Missouri Surveyor

A Quarterly Publication of the
Missouri Society of Professional Surveyors

Jefferson City, Missouri | September 2018

What's in this issue...

CALENDAR OF EVENTS

2018

October 3-6, 2018
61st Annual Meeting and Convention
Tan-Tar-A Resort,
Osage Beach, MO

December 1, 2018
Board Meeting
MSPS Office, Jefferson City, MO

2019

May 2-4, 2019
41st Annual Spring Workshop
Lodge of Four Seasons,
Lake Ozark, MO

September 10-12, 2019
62nd Annual Meeting and Convention
Holiday Inn Executive Center,
Columbia, MO

2020

April 30 - May 2, 2020
42nd Annual Spring Workshop
Lodge of Four Seasons,
Lake Ozark, MO

The cover photo depicts your Missouri Surveyor editor on a quiet evening cruise on the Lake of the Ozarks, which is also the location for the 2018 Annual Conference of the Missouri Society of Professional Surveyors. Find your copy of the registration information enclosed in this newsletter. Photo provided by the Lake of the Ozarks Convention and Visitors Bureau.

Donald R. Martin, Editor

Notes from the Editor's Desk

Donald R. Martin

It's prep time for the *MSPS Annual Meeting* at Osage Beach on October 3rd through the 6th so that means one thing here at Newsletter HQ – the September 2018 edition of *Missouri Surveyor!* My ol' Pard Tripod the three-legged groundhog showed up with some new help in tow as he was inking the plates, setting the type and proofreading the stories. It was a friend from south of here, made his way crossing borders, waters and roads; an armadillo! Yep, a poorman's pig has been diggin' more holes around the homestead than a survey party setting pins in a corn field. Hope this son-of-a-turtle crossed with a possum isn't here to stay. He says him and his folks are known for their work along highways so Tripod has proclaimed his moniker to be *Road Cone*. We'll see 'bout dat. Well, on to this edition and the contained cluster of commentaries, calculations, columns, captions, critiques, commercials, contact-prints, candidates and corporate members. Whew…

This *Missouri Surveyor* is quite unique...it is an **all MSPS** edition! Yes! Members only content for this newsletter. Thanks to the hard work and talent of our contributors we have now published a periodical compiled only of written works by our peers in practice from within our own ranks. So as I rattle through the list of features and articles note the names of our authors; they have our greatest gratitude. Thank you all!

First up in this edition is Duck Bader's final *President's Message*. You've given us a good year Gerald and you are appreciated. Then one of our masters of research and history, Steve Weible shares the tale of how some of Missouri's earliest old-world settlers obtained their land grants from the Spanish Crown in *Grants of Land in Upper Louisiana*. Next our Trig Star alumnus Cassy Doebler writes "home" with *2017 MSPS Trig-Star Winner Off to College*. This impressive young lady has a brilliant future before her. Cassy's message is followed by the anchor piece for this edition, a technical report of the procedures, measurements and results of "typical" surveying practices by Missouri's grand gentleman of surveying, Bob Myers. With help from the team at the State Land Survey Program and in collaboration with MSPS Board of Directors member Stan Emerick, Mr. Myers brings us *Evaluation of Survey Consistency*. A detailed and expansive thesis, don't miss the *Instructions* and *Tables* which accompany this masterful contribution.

The slate of candidates for MSPS offices fills the pages of our centerfold in *Nominees for 2018-2019 Officers*. Next we are treated to another journey in the way-back machine as MSPS President Duck Bader shares the words and images from a presentation he gave to the Missouri Association of County Surveyors with *Missouri's French Land Grants and Concessions*. Then we have *State Tech's First Ever Statewide Drone Conference* by one of Missouri's best surveying educators, Joe Paiva. News of the buzz bombers is followed by some important words from Kim Leavitt in *NSPS – Proposal to Raise Membership Dues*. With the rising costs of doing business, Kim makes the case for increasing NSPS dues.

Within our pages comes the unwelcome news of the passing of two of our honored brethren. In sorrow *Missouri Surveyor* brings to you *In Memory of James Charles Wallick, Missouri LS 1853* and *In Memory of John G. Parsons, Missouri LS 2150*. In thought and in prayer.

That's it friends and readers, another edition done and delivered. Enjoy this publication and remember *Missouri Surveyor* is your voice; I welcome that which you may have to say or write.

Donald

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EDITOR

Donald R. Martin
105 S. Capistrano
Jefferson city, MO 65109
Phone (573) 619-8702
E-mail: editor@missourisurveyor.org

PUBLISHER

Sandra Boeckman
P.O. Box 1342
Jefferson City, MO 65102
(573) 635-9446 FAX (573) 635-7823
E-mail: msps@missourisurveyor.org

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President's Message

Gerald "Duck" Bader, PLS

Wow! Has it been a year already? Well 10 months. I guess you could describe this as a "lame Duck year."

For my last message as President I wanted to have a unique and inspirational letter, so I sat down and grabbed several September issues of *Missouri Surveyor* going back to then President Bob Arnold in 1997. I'm not sure I can state anything that has not been covered by others in the past.

I am sad to report that *Mo McCullough* has decided to retire. Mo has been the MSPS lobbyist for the past several years. Congratulations Mo! We wish you a long and happy retirement. Thanks for your support; your insight into the Missouri state government has helped MSPS improve and protect the land survey profession over the years. Just a few bills passed under Mo's watch/help:

- 2006 - Authorizes the Registration Board to issue licenses to persons meeting certain criteria (HB1494).
- 2009 - Authorizes the Registration Board to conduct disciplinary hearings and deny licenses to anyone who had a license revoked or denied (SB296).
- 2010 - Requires the Office of the State Land Surveyor to establish rules setting Minimum Standards for Cadastral Parcel Mapping. (HB1692)
- 2010 - Mechanic's lien. (HB2058)
- 2011 - Statute of Limitations (SB325)
- 2013 - Land Survey Programs move to Department of Ag. (HB650)

The board met with *Lynne Schlosser*, who is Mo's associate, and decided to have Lynn complete the current contact year. We are looking forward to working with Lynne.

What will the profession hold for the future? Young surveyors? Well, there is hope. Three candidates applied for scholarships this year, and they are interested in the surveying profession. That is an increase of 3 from last year!

The surveying profession has had great advancements over the years in the art of measuring starting with the compass and chain, moving forward to the steel tape, then transits, EDM's, total stations, static GPS, RTK/GPS. Is the next step the *phone app*? "Survey your own property" (yes, an actual app!). Such apps will be not just an issue, but a problem for the surveying profession. The end user believes what they see on the screen as being reality. We know better. I guess this will create more work in the future as surveyors will be called upon to correct the do-it-yourself surveys.

The *Hybrid Geoid* is scheduled to be released in April 2019. Be sure to keep up with the option of the *Low Distortion SPCS2022* system. The Land Survey Program has drafted comments on the NGS proposed Policies and Procedures hoping for more flexibility with the SPCS2022. The board has voted to support the comments letter sent by the LSP.

I would like to invite everyone to attend the Annual Meeting at Tan-Tar-A on October 4th, 5th and 6th 2018; mark your calendar. See the enclosed flyer for more information.

Reflecting on this past year as MSPS President I am filled with the sense of "What an experience!" It has been a joy to work with the officers, board, committee chairs and committee members. Thanks to all! That includes "thanks" to Sandy, who makes this job easier and to Don for his great work with the publication (and patience waiting for the President's messages.)

In closing, this is your Missouri Society of Professional Surveyors. It's your support and your involvement which makes the Society a strong advocate for the surveying profession. Take a few minutes to reflect. There is a committee calling your name.

Hats off to the past Presidents!! Don't forget the marble.

"Duck"

Grants of Land in Upper Louisiana

by Steven E. Weible, PLS, July 2018

When the French and Indian War in North America concluded in 1763, the French were defeated. No longer could they lay claim to that vast territory encompassing the watershed of the Mississippi River and its tributaries, known as the Province of Louisiana. By a secret treaty with Spain in November 1762 France had relinquished to Spain all of Louisiana west of the Mississippi River, including the island and city of New Orleans. Peace with Great Britain was concluded in February 1763 and, as a result of that treaty, Great Britain took control of Canada and that part of Louisiana east of the Mississippi River (Stoddard, pages 71, 138).

The area that now forms the state of Missouri was included in that part of the province known as Upper Louisiana. The inhabitants of Upper Louisiana under the French had tended to focus their efforts on hunting, trapping, trading with the Indians and searching for mineral wealth, lead in particular, not giving much attention to agriculture (Stoddard, pages 211, 254). In contrast, the Spanish found it necessary to promote agriculture as a way to increase the population, thereby forming a barrier to the British in Canada (Stoddard, page 249). As a result, the government of Spain adopted a policy of granting lands that would encourage the settlement of the territory by those willing to make improvements and cultivate the land. Inhabitants from the United States with families and great means were particularly encouraged, because of their sentiment against the English (ASP:PL, Vol. 6, pg 712).

Regulations for granting land, dated February 18, 1770, were issued by Alexander O'Reilly, the first Spanish governor over Louisiana. These regulations were more applicable to Lower Louisiana, however, and were, generally, not applied in Upper Louisiana.

The instructions for granting lands that were most applicable to Upper Louisiana were issued September 9, 1797 by Governor Manuel Gayoso de Lemos. Those instructions stipulated that a new settler must be married in order to qualify for a grant of land. He was allowed a grant of 200 arpents (equivalent to about 170 acres) with an additional 50 arpents (about 42.5 acres) for each child and 20 arpents (about 17 acres) for each Negro that he brought with him. The total amount of the grant was not to exceed 800 arpents (about 680 acres). It was reasoned that if the settler had such a number of Negroes as to amount to a greater quantity of land than 800 arpents by the above formula, then he had the means to purchase more land, if he wanted it (ASP:PL, Vol. 4, pg 3, No. 418).

Unmarried settlers were required to be productively employed for four years and artisans were required to practice their profession for three years, before being allowed a grant of land. Traders were not allowed a grant of land, since they lived in the towns and, generally, did not pursue agricultural activities.

The new settler was required to establish himself within one year of receiving his grant and to have under cultivation 10 arpents for every 100 arpents by the third year. He was not allowed to sell his lands until he had produced three crops on one tenth of the grant.

Although Governor Gayoso's instructions limited a grant of land to 800 arpents, those who were given the authority to concede grants of land had the discretion to exceed that amount. Since the objective was to increase the population, grants of land were made to advance that objective. Those petitioners who had the means and ability to put more land into production were granted accordingly larger tracts (Stoddard, page 251). Larger tracts were also granted to accommodate the particular purpose for which the land was petitioned (ASP:PL, Vol. 6, pg 712). In addition, the Spanish government did not provide salaries to its provincial officers or other persons providing service to the government, so that when compensation was requested, it was delivered in the form of a grant of land rather than in money (Stoddard, page 257).

To obtain a grant of land in Upper Louisiana the settler submitted a petition to the lieutenant governor or local commandant, asking for a definite quantity of land (ASP:PL, Vol. 1, pg 177, No. 99). The petition may be for a **general**

concession or a **special** concession. A general concession (also referred to as a floating concession) allowed the petitioner to select the desired quantity of land anywhere within the King's domain, so long as it did not interfere with any existing legitimate claim. Such a concession was common when a petitioner wanted the tract for a particular purpose and needed to search for a location that was suited to that purpose. A special concession granted a specific tract of land, usually described by calling out the landowners bounding on each side, as well as, any prominent features that would aid in identifying the location (Stoddard, page 245).

If the petition was not submitted directly to the lieutenant governor, it may be forwarded by the local commandant with a recommendation confirming the truth of the facts contained within the petition and the merit of the petitioner. The granting authority, whether lieutenant governor or local commandant, would examine the petition and, if he deemed the petitioner worthy of a grant of land, would concede the land requested, writing his statement at the bottom or on the back of the same petition (ASP:PL, Vol. 1, pg 177, No. 99). He would then direct the surveyor to perform a boundary survey of the land selected by the petitioner, to prepare a plat and to put the petitioner in possession of the lands solicited.

