

MISSOURI SURVEYOR

A Quarterly Publication of the
Missouri Society of Professional Surveyors

Jefferson City, Missouri

March 2017



CALENDAR OF EVENTS

2017

April 27-29, 2017

Board Meeting, Golf Tournament and
39th Annual Spring Workshop
Lake Ozark, MO

July 15, 2017

Board Meeting
Jefferson City, MO

August 23-25, 2017

Review Course
Jefferson City, MO

October 19-21, 2017

60th Annual Meeting and Convention
Ramada Plaza Hotel & Oasis
Convention Center, Joplin, MO

December 2, 2017

Board Meeting
Jefferson City, MO

2018

May 3-5, 2018

Board Meeting, Golf Tournament and
40th Annual Spring Workshop
Lodge of Four Seasons
Lake Ozark, MO

October 3-6, 2018

61st Annual Meeting and Convention
Tan-Tar-A Resort
Osage Beach, MO

Donald R. Martin, Editor



Notes from the Editor's Desk

Donald R. Martin



Welcome readers to the March 2017 Edition of *Missouri Surveyor*, or as my ol' pard Tripod the three legged groundhog thinks of it, the edition reporting on the year's biggest Holiday – Groundhog Day! Not only a shadow spotting festival it is quite the social event in the world of land beavers as they meet and greet after napping away the winter. This year 'bout half of the woodchucks climbed out wearing red ball caps while the other half had donned black ski masks. They was all a fussin' as the mad red hatters began gathering stones and sticks to build a protective perimeter and the masked *marmota anonymus* (thank you Roadrunner!) would pick'em up for throwin' and a burnin'! With that, I was ready for the season to pass and get on with editing. So as the protestors pout and the pundits pontificate and the politicians parade and the People ponder, let's pray for peace.

First up is Joe Clayton's *President's Message* reporting all of the MSPS business, previewing the Spring Workshop and sharing a bit of humor. The Prez is followed by Knud Hermansen's *Affording a Surveying Education*. The good professor from the University of Maine knows how and shares the news. Next is masterpiece of research from MSPS member Steve Weible writing about Missouri's early surveys and the practice by some of panning their work out to others in *GLO Sub-Contractors, Sub-Deputies and Assistant Surveyors*. Not only a history based treatise on such instances, he offers solid advice with tips for re-tracers. Steve's work is followed by *Successful projects begin with a quality survey, and that begins with a complete, defined scope of work* by Massachusetts surveyor Scott L'Italien. I suggest readers consider what this surveyor has done; he reached out beyond our profession to write for real estate professionals. The best outreach for our profession as a whole is the individual LS speaking with authority and insight to those beyond our ranks. Next comes items from NSPS and its *Workforce Development* initiative. First is a letter provided by the Oklahoma Society of Professional Surveyors and the Oklahoma licensing board developed as part of their campaign addressing the future of Survey education. This is followed by "the numbers" from a NSPS poll reporting LS *demographics*. Then we present the sad new of surveyors we have known and loved passing away. I called it sad, but these are offered not in sorrow but in celebration of these cherished friends and their contributions.

Marc Cheves, Editor of *American Surveyor* was kind enough to share a great article from his recent edition, *Surveying & Mapping Industry Economics* by Lee Lovell, PS of Colorado. Offering helpful information and statistics, Lee also serves-up good advice such as "...the difference between a poorly run business and a well-run business is sound business practices..." The business news from our Colorado surveyor is followed by qualification news from the world of drones. Gary Mortimer of *sUAS News* allowed a republishing of his *Jack of all trades, some inconvenient drone truths*. It is a good report about a subject surveyors know too well; profession encroachment by unqualified service providers. *News from the National Geodetic Survey* follows as well as a brief from their report *Rich Rewards from NOAA's CORS and GRAV-D Programs*. This brief spreads the word of the \$2.4 billion (with a "B") in potential annual benefits to the U.S. economy derived from the National Spatial Reference System.

