out its shape, so that when wronged men have a quarrel you are not able to bring peace, but you allow brother to attack brother. Among the scribes, you (alone) are unfit for the clay.*

This poem mentions the tape and rod, which are references to the standard Babylonian surveying tools: the measuring rope and unit rod. These were revered symbols of fairness and justice in ancient Babylon and were often seen in the hands of goddesses and kings.

Surveyor with modern tools.

Babylonian surveyors would use these tools to divide land into manageable shapes: rectangles, right-angled triangles and right trapezoids.

Earlier on, before surveyors needed to establish boundaries, they would simply make agricultural estimates. So 90° angles back then were good approximations, but they were never quite right.

Right angles done right

The Old Babylonian cadastral survey Si.427 shows the boundaries of a small parcel of land purchased from an individual known as Sîn-bêl-apli.

There are some marshy regions which must have been important since they are measured very carefully. Sounds like a normal day at work for a Babylonian surveyor, right? But there is something very distinct about Si.427.

In earlier surveys, the 90° angles are just approximations, but in Si.427 the corners are exactly 90°. How could someone with just a measuring rope and unit rod make such accurate right angles? Well, by making a Pythagorean triple.

A Pythagorean triple is a special kind of right-angled triangle (or rectangle) with simple measurements that satisfy Pythagoras's theorem. They are easy to construct and have theoretically perfect right angles.

(continued on next page)

How Ancient Babylonian Land Surveyors Developed a Unique form of Trigonometry – 1,000 Years Before the Greeks
(continued)

Pythagorean triples were used in ancient India to make rectangular fire altars, potentially as far back as 800 BCE. Through Si.427, we now know ancient Babylonians used them to make accurate land measurements as far back as 1900 BCE.

Si.427 contains not one, but three Pythagorean triples.

Crib notes for surveyors

Si.427 has also helped us understand other tablets from the Old Babylonian era.

Not all Pythagorean triples were useful to Babylonian surveyors. What makes a Pythagorean triple useful are its sides. Specifically, the sides have to be "regular", which means they can be scaled up or down to any length. Regular numbers have no prime factors apart from 2, 3 and 5.

Plimpton 322 is another ancient Babylonian tablet, with a list of Pythagorean triples that look similar to a modern trigonometric table. Modern trigonometric tables list the ratios of sides (sin, cos and tan anyone?).

But instead of these ratios, Plimpton 322 tells us which sides of a Pythagorean triple are regular and therefore useful in surveying. It is easy to imagine it was made by a pure mathematician who wanted to know why some Pythagorean triples were usable while others were not.

Alternatively, Plimpton 322 could have been made to solve some specific practical problem. While we will never know the author's true intentions, it is probably somewhere between these two possibilities. What we do know is the Babylonians developed their own unique understanding of Pythagorean triples.

This "proto-trigonometry" is equivalent to the trigonometry developed by ancient Greek astronomers. Yet it is different because it was developed in response to the problems faced by Babylonian surveyors looking not at the night sky — but at the land.

Dr Daniel Mansfield is a Senior Lecturer with the University of New South Wales (Australia) School of Mathematics and Statistics. His area of research is in ancient Mesopotamian mathematics: their computational techniques and how their unique and forgotten form of geometry was applied to land measurement during 2000-1600 BCE. Dr. Mansfield is particularly interested in how to best use technology to enhance learning and teaching. He is a relentless innovator in this space and is always keen to talk about problems in learning and teaching, and how to solve them.

For a video on this subject, got to: https://www.youtube.com/watch?v=8C6IbJJ-mhM

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