The following is a representative example of the sequence of correspondence related to a grant of land (ASP:PL, Vol. 6, pg 801):

Petition:

To Don Charles Dehault Delassus, lieutenant governor and commander-in-chief of Upper Louisiana, &c.:

Purnel Howard, C. R. [Roman Catholic], has the honor to represent to you that, with the permission of the government, he has settled himself on a tract of land in his Majesty's domain, on the north side of the Missouri; therefore he supplicates you to have the goodness to grant to him, at the same place, the quantity of land corresponding to the number of his family, composed of himself, his wife, and four children; the petitioner having sufficient means to improve a plantation, and having no other views but to live as a peaceable and submissive cultivator of the soil, hopes to obtain the favor which he solicits of your justice.

PURNEL HOWARD, + mark.

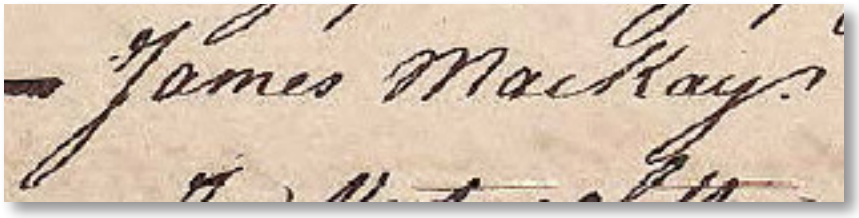
St. André, November 11, 1799.

Recommendation of the local commandant:

Be it forwarded to the lieutenant governor, with information that the statement above is true, and that the petitioner deserves the favor which he solicits.

SANTIAGO [JAMES] MACKAY.

St. André, November 11, 1799.



Signature of James Mackay, Commandant of St. Andre & Deputy Surveyor, (Courtesy of the Missouri State Archives)

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Grants of Land in Upper Louisiana *(continued)*

Concession by Lieutenant Governor:

St. Louis of Illinois, November 25, 1799.

By virtue of the information given by Don Santiago Mackay, commandant of the settlement of St. André, in which he testifies as to the truth of the number of individuals stated to compose the family of the petitioner, the surveyor, Don Antonio Soulard, shall put him in possession of 400 arpents of land in superficie, in the place where asked by him, this quantity corresponding to the number of his family, conformably to the regulation of the governor general of the province; and this being executed, the interested party shall have to solicit the title of concession in form from the intendant general of the same province, to whom, by royal order, corresponds the distributing and granting all classes of lands of the royal domain.

CARLOS DEHAULT DELASSUS

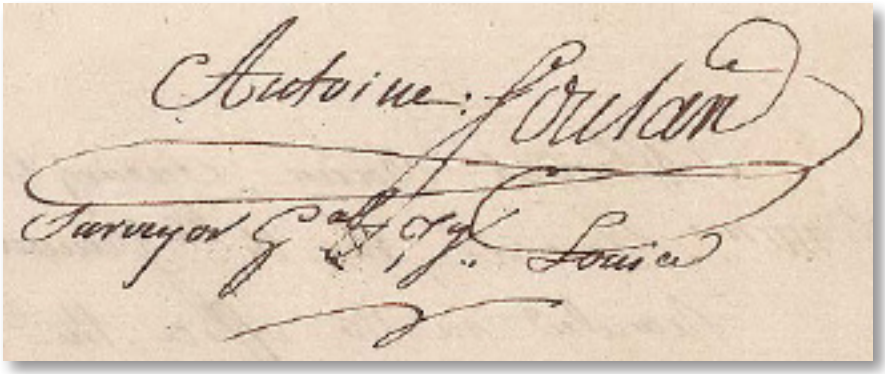
Surveyor's certificate:

Don Antonio Soulard, surveyor general of the settlements of Upper Louisiana.

I do certify that a tract of land, of [400] arpents in superficie, has been measured, the lines run and bounded, in favor and in presence of Purnel Howard. Said measurement has been taken with the perch of Paris, of 18 French feet, lineal measure of the same city, according to the agrarian measure of this province. Said land is situated on the north side of the Missouri, at the distance of two miles from said river, and at about sixty miles west of this town of St. Louis, and is bounded on its four sides – north, south, east, and west – by vacant lands of the royal domain. The said survey and measurement was taken without having regard to the variation of the needle, which is 7°30' east, as is evinced by the foregoing figurative plat, on which are noted the dimensions, courses of the lines, other boundaries, &c. This survey was taken by virtue of the decree of the lieutenant governor and sub-delegate of the royal fisc, Don Carlos Dehault Delassus, bearing date November 25, 1799, here annexed.

In testimony whereof, I do give the present, with the foregoing figurative plat drawn conformably to the survey executed by the deputy surveyor, Don Santiago Mackay, on the 28th of March, 1804.

ANTONIO SOULARD, Surveyor General



Signature of Antoine Soulard, Surveryor General of Upper Louisiana, (Courtesy of the Missouri State Archives)

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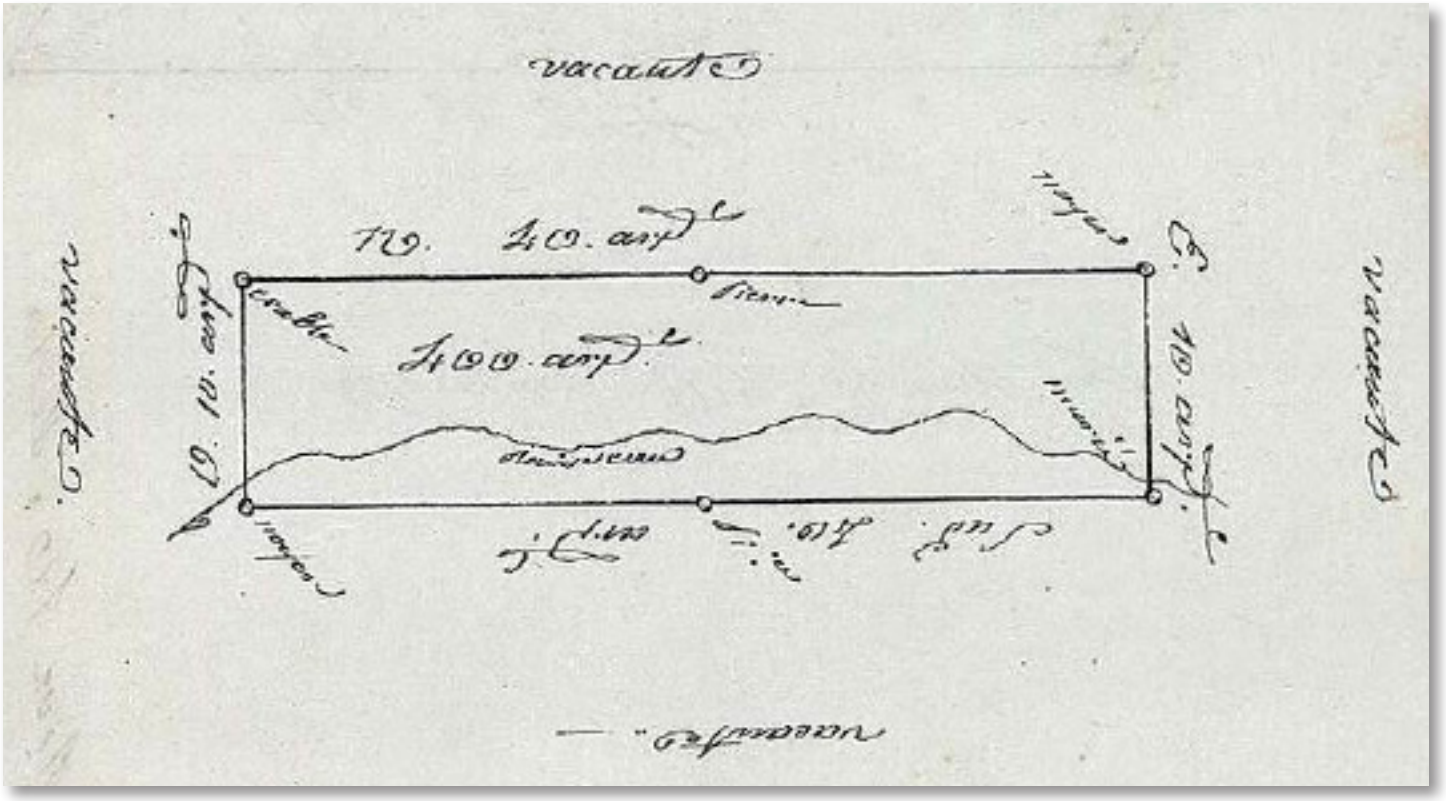
Grants of Land in Upper Louisiana *(continued)*

Once a petition had been submitted and a concession from the lieutenant governor or local commandant had been received, the next steps were to locate a suitable tract of land, obtain a boundary survey and register the grant with the appropriate authority in New Orleans.



Survey of 400 Arpents for Parnelle Howard by James Mackay, dated March 28, 1804. Erable = maple; noyer = walnut; pierre = stone. (Courtesy of the Missouri State Archives)

In the case of a general concession a petitioner was granted the privilege of selecting a tract of land anywhere within the king's domain. If a tract of land was needed for the development of mineral lands, the establishment of a mill, the production of salt, the establishment of a dairy or grazing farm or some other particular purpose, a site suitable for the purpose needed to be found. The king's domain was extensive and it took time to travel about and search for a suitable tract of land that was not already claimed by someone else. Roads and modes of transportation were not well developed or convenient, so travel was expensive and time-consuming, not to mention dangerous. A well-traveled agent familiar with the character of the land may be necessary to aid in the location of an appropriate tract.

Once a suitable tract had been identified, a qualified surveyor was needed to perform a boundary survey. Surveyors in Upper Louisiana were in short supply, however, and a settler may have to wait a few years before a survey could be performed, if at all. It was not until 1795 that Antoine Soulard was appointed to the newly created office of principal surveyor, or Surveyor General, for Upper Louisiana (Stoddard, page 248 and ASP:PL, Vol. 6, pages 712-714). Soulard organized the office and in the following years appointed deputy surveyors for the districts: Joseph Story for the District of New Madrid, Thomas Madden for the District of Sainte Genevieve, Bartholomew Cousin for the District of Cape Girardeau and James Mackay for the District of Saint Charles. Additional deputy surveyors were appointed at intervals, including James Rankin, John Ferry (or Terrey) and Charles Frémon Delauriere.

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Grants of Land in Upper Louisiana *(continued)*

When a surveyor became available to perform the boundary survey, the next obstacle for the settler was the expense of the survey. The fees included payment to the surveyor to do the work, wages and supplies for the axemen and chain-carriers, travel expense and the fee to the principal surveyor for the plat of survey. In addition to these were the extra expense and stress of defending against hostile Indians, who appeared determined to oppose all white settlements. Often the value of the land at that time was less than the cost of the boundary survey. Hard money was scarce in Upper Louisiana with shaved deer skins being the circulating medium of exchange (ASP:PL, Vol. 6, pg 713). To make surveys more cost effective settlers were encouraged to work together in locating their tracts so that the surveys for several tracts could be accomplished at the same time.

A settler who had successfully located a suitable tract of land, obtained a boundary survey and satisfied the stipulations of his grant had yet one more requirement to secure complete title to the land. He had to present (1) the petition, (2) the concession from the lieutenant governor or local commandant with the order for a boundary survey and (3) the results of the survey to the intendant general, the highest representative of the crown, at the capital of the province in New Orleans.

Few concessions, however, were actually perfected into complete grants. The expense and the distance to New Orleans was a hardship for most and impractical for the average settler. Most settlers were content with their concession from the lieutenant governor and felt no need to obtain a complete title from New Orleans. Who knew they had any need for concern?