The newsletter starts wrapping-up when you come to a reminder, *Be a Magazine Cover Model or News Maker!* Send us your stories and photos. Special thanks to the MoDOT surveyors of Stephen Jantosik, Matthew Schultheiss and Edward Stannard for their photos on and in this edition. With that, I best break-it-down and bunch-it-up so I can start getting ready for the June Edition ...I'll get back with ya' then... 🇺🇸

Donald

THE MISSOURI SURVEYOR

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The Missouri Surveyor is published quarterly by the Missouri Society of Professional Surveyors, to inform land surveyors and related professions, government officials, educational institutions, contractors, suppliers and associated businesses and industries about land surveying affairs. Articles or opinions appearing in this publication do not necessarily reflect the viewpoints of MSPS but are published as a service to its members, the general public and for the betterment of the surveying profession. No responsibility is assumed for errors, misquotes or deletions as to its contents. Articles may be reprinted with due credit given.

President's Message

Joe Clayton, PLS



Spring has to be my favorite season! It's always filled with the gift of renewed life and longer days following the long dark months of winter. Cast away the fog of cabin fever and enjoy the outdoor beauty of a Missouri spring, it'll keep you young! I hope a steady flow of work has found its way to your business. MSPS members have been busy at work and with the business of preparing for our upcoming events and the legislative season.

The MSPS Spring Workshop, April 27-29 at the Lodge of Four Seasons looks to be a good one. Our sessions will feature Jeffery Lucas and John Matonich. Mr. Lucas always makes for a good spirited discussion as does John. Agree with him or not, Lucas will make you think; if nothing else but about how to argue your point of view. Engagement and challenging one's own opinions are needed steps to being a practicing professional, thus the word *practice!* The thankless task of putting together this program fell to our continuing education leader, Dan Govero. Thanks Dan; putting together our programs is like cooking a dinner for a big group; plenty of advice on what to add to the dish, but little help cooking the meal!

The History and Public Relations Committees have submitted an entry in the NSPS Public Relations Award for 2016. We put together a nine page brief citing our Osage Treaty Line Bicentennial Celebration, Initiative and Bounty Program. The winner is to be announced at this year's NSPS national conference in Maryland during the week of March 12th.

Our Board of Directors and Nominating Committee have completed the two step process by which we choose people to be named to the Land Survey Division of the Board of Registration. This list is submitted in an advisory capacity in letter form to the Governor. The Land Survey Division of the board is filled with excellent folks who continue to serve well past their appointed terms, but they are having to serve until relieved! We all commend the service of the incumbents and submit to the Governor our nominees; James Anderson of Lee's Summit, Jerrod Hogan of Joplin, Mark Nolte of Higginsville and Ralph Riggs of West Plains.

Speaking of the Governor, our state's new Executive and 99th General Assembly are moving toward less regulation. The Governor's Executive Order 17-03 temporally suspends all rule making. This may slow our efforts to enact any changes to our minimum standards or open any considerations of changes to Chapter 327. Rest assured our Legislative team will stay atop developments. In the meantime, our Legislative Committee continues to work with the Missouri Bar and County Recorders Association on legislation related to deed writing.

I'll close by sharing a light-hearted tale of humor starting a day of smiles during a recent survey team meeting. The guys were giving our future PLS, Trevor Byrd a hard time about the smell of his truck. Seems he'd been scanning a local poultry plant and that odor had permeated his truck. He quickly let it be known the smell wasn't the worst part of working at the plant. "I don't mind the smell," he said, "but I sh#@*t you not there are chicken innards raining from the skies! Gulls fighting over chicken parts in mid-air drop pieces; their falling all over! I even had a drum stick on my windshield! It may be Colonel Sander's dream come true, but I'll be glad to finish that one!"

Ours is a serious business, but find humor in your day and enjoy yourself at work! People don't always remember what you say, but they'll always remember how you made them feel! Be safe and I'll see you at the Spring Workshop! 🇺🇸

Joe!

Affording a Surveying Education

by Knud E. Hermansen, P.L.S., P.E., Ph.D., Esq.

I am a faculty member in the surveying program at the University of Maine and a parent of three college educated children. I am often asked, mostly by parents, what financial aid is available for their children. I will share the guidance I provide on the subject of how to afford a quality four-year surveying education.

Apply for Surveying Scholarships —Almost every state surveying society has scholarships available for aspiring surveyors. National professional societies such as the National Society of Professional Surveyors have scholarships available to students (<http://www.nsp.us.com/?page=Scholarships>). Scholarship committee members often lament how few scholarship applications they receive. The fact is that a majority of surveying students do not apply for the numerous surveying scholarships that are available.

In order to encourage students to apply for scholarships, I will often suggest to students that the hour or two that may be required to prepare a complete and quality application will often garner some of the best hourly pay the student will ever earn. To obtain a \$2,000 scholarship for two hours of effort is equivalent to \$1,000 per hour.