In July 1799 the authority to confirm grants of land was transferred to the tribunal of finance. Not long after the transfer, the assessor of the tribunal died. No concessions could be confirmed until a new assessor was appointed, but no appointment was made by the king (Stoddard, page 248). It was, therefore, not possible to obtain a complete title at that time.

On October 1, 1800, by the Treaty of San Ildefonso, Spanish Louisiana was returned to France. Just a few years later on April 30, 1803, France unloaded the entire territory for cash to a most eager buyer, the United States of America. The United States took possession of Lower Louisiana at New Orleans on December 20, 1803. Possession of Upper Louisiana became official on March 10, 1804. The inhabitants of the Province of Louisiana were no longer subjects of the King of Spain, but citizens of the United States of America. Were they still secure in their concessions with incomplete title?

Primary sources for this article include "*Sketches, Historical and Descriptive, of Louisiana*" by Major Amos Stoddard, 1812, and the American State Papers: Public Lands (ASP:PL).

2017 MSPS Trig-Star Winner Off to College

Ms. Cassy Doebler, last year's winner of the Missouri Society of Professional Surveyors Trig-Star competition recently wrote to MSPS. The life-long resident of Gainesville, Missouri wanted to share the news of a recent accomplishment and her plans for the future…

… I recently graduated from Gainesville High School in May as the salutatorian of my class. I plan to attend Missouri State University in Springfield starting this fall to get my bachelor's degree in chemistry. I will then transfer to a pharmacy school where I am will get my doctorate's degree in pharmacy. I have worked at Century Bank of the Ozarks in Gainesville, Missouri for the past 7 months as a data processor. Outside of school and work I like to spend time with my friends and family. I also like to go kayaking in the summer and hiking in the fall.

Cassy, congratulations on your recent graduation and we wish you continued success!

Evaluation of Survey Consistency

by Bob Myers

ABSTRACT

A study was conducted to evaluate field measurements made by survey crews using their standard procedures over a course designed to simulate actual survey conditions that may be encountered in a typical land survey. General instructions were provided for the measurements and specific requirements were set for reporting. For establishing "truth" , the Missouri Land Survey Program of the Department of Agriculture conducted a control network survey at the site consisting of almost 100 observations. After testing for internal consistency, the results from a rigorous adjustment following a least-squares analysis was used for the evaluations. The comparison of individual measurements for the same line was also used to evaluate consistency between surveyors. The variation in consistency in the measurement of direction was very evident. The evaluation of distances shows some measurements to be quite good, but on the other hand, distance measurements, especially of smaller length could not even achieve the previously held standard for chaining of one part in 10,000. Most surveys appeared to be largely in compliance with the Missouri Standards for Property Boundary Surveys but only half were able to achieve the positional accuracy required for the ALTA/NSPS Land Title Surveys. The results also showed some of the typical errors encountered in normal field results. The examples of the data comparison and implications for Missouri surveying practice are presented.

The Purpose of This Study

The St. Louis chapter of the Missouri Society of Professional Surveyors (MSPS) has actively strived to elevate the standards of the surveying profession in Missouri. The St. Louis chapter in the late 1960s sponsored a test survey to evaluate the accuracy of chaining with a steel tape as practiced at that time. The surveyors from several companies measured the distance between two points on an abandoned roadway. The results of that survey showed that the distance was being measured with an accuracy of one part in 10,000. That accuracy was considered the measurement standard of that time. The equipment used for that project was a 100-foot steel tape, plumb bobs and a transit to keep the measurements in line. Results of this project validated the current procedures before electronic distance measuring instruments (EDMI) were available.

The equipment and surveying technology used in the execution of surveys by the professional land surveyor has drastically changed in the last 45 years. The standards themselves have also changed from a surveying procedures specification to accuracy-based standards. Current standards rely on procedures and techniques designed by the surveyor that yield results of a specified accuracy.

This study attempts to answer the question "are the results obtained by current surveys consistent with the accuracy standards in place?". The St. Louis chapter is also interested in determining the relative consistency of measurements of their members. This study is not a contest between surveyors to see who could make the most accurate survey but to compare the actual survey measurements by one surveyor with the measurements from other surveyors.

The study is intended to compare the accuracy of the survey measurements with the accuracy standards currently being used with the intention to make recommendations for evaluating the survey standards if needed. The results of this study should provide information relative to the current standard of practice and may pinpoint needed changes in the Missouri's surveying statutes and regulations to consider modern procedures and technology.

There were no preconceived results of this study. It was recognized in the very beginning that the results of this study may have no tangible results and thus be inconclusive. It was also recognized that even if no earth-shattering results were found, the study would provide good information and insights into surveying technology in common use today.

Procedure for the Study

The plan is to conduct a survey at a location that was both realistic and accessible. The survey is intended to emulate a boundary survey in which the lines to be measured were property lines. Although the lines were not actual boundary lines they could have been boundaries. The site was selected to allow easy access to the interstate highway system, and thus accessibility to the survey crews in the area.

- The site selected was on property in the southwest quadrant of Missouri highway 141 and Interstate I-64. It was chosen because it had the following characteristics.
- The site had readily available parking for the surveyor's crew.

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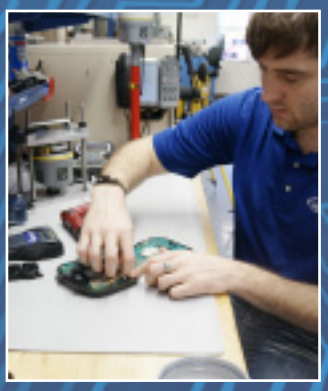

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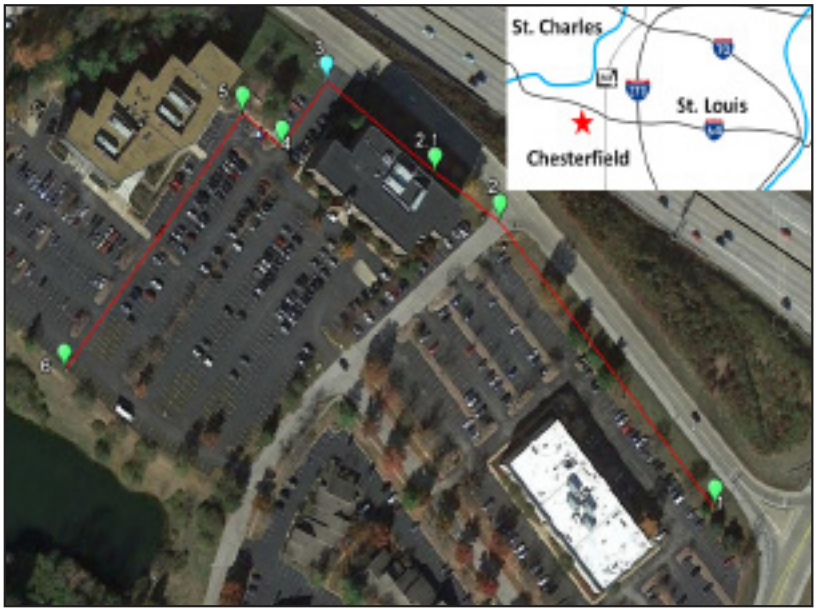
Evaluation of Survey Consistency *(continued)*

- The survey crews could come to the site any time during a normal working day.
- The measurement points are easy to monument and all the lines to be measured were visible and the corners could be occupied.
- The length of the lines varied so that the quality of the measurements could be evaluated with respect to distance.
- All the angles at the measurement points could be easily measured.
- Because there are some commercial buildings on the site the visibility (and non-visibility) of satellites provided a normal situation, with some blockages for the GPS satellites
- The configuration was such that the endpoints of the survey were not inter-visible.

The site chosen to conduct this evaluation was owned by two property owners and included major office buildings. Before any work started these owners were contacted and permission was received for the work. The surveyors were particularly admonished to not block traffic unnecessarily or to cause any undue problems with access to the property by the public.

For specific detail of the site refer to the Site Plan. Corners 1 and 2 were relatively open and clear to receive GNSS satellite signals and not blocked by any other obstructions. Corner 2.1 was selected at a point close to the three-story building. That building blocked most GNSS satellites from the South. Corner 2.1 was visible to both the preceding and subsequent monument. i.e. they were inter-visible, as might be required for total station surveying by direct measurements. Corner 3 was clear for the observation to 2.1, 2 and 4. Corners 4 and 5 were selected between the three-story buildings although these buildings did not completely block satellite coverage. Corners 4 and 5 were selected so that the distance between them was less than 100 feet. Corner 6 was selected to give the greatest amount of difference in elevation between Corner 1 and Corner 6 and had good visibility to GNSS satellite signals. The line between Corner 1 and 6 was blocked by a building.



Participation in the special survey

A reasonable amount of participation from the surveyors in the St. Louis area was necessary to make this study a successful project. To provide an incentive for the participation of survey crews, a single cash award of $1000 was awarded to one of the participating crews. The winner of this cash prize was chosen by randomly drawing a name from those crews that had submitted their work. This award was made at a meeting of the St Louis chapter when the oral presentation of the results was given. The $1000 prize was money donated to the project by individuals interested in this study.

Participation in the study was not as high as expected. A total of 14 results were submitted. Three of the surveyors participating were listed as land surveyors in the St Louis Yellow Pages. One surveyor was from outside the St Louis area. Three consulting engineering companies and two state government agencies participated. Fourteen crews are a statistically small sample and represents a small percentage of the surveying profession. Although the deadline for submitting data was extended twice to solicit additional participation there seemed to be a reluctance to participate. The most common excuse was “that the company was too busy”. Nevertheless, the participation did yield enough data for an analysis.

Instructions given to the surveyors

The primary purpose of this project was to evaluate the results of the field work obtained from the survey. The study was to compare values and results and leave the procedures up to the survey crews themselves. The crews were instructed to make that survey measurements just the way they normally would on a similar survey project in this area. There was no intention to use special procedures for this survey. Instructions were

(continued on page 16)

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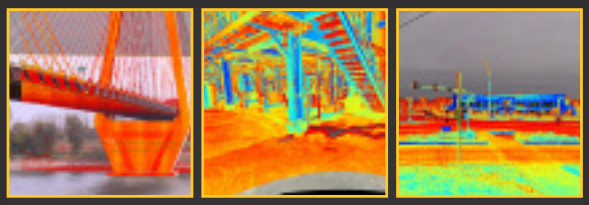

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Evaluation of Survey Consistency *(continued)*

written for the survey crew that gave only general guidance on conducting the survey and specific instructions on reporting requirements.

By way of example the following is taken directly from the procedure given in the instructions:

Procedure: a series of points have been established in an area simulating an actual boundary survey. Survey crews are asked to determine ground distances and directions, state plane coordinates and elevations of selected lines and points. The survey crews are asked to use their normal or standard procedure to make these measurements. It is not intended that the survey crew will use special procedures. They should use procedures that they would normally use in conducting a survey for a client. For statistical purposes, the final report submitted by each survey crew will also include the estimated field and office time associated with the survey and a general description of the procedure and equipment used the names of the party chief and crew members must be included in the report, but those names will not be used in the comparison of measurements or included in the final analysis of the results.

Note that procedures were not specified, the term state plane coordinates was used without further identification and elevation was used without further identification. Interpretation of this information was left up to the individual crew.

Analysis of survey results

The low number of participants and thus the number of actual results were disappointing. Nevertheless, these results were analyzed and considered to be a representation of the surveying practice in the St. Louis metropolitan area. Although the results probably would not stand up under a rigorous academic standard the results are significant. It's important to keep in mind that this project was not intended to determine the most accurate survey possible but to evaluate and compare the results obtained by different surveyor's using their normal everyday procedures.

Analysis of the coordinate values

The instructions for this survey were to provides the state plane coordinates of points 1 and 6. There was no additional description of what was required. The surveyor had the responsibility to determine that he felt was the appropriate coordinate. Of the 14-surveyor's responding one surveyor chose not to provide coordinates at all stating that he did not normally provide coordinates on his surveys. Two surveyors responded with state coordinates in metric units only. Two surveyors responded with coordinates in both metric and English units. Nine surveyors responded with coordinates in English units only. One of the surveyors that provided coordinates in both English and metric units had an error in the conversion between the units.

The Missouri statutes specifically state that the Missouri state plane coordinate system (SPCS) will be reported in metric units. The intent of the statute is to provide a unique coordinate of specific locations unrelated to the dimensions or units of the survey itself. The use of metric coordinates is an additional way to make that apparent. The National Geodetic Survey (NGS) also publishes the coordinates of control stations in metric units. Since all the coordinates in the SPCS are based on the published coordinates of marks in the National Spatial Reference System (NSRS) maintained by in NGS, the metric system is the system to use. Some of the surveyor's made a statement in their reports that they would only publish the coordinates in metric units.

Most of the surveyors returned coordinates that were related to the Missouri Department of Transportation's Real-Time Network (RTN) and tied to NGS control station SL 33. Some surveyors submitted data to the NGS OPUS program and reported that result. The coordinate values reported are based on NAD 83 (2011).

The results of the analysis of coordinates are shown in Table A. The analysis clearly indicates that the average coordinate values obtained for points 1 and 6 are highly consistent. The average of 13 coordinates for Corner 1 was 311,727.762 m +/-4 mm North and 248,714.311 m +/- 22 mm East. The average coordinate for Corner 6 was 311,703.464 m +/- 4 mm North and 248,408.123 m +/-27 mm East. The precision of the average observations, i.e. the uncertainty indicated by the plus minus value, is given at the 68% confidence level. None of the observations were outside of the rejection limits of 3 sigma. The work of the surveyors who participated in this evaluation to determine the coordinate values was well within the accuracy of the network itself. In summary the level of consistency of the coordinate determination was very good. The ability of the surveyor to obtain consistent coordinates is demonstrated by the results of this part of the evaluation.

Analysis of the measured distances.

One of the primary items evaluated in this study is the quality of the measured distances. The measurements are given as ground distances in Table B. According to the Missouri standards, the accuracy of the fieldwork should be reflected in the number of significant figures shown in the measurements. One half of the survey crews reported distances measured to 100th of a foot and the other half reported distances to 1000th

of a foot. The results of this study would indicate that the field work is only accurate to 100th of a foot. Using distance of 1000th of a foot is appropriate for field results but should not be carried forward in the final survey plat and would be misleading to the client.

To evaluate the accuracy of the measurements the 14 measurements for each of the distances was averaged. That average distance is accurate with a standard deviation of .01 ft or less. To be able to state accuracy, a value needed to be measured that would serve as "truth". This was done by a survey conducted by the Missouri Land Survey Program (LSP). The LSP team measured a closed network that included the corners in the study area. The network was then adjusted using least squares with the Star Net Pro program. The average of the distances that was obtained from the observations by participating crews agreed very closely with the solutions obtained from the least squares solution. There were six distances measured and two agreed exactly, two differed by 0.01 ft, one by 0.02 ft and one by 0.03 ft. This analysis shows that the accuracy of the overall measurements was quite good and we consider the averages as a measure of the true value.

In this study we are particularly interested in how the Individual measurements compare between surveyors. When we look at the 14 individual observations of the lines we see a variation. The precision of these measurements is like the standard deviation of the measurements. Table B shows the standard deviation of Length A is +/-0.03 or 1:20,216, Length B is +/-0.04 or 1:3,173, Length C is +/-0.02 or 1:8,259, Length D is 0+/-.02 or 1:6,893, Length E is +/-0.02 or 1:3,944, and Length F is+/- 0.04 or 1:10,896. The old accepted standard for measurements using a steel tape was 1:10,000. The results would indicate that only Length A and F were better than the old taping measurements. The other lengths have accuracies that were below 1:10,000 and they are all less than 200 ft in length.

Another question to consider is how the 84 measurements compare with the current standards. All but one distance measurement is within the tolerance of the Missouri standards. That may say something about the standards and not the measurements. The analysis of the measurements shows that thirteen of the measurements are outside the tolerance of the ALTA/NSPS standards. Interestingly seven of the individual crews had no measurement outside that standards. Of the other seven crews four of them only had one measurement outside the standards. The length measurements in this study indicate good quality work but there is real concern about the lack of adherence to the ALTA/NSPS Land Title Survey Standard.

Analysis of the directions of the lines.

The instructions did not detail how the directions were to be reported so it was up to each individual crew to use their standard procedure. Of the 14 crews reporting six crews used azimuths the remainder used bearings. Each crew used a slightly different basis for their bearing. A comparison of the bearings or azimuth as reported was of no value to this analysis. To make a valid comparison the reported directions were used to compute the included angle at Corners 2, 2.1, 3, and 4. When the angles were computed it was apparent that there was an inconsistency in the angle at Corner 2. The bearing of line 2 to 2.1 reported by crew 10 was consistent with the other reported values but the value reported by crew 10 for line 1 to 2 was approximately 10 minutes different than the other reported values. When the results from crew 10 was used to compute the angle at point 2 that angle stands out as a possible blunder. For that reason, that bearing was rejected.

Table C shows the results of the analysis. The average of all computed interior angles at each point was in good agreement with the corresponding angles computed from the least-squares adjustment. The standard deviation of the average at Corner 2 was+/- 9 sec., at Corner 2.1 it was +/-20 sec., at Corner 3 it was +/-19 sec. and at Corner 4 it was +/- 12 sec. Consequently, we can conclude that the average angle is close to the actual angles.

Even though the average was good there was considerable variation in the reported individual angles. The standard deviation of the angles at Corner 2 was +/- 34 sec., at Corner 2.1 it was +/-1 minute 15 sec., at Corner 3 it was +/-1 minute 10 sec., and at Corner 4 it was +/-44 seconds. This variations in precision of the angles is larger than expected. Relating those variations to linear quantities may be more meaningful. Those variations are equivalent to 1:6,000 at 2, 1:2,750 at 2.1, 1:3,000 at 3 and 1:4,700 at 4. Although there is no actual angular error specification in current standards intuitively one can see that anything less than 1:10,000 is questionable. Whereas the average is fairly accurate the precision of the angle reflects on the method used to obtain the directions of the lines. There was no indication that actual angles were measured by any of the crews. Directions derived by computations over short distances such as those at Corners 2.1 and 3 may account for this lack of precision. These directions may result in some shortcomings in the written description of the property.

Survey Positional Accuracy Check

The surveyor needs to check positional accuracy. A positional accuracy standard is a yardstick by which surveyors can judge the quality of the survey work. One way to check the positional accuracy is to measure the distances between two points in a survey that have not been directly measured in

(continued on next page)

Evaluation of Survey Consistency *(continued)*

the survey. This distance is one that is not usually or easily measured but can be determined indirectly from a precise survey or it can be directly measured as part of the fieldwork to serve as a check. In this project the distance between points 1 and 6 cannot be directly measured because of an intervening building. The survey conducted by the Land Survey Program serves as the source that provides the check on that distance. The network surveyed by LSP was composed of 98 Observations, 11 angles and 11 distances measured with recently calibrated instruments and adjusted by the least squares method in the STAR*NET-PRO program. The quality of the results of the network adjustment have been verified by the comparisons noted previously in this report

The survey positional accuracy of the 13 crews is being evaluated with respect to the published tolerance of the ALTA/NSPS standard at the 95% confidence level and at the 68% confidence level of the Missouri Standards for Property Boundary Surveys.

The following is an analysis of results as shown in Table D. All the distances were converted to grid distances using the combined grid factor from the least squares solution. The positional accuracy is computed by comparing the computed distance between Corners 1 and 6 and the distance resulting from the STAR*NET-PRO adjustment.

According to the Missouri Standards an error that exceeds 0.10 ft would not be acceptable. Of the 13 crews reporting three were not up to the Missouri standards. The other standard in general use is the ALTA/NSPS Land Title Survey standard. The computed accuracy value for this distance is +/-0.06 feet at the 68% confidence level which is +/-0.12 at the 95% confidence level. Of the 13 surveys crews, only 7 meet that much more stringent standard and the other 6 fails. The results of this positional accuracy evaluation show that if this study is representative of work done by Missouri surveyors, additional work should be done to strengthen the quality of their surveys to meet the ALTA/NSPS Land Title Survey standards. Certifying to the ALTA/NSPS standard when the survey is not in compliance with the accuracy standards may incur liability on the surveyor.

Evaluation of the elevations

The instructions for this project did not specify the vertical datum to be used. Each surveyor was able to determine what datum to use. One surveyor (crew 5) used an assumed datum and the others apparently used NAVD 88 orthometric heights based on Station SL 33. One crew reported the heights in reverse. The results are shown in Table E. The difference in elevation was good. The results of the 14 surveys shows that the average difference in elevation between 1 and 6 was 34.09 feet with a standard deviation of less than+/- 0.01 ft. The precision of the 14 observations of the orthometric height at Corner 1 was 0.05 ft and at Corner 6 was 0.06 ft.; none of the observations were outside of the rejection limits. This indicated that the elevation quality was quite acceptable and within the standard tolerance.

Conclusions to be reached from this study

The low number of participants and thus the number of actual results was disappointing. Nevertheless, these results were analyzed and considered to be a representation of the surveying practice in the St. Louis metropolitan area.

The surveyors reported state plane coordinates of points 1 and 6. These coordinates according to Missouri statutes should be in meters, but nine surveyors reported coordinates in English units only. The results of this study clearly show that the average coordinate values obtained for Corners 1 and 6 were extremely consistent. The ability of the surveyor to obtain quality coordinates is demonstrated quite well by the results of this study.

We are particularly interested in comparing the measurements of the distances made by each surveyor. The 14 individual observations of each of the six lines show some normal variation. The standard deviation of the measurements is a measure of the variation. The standard deviation ranges from +/- 0.02 feet to+/- 0.04 feet. Because the lengths of these lines varied from over 500 feet to less than 100 feet we reviewed the accuracy of each line. The accuracy ratio varied from 1 : 20,216 to 1 : 3,944. Only the two longer distances result in accuracy ratios that were better than 1: 10,000 (the normal accuracy of chaining). The average of the 14 observations for each distance agreed closely with the least-squares adjustment provided by the Missouri LSP and in turn shows the high accuracy of the LSP solution.

In this evaluation we computed the included angle at each of the angle points using the reported directions. One crew apparently made a 10-minute blunder in the bearing of the first line and those directions were rejected. The average of all computed interior angles at each corner was in good agreement with the angles computed from the least-squares adjustment. But the variation between the angles themselves left something to be desired. The variation between the angles ranged from 34 seconds to 1 minute and 15 seconds. A variation of more than 21 seconds would indicate poor quality. There is no indication that actual angles were measured by any of the crews. This may show up as a point of controversy in future legal descriptions written using the bearings.

Surveyors need to check the positional accuracy of their survey to see if they are within the accepted standards. In this study the positional accuracy was computed by comparing the computed grid distance between Corners 1 and 6 and the accurate grid distance computed by the least-squares adjustment determined by the LSP. Of the 13 crews reporting three were not up to Missouri standards. Only seven crews met the more stringent standard of the ALTA/NSPS Land Title Survey and six failed that standard altogether. The results of this positional accuracy evaluation indicate that additional work must be done to strengthen the quality of survey work to meet the standards for ALTA/NSPS Land Title Surveys.

The study shows that orthometric heights were adequately obtained. The difference in orthometric height between corners 1 and 6 was consistent and none of the observations were outside the rejection limits. The results show that for normal construction purposes the procedures used by the crews was sufficiently accurate for determining both the difference in elevation and orthometric height's. It is interesting that the city where this property is located requires the elevation to be in the "USGS Datum". The profession has not met its obligation to inform the public of the proper datum being used in the area.

Aside from the actual evaluation of measurements in this study it must be pointed out that there were numerous mistakes of one kind or another that occurred. Some were in the use of terminology as with Missouri state plane coordinates, one with the conversion between metric and English units, one was the possible copying error in recording a bearing, and one was with just a mistake in recording results in the wrong column of the prescribed report form. Mistakes are tolerable and expected in all kinds of work. But it must be clear to all surveyors that errors must be caught by having appropriate redundancy and checking of results before the error shows up as a **mistake** on the resulting survey report. For the surveyor as an expert in measurements to make a **mistake** represents an incompetence that needs to be guarded against in every surveyors practice.

INSTRUCTIONS & TABLES
(continued on page 30)

In Memory of James Charles Wallick, Missouri LS 1853

Jim C. Wallick, age 71, was born January 20, 1947 in Columbus, NE. He was the son of James E. and Pearl (Waldon) Wallick. Jim C. passed away August 4, 2018.

Jim graduated from Trenton High School Class of 1965 and received a Bachelor of Arts degree from Southern Nazarene University in Social Studies. On February 14, 1974, Jim and Beverly Williams were united in marriage. To this union twin boys were born.

Jim received a Public School Teachers Lifetime Certificate from the State of Missouri. Like his father he became a Professional Land Surveyor, working for Engineering Companies, Cities, and State Government. He was a County Surveyor & owned North Missouri Survey Company, retiring in 2013.

He was a loving father and husband. A self-sacrificing Godly Man who loved his family, especially his grandchildren. Jim was a member of The Church of the Nazarene and Missouri Society of Professional Surveyors.

Jim is preceded in death by his parents; and sister Judy Wallick. Survivors include his wife Beverly of the home; two sons, Philip (Amy) Wallick, St. Joseph, and Wes (Laura) Wallick, Stewartsville; sister, Ruth Percefull, Kirksville, and brother, Don (Earlene) Wallick, Ohio; Seven grandchildren, Anthony, Ryan, Grace, Joy, Lincoln, Micah, and Remington.

Funeral services were held Tuesday, August 7, 2018 at Cameron Church of the Nazarene followed by burial in Old School Presbyterian Cemetery of Stewartsville.

Nominees for 2018-2019 Officers

President
Chris Wickern

Chris manages the survey operations for Engineering Surveys & Services Sedalia office.

Humbly serving MSPS and his profession, he does so while celebrating his most important "callings"; "We all have different things we are called to do throughout our lives. My first calling was to marry the love of my life some 43 years ago. This calling naturally lead to being called to be a father and now a grandfather."

He was introduced to surveying by the US Army Field Artillery as an Artillery Surveyor. He served as chainman, instrument operator, recorder and computer - surveying became another calling. He would go on to serve as a Party Chief, a Regimental Chief Surveyor and a Brigade Chief Surveyor. Wickern was also an instructor for the Surveyors Basic Course and later taught basic surveying and legal aspects at a community college in Arizona. In 2016, after several years of discernment and training, he answered a different call and was ordained a deacon of the Catholic Church in the Jefferson City Diocese.

Chris shares, "Surveyors presenting the truth of boundaries is best summed up with the very high regard found in the Bible, Ezekiel Chapter 40: The Man with a Measure. 3 'He brought me there, and there standing in the gateway was a man whose appearance was like bronze! He held in his hand a linen cord and a measuring rod.' This angelic vision given to Ezekiel demonstrates both the historic importance of surveying and the very high regard the public has for our noble profession. One our society continues to work to uphold and enrich."

Chris has been involved with MSPS by chairing and serving on various committee's and is just finishing a year of service as president-elect.

President-Elect
Susanne Daniel

Susanne is co-owner of Daniel Surveying in Ava, Missouri. She has over 20 years of experience in surveying and earned her professional surveying license in 2001. Susanne has studied chemistry and mathematics at Missouri State University and holds a B. S. in Geology degree. Susanne enjoys volleyball, playing flute in her church orchestra and volunteering in lawn care and construction ministries. Susanne and her husband Andy currently reside in Ava, Missouri where he serves as Douglas County Surveyor and she acts as secretary for Ava Chamber of Commerce Economic Development. It is an honor to serve the Society and I remain committed to promoting and advancing our profession.

Vice President
Earl Graham

Earl is the Director of Surveying for Grimes Consulting, Inc., in South St. Louis County. He was licensed in Missouri in 1988 and over his more than 35-year surveying career has earned licenses in five adjoining states as well as Colorado. Beginning with transit and chain methods, Earl has experienced the implementation of the modern EDM, the Electronic Theodolite, the Data Collector, the Total Station, GPS, and VRS networks. Today he leads a surveying department that serves dozens of major commercial and industrial clients and leads surveying efforts for developments across the region. Earl's diverse background includes surveys of large sectional tracts for mining and timber in St. Francois, Madison, Iron, St. Genevieve, and Washington counties, as well as urban surveys throughout Northern Jefferson County, St. Louis County, the City of St. Louis and across the Midwest, including a strong background in urban redevelopment. Earl earned an Associate of Science degree from Mineral Area College and currently resides in Park Hills. He is the current chairman of MSPS State Government Liaison Committee and has twice served as the director of MSPS (MARLS) three different times.

Secretary-Treasurer
Bradley McCloud

Bradley McCloud is a Land Surveyor with the Missouri Department of Conservation, based out of Jefferson City, MO where he is responsible for land boundary surveys and contracts. Prior to this Brad was the Land Survey Coordinator/Photogrammetry Manager for the Missouri Department of Transportation. While in this role he served as the department's expert for photogrammetric compilation and mapping as well as representing the department to the state board of registration, surveyors' society, and the state land surveyor's office. Also, 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. He has a passion for speaking and teaching about surveying and LiDAR and has spoken on the subjects at several forums across the state. Brad and His wife reside in Jefferson City where they are active raising their four children.

Nominees for 2018-2019 Board of Directors

Robert J. 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.

Kirk Baldwin

Kirk Baldwin is a Professional Land Surveyor licensed in Missouri and Kansas. He graduated from the University of Central Missouri in 1991 and began his surveying career shortly after in Forsyth, MO, as a greenhorn rodman and instrument-man. From there, Kirk continued his surveying career in the Kansas City area going from instrument-man to party chief to obtaining his first Professional Land Surveyor license in Missouri in 2001 and then his Kansas license in 2003. Taking a short hiatus from surveying from 2005 to 2005 to work as a conductor and engineer for BNSF Railroad, Kirk returned to the field of land surveying in 2005. Kirk has held several positions which include Vice President of Land Survey for Missouri Valley Engineering and Surveying, Inc., Project Land Surveyor for Engineering Solutions,LLC, Survey Manager for Cook, Flatt and Strobel, P.A. Survey Manager and Field Services Division Leader for TranSystems before landing now at Westwood Professional Services.

As a Survey Project Manager for Westwood in their Kansas City office, Kirk brings over 27 years of experience to Westwood as a professional land surveyor. He is skilled on a wide array of services, including highway corridor surveys, railroad right of way surveys, private land boundary surveys, subdivision layout, construction staking, aerial photo control surveys, ALTA/NSPS Land Title Surveys, and topographic surveys.

Kirk's daily focus is on survey project management, research, proposals, field survey operations, CADD drafting, land boundary determinations, field support, and mentoring.

In his spare time you'll find Kirk attending Division II college football games in Maryville, MO (Go Bearcats), hunting quail, pheasant, turkey and fishing, or you may find him out on his farm breathing in the country air and enjoying general lazy days.

Charles Quinby

Chuck Quinby is from Northeast Ohio and has over 40 years of experience in the field of surveying, Chuck joined the Army as a Field Artillery Surveyor at age 18. He earned an Associate in Arts and a Bachelor of Science from the University of Maryland University College while on active duty. Chuck 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's position while still an E-5. His service included being an instructor of Surveying and Land Navigation as well as a Training Developer. Chuck began his civilian surveying career in Snyder, Oklahoma and has surveyed in Texas, Arkansas, Pennsylvania and 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. Chuck received his license in 2007 and has been surveying in St. Louis, Jefferson and Franklin Counties. Chuck is presently working for Engineering Design Source Inc. in Chesterfield Missouri as Survey Coordinator/Party Chief. Chuck was President of the Saint Louis Chapter of MSPS in 2004 and 2017.

Mark Wiley

Mark Wiley is a Second generation Surveyor who currently manages the Surveying Department for Heideman + Associates Inc. Licensed in Missouri in 1991 he has done course work at St. Louis Community College, Mineral Area Community College, and the University of Missouri Rolla in Surveying related courses. He began his career prior to 1978 working for his father during the summers and on weekends and has continued in this profession ever since. 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.

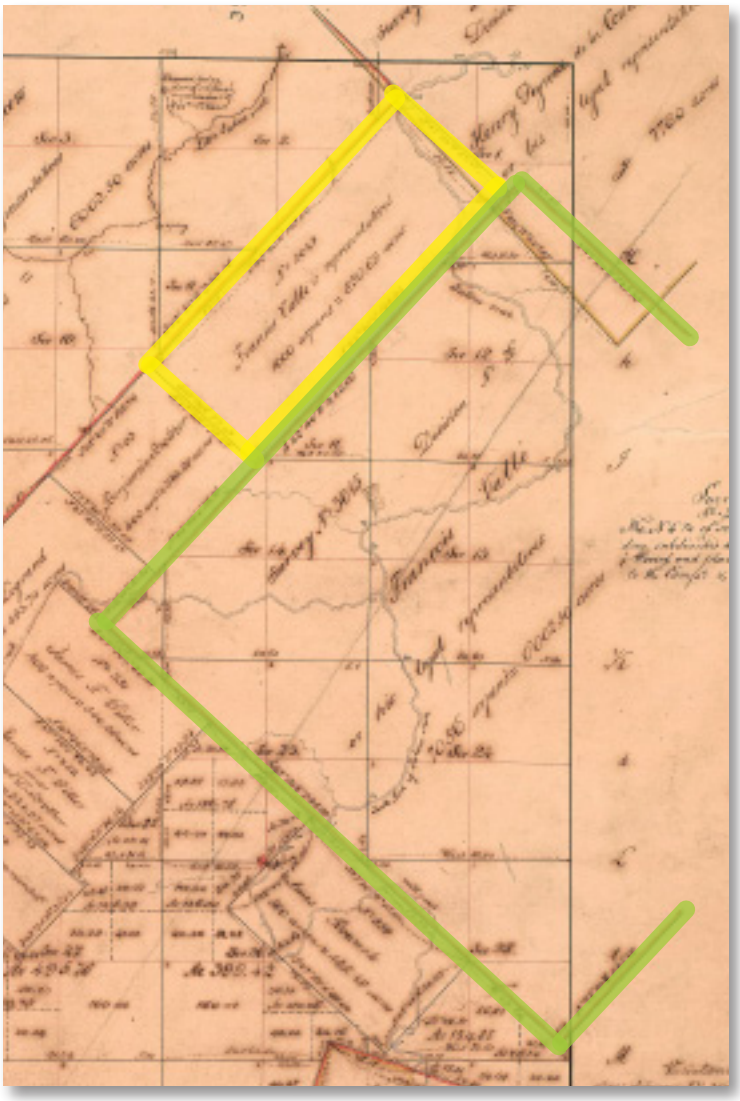
Mark serves the Son Light Parish as a Commissioned Ruling Elder serving the congregations of the Ironton, Fredericktown and Park Hills Presbyterian Church (PCUSA) as spiritual leader. He is also the President of the Belews Creek Watershed Partnership, a group of local folks who are working to make a difference in the Watershed by both cleaning and stabilizing the creek.

Missouri's French Land Grants and Concessions

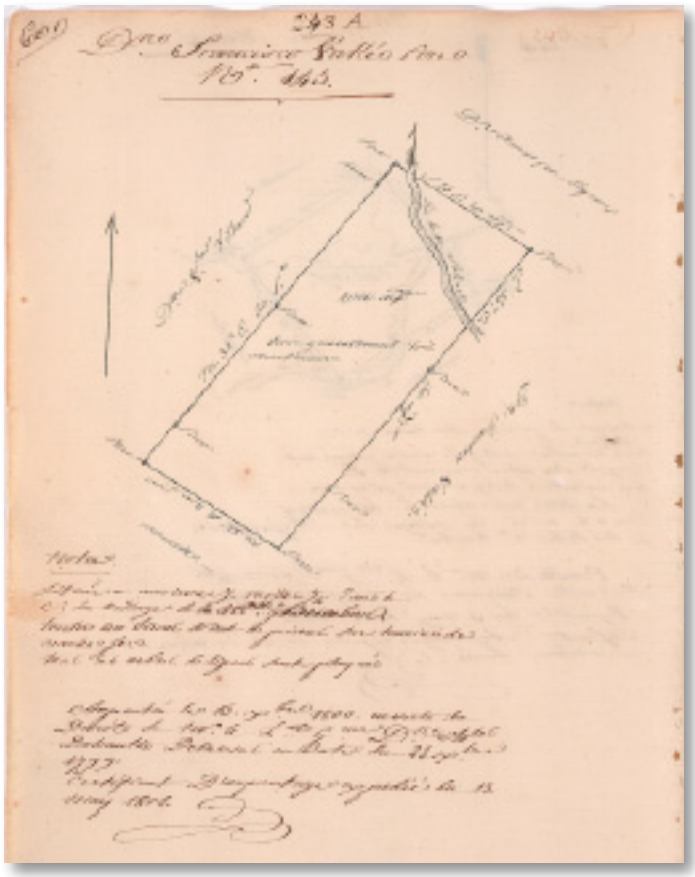
by Gerald Bader

On June 23rd, the Missouri Association of County Surveyors (MACS) held a workshop at Bennet Springs State Park. After a short meeting, the morning session was on the history of Missouri's French Land Grants and Concessions and where/how do these concessions fit into the Rectangular Survey System? From that presentation…

In December 1803 the United States doubled in size with the Louisiana Purchase from France. During the previous ownership by France and Spain land was conveyed. The first grants or concessions were in 1717 by France, mostly along the rivers in the province of Louisiana. Spain took possession in 1770 and in 1800 returned the land to France. The first grant in the upper Louisiana was in 1766. Were these concessions surveyed? The answer is: Yes.



GLO plat for Township 37 North, Range 9 East in Ste. Genevieve County.



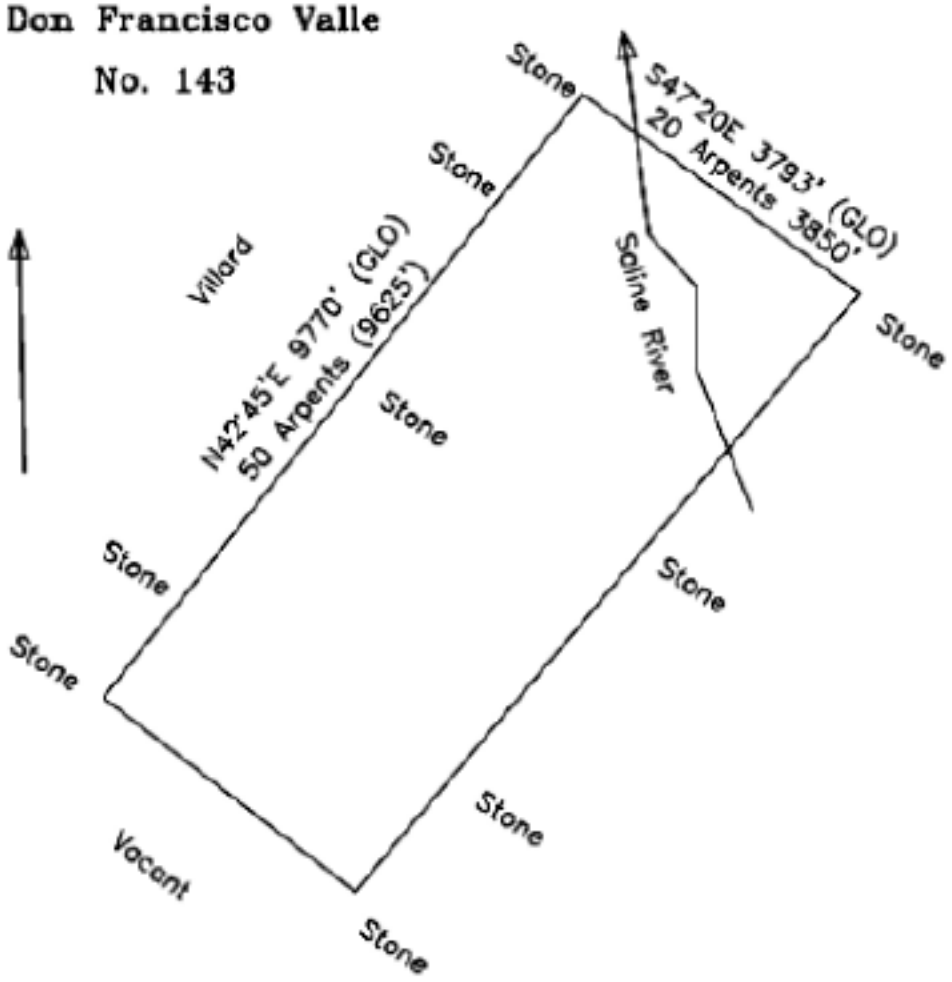
In the center on the right side of the Township is US Survey 2045. Above is the French survey of that Grant.

Below is a the transcription of the French Survey

243A

Don Francisco Valle

No. 143



Note:
situated around 7 miles 1/9 in the
South of New Bourban
All marked boundaries of stone
All trees on line made marked

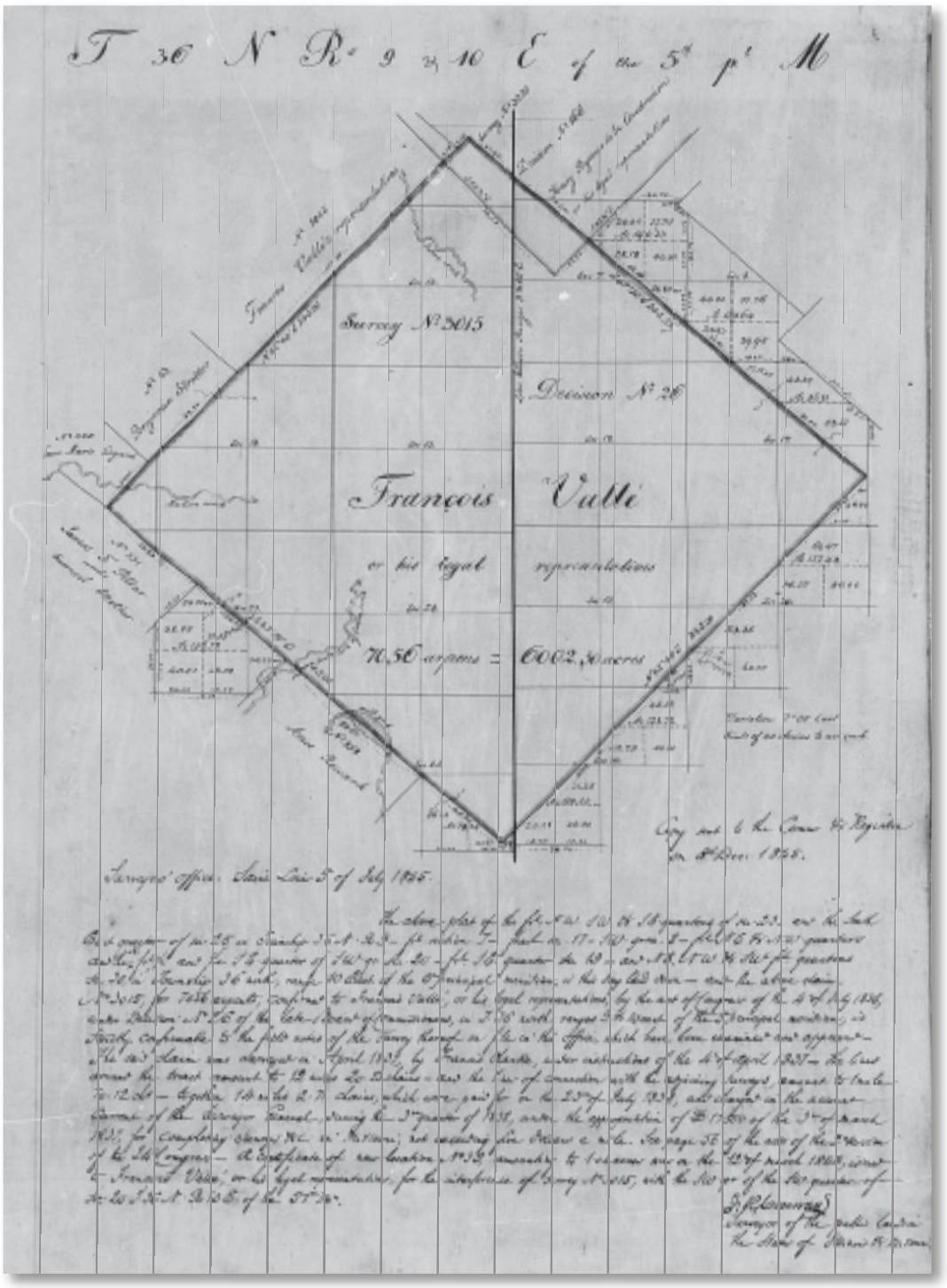
Measured the 15th September 1800 _____ from
decree by Monsieur the Lt. Governor Don Charlers
_____ delassus dated from the 23 Setpember
1799
Certificate of arpentage sent the 13 May 1801

US Survey No. 2045 T-36-N, R-9-E dated 12-9-1818

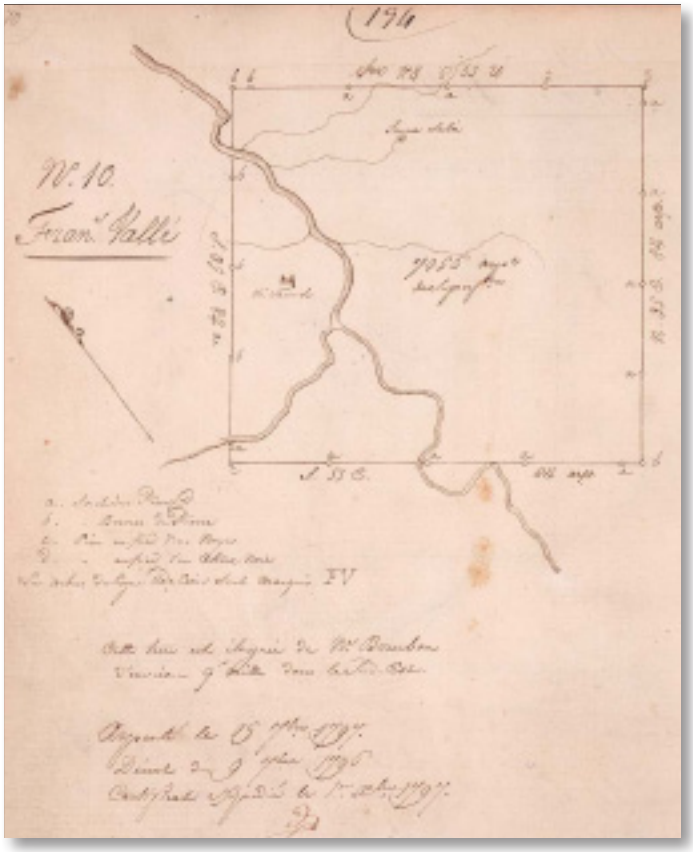
(continued on next page)

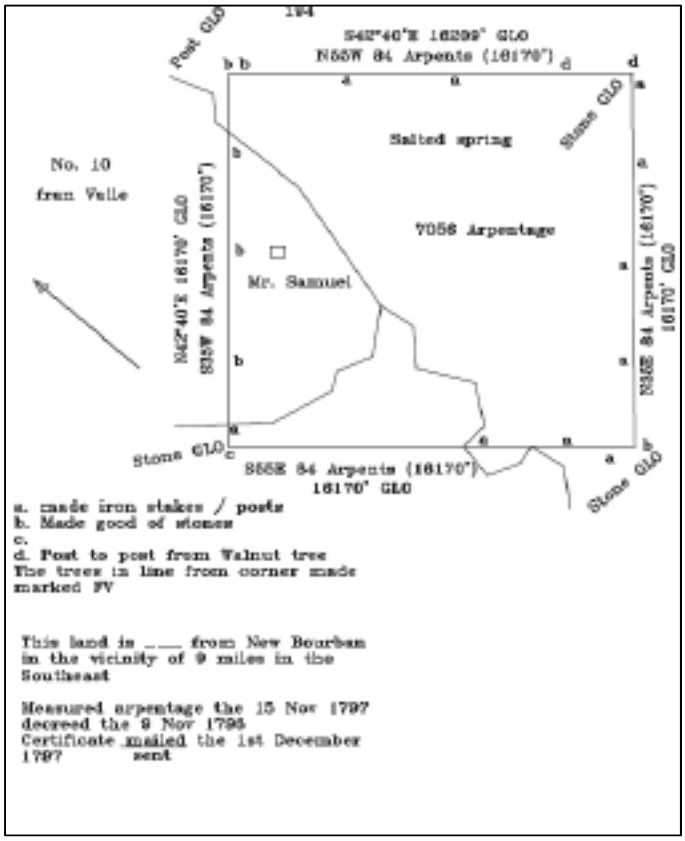
Missouri's French Land Grants and Concessions *(continued)*

Another example: Below is a 6002 acre tract (US Survey No. 3015) in Township 36 North, Ranges 9 and 10 East. Francois Valle was unable to prove ownership at the time of the GLO surveys. However late in 1836 this tract was granted to Mr. Valle and GLO was sent to survey this tract. GLO started the survey at the Northern corner, ran Southwest, then Southeast, Northeast and then Northwest (without a random line for closure); Interesting. On the Southwest side of US Survey 3015 is US Survey 858, which was surveyed in 1818. How did GLO know where to stop the Northeast line of US Survey 858. Were they following the footsteps of the previous Surveyors?



Below is the French Survey of the 7056 arpens and a transcription.





The afternoon session started with a special guest, a visit by a well-known surveyor PK Robbins. Mr. Robbins provided the life and times of PK. Mr. Robbins comes to life at the annual Ste. Genevieve Déjà vu Spirit Reunion held in the Memorial Cemetery. The reunion is held in October. The County Surveyor's donated a stone bench and plaque in honor of PK in 2006.

Following PK, the group proceeded outside to evaluate a mock GLO corner. A good time was had by all! Thanks to Loyd and Connie Todd for all their hard work in organizing and preparing for this workshop.

MSPS President "Duck" Bader as PK Robbins.

References:

GLO plats from the Department of Agriculture, Land Survey Program

French Land Grants from the Missouri State Archives

State Tech's First Ever Statewide Drone Conference

by Joe Paiva

State Technical College of Missouri had a wonderful launch event for what it hopes will be an annual event on its campus in Linn, Mo. of June 1st and 2nd. The event was called "Using Unmanned Airborne Systems (Drones)." It was organized and presented by the Civil Engineering Technology Department at State Tech.
The program featured a morning plenary s
ession on the first day on topics such as, How to Use Drone Data Productively, Impact of Drones on Agriculture, Drones in Surveying and Mapping, Drones in Railway and Other Projects and How to Get into Using Drones. The speakers came from a variety of backgrounds including three Missouri surveyors: Dr. Jim Peterson, Mark Nolte and Steve Kasten. Also featured was a talk on FAA Guidelines by Marvin Moore from the Kansas City FAA office.

The provided lunch period gave the 80 plus attendees an opportunity to also mix with the exhibitors. Ozark Laser and Shoring was a platinum sponsor. Seiler Instrument Company and the Topcon Solutions Store were gold sponsors as well. A total of 10 exhibitors including vendors and several associations including MSPS were present. In addition MSPS was listed as a sponsor of the event. President Gerald Bader represented MSPS in the booth, but many of the attendees were also members.

There were breakout sessions on a variety of topics on the afternoon of the first day and beginning at midmorning on the second day. Sixteen sessions were presented ranging across the board on UAS topics. Some of them included Mine Planning and Operations, Introduction to Land Mapping, FAA Drone Pilot Licensing Process and Choosing the Right Camera.

The highlight on the morning of the second day were live flights at State Tech's airport, which was shut down to manned aircraft flights for the duration. Several vendors were able to demonstrate their aircraft and give lectures on some of the processes they and their aircraft system follow to prepare for flight, fly, and land their aircraft safely.
Crowd reaction was overwhelmingly enthusiastic, with several expressing a desire for more events in the future and comments such as, "Now I kinda know what I'll be getting into with drones," and, "I need to bring some of my associates next time."

Cynthia Cox, Director of Continuing Technical Education at State Tech said, "This conference was an overwhelming success by any measure, we want to thank everyone who came and spoke and attended, and we especially want to thank MSPS for being willingness to sponsor and exhibit."


TOPCON
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NSPS – Proposal to Raise Membership Dues

by Kim H. Leavit

After carefully scrutinizing all of the factors associated with a proposal to raise NSPS membership dues, and hearing from the NSPS Directors who represent the respective state societies, the NSPS Executive Committee is asking for your support of a dues increase of $10 per year. This increase is necessary in order for NSPS to remain fiscally solvent in supporting its projected five-year budget. As with any enterprise, the cost of doing business continues to rise and, in the case of NSPS (and the state societies), revenues are declining due significantly to lower membership levels resulting, in part, from increasing numbers of retiring Surveyors.

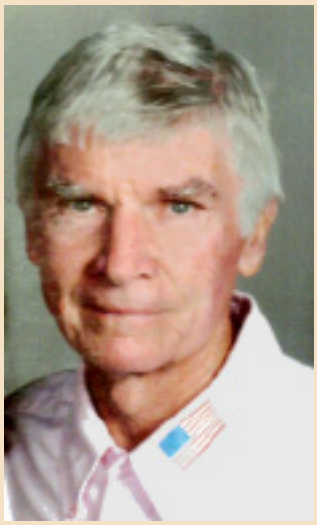
As always, the emphasis of NSPS leadership and staff is to be responsible for each expenditure, and being transparent in doing so. The amount of effort required to represent 17,000 members is daunting, and is not taken lightly. NSPS leadership and members commend the staff for their efforts to manage this task and still remain fiscally responsible. This request itself is a result of the staff looking to the future and watching out for our needs.

The NSPS leadership team also realizes that each state society needs to have its membership ratify this change, and to make requisite changes to its MOU with NSPS. If a dues increase were to be approved now, NSPS really wouldn't see any actual revenue increases for six months to a year.

The NSPS Executive Committee would also like to thank the NSPS Directors for their input and general support for this necessary dues increase. Most ExCom members have been Directors or Governors and realize the anguish associated with asking membership to vote to raise dues. We believe that all NSPS members recognize the importance of a strong national organization supporting the role, and yes survival, of our profession. As you have all witnessed, there are more issues each year requiring our attention and advocacy efforts. With this increase in the number and impact of issues, the support and proactive engagement of all the Surveyors in the nation is essential in all aspects of our profession.

We would also like to encourage Directors and members to identify, and educate, those who are not yet members and stress to them the importance of joining our ranks. We can certainly use more input and ideas. With your continued support we can make this profession that we all love even better than it already is.

In Memory of John G. Parsons, Missouri LS 2150



John Galen Parsons, 75, of Warrensburg, passed away on Tuesday, July 24, 2018, in Kansas City. John was born on June 9, 1943, in Warrensburg, to Arthur John Parsons and Stella (McCoy) Parsons.

John was the owner and operator of Parsons Surveying Co. of Warrensburg for 43 years. He was a member of Jacoby Chapel Presbyterian Church and was renowned for his enjoyment of riding trails with his beloved horses.

John is survived by Marilyn Pullium; sister, Bonita Lambert; and numerous extended family and friends. John was preceded in death by his parents, one brother, and one sister.

Funeral services were be held on Saturday, July 28, at Jacoby Chapel Presbyterian Church, with Pastor Paul Moss officiating. Pallbearers were Jeff Keith, David Franklin, Roger Ellis, Charles Pullium, Max Parsons and Dana Parsons.
Interment at Union Cemetery followed the services.

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Instructions; Evaluation of Survey Consistency *(continued)*

Project for Evaluation of Survey Consistency

Purpose: To compare survey measurements and the reporting of survey information between survey crews in the St. Louis area. This is not a competition but an evaluation of the accuracy of modern survey equipment and common field procedures. The results of individual crews will not be reported but will be kept confidential. The names of the crews will only be used to identify the crews that will be included in the final prize drawing

Procedure: A series of points have been established in an area simulating an actual boundary survey. Survey crews are asked to determine ground distances and directions, state plane coordinates and elevations of selected lines and points. The survey crews are ask to use their normal or standard procedure to make these measurements. It is not intended that the survey crews will use special procedures. They should use the procedures that they would ordinarily use in conducting a survey for a client. For statistical purposes, the final report submitted by each survey crew will also include the estimated field and office time associated with the survey and a general description of the procedure and equipment used. The names of the party chief and crew members must be included in the report but those names will not be used in the comparison of measurements or included in the final analysis of the results. These names will be used in the drawing for a monetary prize.

Results: An analysis of the survey measurements will be made in order to compare the consistency of the measurements. The results will be presented to the membership at a forthcoming St. Louis MSPS chapter meeting and Individual results will be kept confidential. If a participating company would like to have the results of their crew in order to compare it with the overall results that information can be provided, however no individual crews results will be shared publicly.

Incentive: Each crew that submits their measurements in the correct form will be entered into a drawing for a monetary prize. The prize drawing will take place at the meeting where the result of the consistency analysis is presented.

Qualification: Only one entry per survey crew will be allowed and there must be at least 15 crews submitting valid and complete data before the drawing will take place. Participants do not need to be a member of either MSPS or the St Louis Chapter of MSPS.

1

(continued on page 32)

Detailed instructions for the survey crew

The Survey Crew should consider this survey as they would a normal survey that they would execute for a client in this location.

THE SCENARIO: The client is requesting some specific measurements of lines and the bearings of those lines. The client is also going to record the final survey and will therefore need to meet the requirements for state plane coordinates of two of the points called for in the survey. The client is also going to design some streets and sewers that will match existing streets and sewers already in existence. For this reason the surveyor is asked to give elevation data on two specific points in the survey.

The survey crew is to report the data on the attached Survey Results Report Form. The surveyor is also request to give the estimated amount of field time and office time used in developing these measurements. It is important that the survey crew describe the equipment that was used in the survey and the procedure that was used. This information will be utilized to make a comparison in the survey measurements. Survey crew should include all of the basic data which would be necessary to reproduce the survey in the future.

Each survey crew should keep in mind that this survey is taking place on private property with the permission of the owners. But the survey crew should use utmost care not to cause any problems for the tenants using this facility. Survey crews should conduct themselves in a courteous and competent manner. There should be no need to cause traffic to be blocked or delayed while making the surveys and any questions ask by the tenants or clients using these buildings should be answered as clearly as possible by the survey crews.

The **completed survey report must be returned to**;

Robert E. Myers
705 S. Laclede Station Rd Apt 365
Webster Groves MO 63119

Before January 15, 2015

2

(continued on page 34)

eBee

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The **professional mapping** drone

Survey Results Report Form

The name of the Company Performing the Survey-______________________________
Name of Survey Crew Chief ______________________________
Name of Crew Members______________________________
Phone Number______________________________
Email Address______________________________

>>

Survey Crew number (assigned by committee)________________________

Refer to the attached survey diagram (page 14) showing the test survey area.

Length and direction of line between point 1 and point 2 ________________________

Length and direction of line between point 2 and point 2.1 ________________________

Length and direction of the line between point 2.1 and point 3 ________________________

Length and direction of line between point 3 and point 4 ________________________

Direction and length of line between Point 4 and point 5 ________________________

Direction and length of line between Point 5 and Point 6 ________________________

State plane coordinates of Point 1 ________________________,________________________

State plane coordinates of Point 6 ________________________,________________________

Elevation of Point 1 ________________________

Elevation of Point 6 ________________________

Date of the field work ________________________

Time of day of the field Work ________________________

Tables; Evaluation of Survey Consistency *(continued)*

TABLE A				
COORDINATES OF POINTS 1 AND 6				
(MISSOURI COORDINATE SYSTEM OF 1983, EAST ZONE)				
	Coordinate of Point 1		Coordinate of Point 6	
	Northing (meters)	Easting (meters)	Northing (meters)	Easting (meters)
Land Survey Program STAR*NET Result	311727.755	248714.307	311703.456	248408.124
Crew				
5	0.000	0.000	0.000	0.000
1	311,727.765	248,714.297	311,703.460	248,408.118
2	311,727.753	248,714.335	311,703.466	248,408.154
3	311,727.765	248,714.296	311,703.460	248,408.115
4	311,727.763	248,714.299	311,703.470	248,408.108
6	311,727.756	248,714.325	311,703.469	248,408.138
7	311,727.765	248,714.316	311,703.461	248,408.146
8	311,727.764	248,714.269	311,703.463	248,408.082
9	311,727.761	248,714.347	311,703.462	248,408.144
10	311,727.761	248,714.301	311,703.459	248,408.111
11	311,727.764	248,714.298	311,703.472	248,408.124
12	311,727.760	248,714.335	311,703.457	248,408.146
13	311,727.764	248,714.298	311,703.466	248,408.065
14	311,727.765	248,714.332	311,703.465	248,408.143
Standard Deviation of the measurements	0.004	0.022	0.004	0.027
Arithmetic mean	311,727.762	248,714.311	311,703.464	248,408.123
Standard Deviation of the mean	0.001	0.006	0.001	0.007
Average - LSP Value	0.007	0.004	0.008	-0.001
Rev 4/14/2018				

TABLE B																				
Measured Ground Distances in Feet																				
	LENGTH A FROM POINT 1 TO POINT 2			LENGTH B FROM POINT 2 TO POINT 2.1			LENGTH C FROM POINT 2.1 TO POINT 3			LENGTH D FROM POINT 3 TO POINT 4			LENGTH E FROM POINT 4 TO POINT 5			LENGTH F FROM POINT 5 TO POINT 6		
LSP STAR*NET Results (in feet)	506.018			141.570			187.525			156.570			64.452			450.025		
Crew	Distance	Residual		Distance	Residual		Distance	Residual		Distance	Residual		Distance	Residual		Distance	Residual	
1	506.03	0.004		141.31	0.056	**	187.56	-0.040	**	156.35	0.018		64.43	-0.006		449.92	0.075	**
2	506.06	-0.026		141.35	0.016		187.50	0.020		156.36	0.008		64.42	0.004		449.99	0.005	
3	506.01	0.022		141.47	-0.106	*	187.57	-0.054	**	156.32	0.048	**	64.43	-0.009		450.08	-0.087	**
4	506.03	0.004		141.35	0.016	**	187.52	0.000		156.36	0.008		64.43	-0.006		449.99	0.005	
5	506.05	-0.016		141.41	-0.039		187.51	0.012		156.38	-0.008		64.44	-0.015		449.99	0.003	
6	506.05	-0.016		141.36	0.006		187.52	0.000		156.36	0.008		64.43	-0.006		449.99	0.005	
7	506.05	-0.015		141.37	0.000		187.51	0.011		156.38	-0.016		64.43	-0.005		450.02	-0.023	
8	506.05	-0.019		141.36	0.011		187.51	0.006		156.37	-0.004		64.40	0.023		450.04	-0.040	
9	506.03	0.005		141.36	0.008		187.52	0.004		156.35	0.014		64.43	-0.001		450.00	-0.004	
10	506.03	0.004		141.37	-0.004		187.52	0.000		156.40	-0.032		64.45	-0.026		450.03	-0.035	
11	506.05	-0.018		141.28	0.087	**	187.52	-0.001		156.39	-0.025		64.42	0.006		449.97	0.026	
12	506.03	0.004		141.38	-0.014		187.52	0.000		156.37	-0.002		64.39	0.034		449.93	0.065	**
13	506.04	-0.001		141.40	-0.037	**	187.48	0.037	**	156.38	-0.009		64.41	0.019		449.98	0.020	
14	505.96	0.074	**	141.36	0.006		187.51	0.010		156.37	-0.002		64.44	-0.016		450.01	-0.015	
Standard Deviation of the measurements	0.03			0.04			0.02			0.02			0.02			0.04		
Precision	1:20,216 (±50 ppm)			1:3,173 (±315 ppm)			1:8,260 (±120 ppm)			1:6,884 (±145 ppm)			1:3,954 (±255 ppm)			1:10,896 (±90 ppm)		
Arithmetic mean	506.03			141.37			187.52			156.37			64.42			450.00		
Standard Deviation of the mean	0.007			0.012			0.006			0.005			0.004			0.011		
Precision	1:75,641 (±15 ppm)			1:11,871 (±85 ppm)			1:30,908 (±30 ppm)			1:25,795 (±40 ppm)			1:14,757 (±70 ppm)			1:40,768 (±25 ppm)		
* Exceeds Missouri Standard and ALTA/NSPS Standard																				
** Exceeds ALTA/NSPS Standard																				
Residual: the difference between the distance measurement and the arithmetic mean.																				

(continued on page 37)

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Tables; Evaluation of Survey Consistency *(continued)*

TABLE C

INTERIOR ANGLES

(ANGLE RIGHT)	AT POINT 3	AT POINT 2.1	AT POINT 3	AT POINT 4	AT POINT 5
LSP STAR*NET	154° 59' 33"	205° 17' 17"	81° 54' 36"	266° 48' 25"	89° 02' 17"
Crew					
1	154° 59' 42"	205° 17' 06"	81° 54' 34"	266° 47' 06"	89° 03' 29"
2	154° 59' 37"	205° 17' 29"	81° 53' 57"	266° 47' 53"	89° 03' 40"
3	155° 00' 06"	205° 17' 42"	81° 53' 40"	266° 47' 35"	89° 03' 15"
4	154° 59' 55"	205° 16' 51"	81° 54' 58"	266° 48' 39"	89° 02' 42"
5	154° 59' 53"	205° 17' 28"	81° 54' 02"	266° 48' 34"	89° 02' 30"
6	154° 59' 36"	205° 17' 35"	81° 54' 15"	266° 48' 01"	89° 02' 59"
7	155° 00' 07"	205° 17' 12"	81° 55' 12"	266° 48' 03"	89° 02' 00"
8	155° 00' 08"	205° 16' 20"	81° 55' 06"	266° 48' 52"	89° 02' 00"
9	154° 59' 55"	205° 17' 20"	81° 54' 24"	266° 49' 34"	89° 01' 18"
10	(OMITTED)	205° 17' 31"	81° 54' 02"	266° 48' 31"	89° 02' 03"
11	155° 01' 46"	205° 12' 51"	81° 58' 16"	266° 48' 20"	89° 00' 42"
12	155° 00' 22"	205° 17' 4"	81° 55' 02"	266° 48' 06"	89° 01' 45"
13	155° 00' 07"	205° 17' 49"	81° 54' 50"	266° 47' 03"	89° 03' 16"
Arithmetic mean	155° 00' 06"	205° 16' 58"	81° 54' 41"	266° 48' 16"	89° 02' 24"
Standard Deviation	0° 00' 33"	0° 01' 15"	0° 01' 10"	0° 00' 32"	0° 00' 44"
Standard Deviation of the mean	0° 00' 33"	0° 00' 20"	0° 00' 19"	0° 00' 12"	0° 00' 20"

TABLE D

SURVEY ACCURACY CHECK

THE ACCURATE GRID DISTANCE* IS 1007.70 ft.

				Missouri Standards**	ALTA/NSPS Land Title Standards***
CALCULATED MAXIMUM ALLOWABLE				0.10'	0.06' (2cm)
RELATIVE POSITIONAL PRECISION OF GRID DISTANCE 1 TO 6				1:10,077 (±100ppm)	1:17,379 (±58ppm)
Crew	(Feet)	ERROR (in Feet)	Precision		
1	1007.592	-0.10	1:9,820 (±100 ppm)	Fail	Fail
2	1007.688	-0.01	1:147,559 (±07 ppm)		
3	1007.808	0.11	1:8,957 (±112 ppm)	Fail	Fail
4	1007.763	0.07	1:14,718 (±70 ppm)		Fail
5	1007.739	0.04	1:22,974 (±44 ppm)		
6	1007.700	0.01	1:187,574 (±05 ppm)		
7	1007.754	0.06	1:17,211 (±58 ppm)		Fail
8	1007.710	0.02	1:65,056 (±15 ppm)		
9	1007.671	-0.02	1:42,248 (±24 ppm)		
11	1007.680	-0.02	1:66,134 (±15 ppm)		
12	1007.639	-0.06	1:17,995 (±56 ppm)		
13	1007.767	0.07	1:13,985 (±70 ppm)		Fail
14	1007.519	-0.18	1:5,715 (±175 ppm)	Fail	Fail

* The Accuarate Grid Distance from Point 1 to Point 6 taken from the LSP Detail Survey and Adjustment by STAR*NET

** The Missouri Standards are set at a 1-Sigma (68%) Confidence Level .

*** The ALTA/NSPS Standards at set at a 2-Sigma (95%) Confidence Level.

(Crew 10's data was rejected and eliminated from these results.)

(continued on next page)

Tables; Evaluation of Survey Consistency *(continued)*

TABLE E						
ELEVATION DATA						
	Elevation of Point 1		Elevation of Point 6		Difference	
LSP STAR*NET Result	598.09		564.00		34.09	
		Avg- Mea				
Crew		Star*net - Mea		Star*net - Mea		
5	100.00		65.88		34.12	
1	597.99	0.10	565.89	0.11	34.11	
2	597.96	0.13	563.85	0.15	34.11	
3	597.98	0.11	563.86	0.14	34.12	
4	598.04	0.06	563.95	0.05	34.09	
6	597.96	0.13	563.86	0.14	34.10	
7	598.08	0.01	563.96	0.04	34.12	
8	598.00	0.09	563.87	0.13	34.13	
9	598.05	0.05	563.94	0.06	34.11	Reversed
10	598.01	0.08	563.94	0.06	34.07	
11	598.07	0.02	564.00	0.00	34.07	
12	598.06	0.03	563.93	0.07	34.13	
13	598.08	0.01	563.95	0.05	34.13	
14	598.16	-0.06	564.09	-0.09	34.07	
Arithmetic mean	598.03	0.06	563.93	0.07	34.10	
Standard Deviation	0.05		0.06		0.02	

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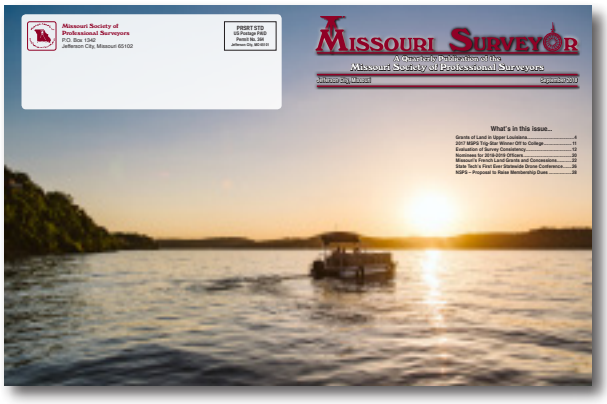

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