My advice is usually ignored. (I suspect if the parents heard my advice, more scholarship applications would be forthcoming from their children.) Accordingly, those students that do apply for a scholarship have an excellent chance to obtain a scholarship. The odds of receiving a scholarship are much better than any lottery.

Apply for Work Related Scholarships — Many employers offer scholarships to employees. In the past, the Bureau of Land Management (BLM) provided educational funding for

students that worked for the BLM as summer survey interns. Several private surveying firms often provide scholarships to summer interns upon their return to college after working for the firm during the summer so long as there is a commitment to work for the firm in the future.

The most notable work related scholarships available to employees are National Guard and military reserve scholarships. Serving one weekend a month and two weeks a year will often provide a student with full tuition toward a four-year degree.

Apply for General Scholarships — Numerous colleges offer general scholarships to students. Scholarships are often available to students that are in certain disciplines, the residents of certain towns, members of certain minority ethnic groups, or have achieved notable academic standards.

Community College — Students can save considerable tuition expense by attending a community college. Tuition is often considerably less at community colleges when compared to the tuition for similar courses at a four-year university. Students should be encouraged to take as many credits as possible at a community college.

Mathematics, English, speech, physics, and many other general subject classes can be taken at a community college. These courses will usually transfer to a four-year surveying program. If there is some doubt, check on transfer credits at the four-year program before taking the course at a community college.

Students that are intending to embark on a surveying career should consider getting an associate degree in surveying at a community college before transferring to a four year



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surveying degree program. In the alternative, the student can take almost all their general course work at a community college and take the engineering and surveying courses at a four-year college in order to complete a degree requirement leading to a bachelor of science degree in surveying.

Advice to My Children — While I have given this advice to many students and parents, parents are curious and have asked me what advice I gave to my own children. How did I handle financing my children's education? My advice to my three children was simple and direct. They could go to any college they could afford.

I see so many young students enroll in university programs that have very little future for employment (not so in surveying). Students enrolled in majors without future employment prospects will pile up debt with little hope for paying off the student loans in a reasonable period, if at all. At least half of the students at the campus where I teach would have a much brighter economic future and more rewarding career had they gone to a technical school and learned a trade rather than attend a university where they majored in, for example, Medieval Literature.

To further compound their future financial difficulty, many students attend expensive private colleges where

the students enroll in majors with little prospect for future employment.

My advice and opinions were communicated to my three children. My daughter and son became engineers. My youngest son is a nurse. All are gainfully employed without student loan debt. Two financed their education with Army scholarships. One financed her electrical engineering education with a merit scholarship that covered all four years of her education.

In closing, you might ask how I funded my own education. I used the G.I. Bill (Marine Corp veteran). I followed the advice I gave. I earned a two-year degree before transferring to a four-year program. My graduate degrees were funded by my employment as a teaching assistant. I will also give credit to my wife who also worked to support the family while I attended college.

I hope this advice helps prospective students and parents. We need more surveying students. In 2016, surveying graduates had at least three employment offers each. Surveying is a great major and rewarding career. Encourage more students to enroll in a surveying program and give the prospective students and parents my advice. 🇺🇸

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GLO Sub-Contractors, Sub-Deputies and Assistant Surveyors

by Steven E. Weible, PLS, December 2016

“Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, That a surveyor of the lands of the United States in the territories of Illinois and Missouri shall be appointed, whose duty it shall be to engage a sufficient number of skilful surveyors as his deputies, and to cause so much of the land above-mentioned, as the President of the United States shall direct, and to which the titles of the Indian tribes have been extinguished, to be surveyed and divided in the manner, and to do and perform all such other acts in relation to such lands, as the surveyor general is authorized and directed to do, in relation to the same, or the lands lying north-west of the river Ohio ...” (The Act of April 29, 1816, chapter 151, *An Act to provide for the appointment of a surveyor of the public lands in the territories of Illinois and Missouri*, U. S. Statutes at Large, Volume 3, page 325.)

Following the passage of the Act of April 29, 1816, chapter 151, William Rector was elevated from Principal Deputy Surveyor to the position of Surveyor of the Public Lands of the United States (a.k.a. Surveyor General) in the territories of Missouri and Illinois. As such, he set about the task of engaging surveyors as his deputies to lay off and mark the public lands into townships, subdividing them into sections, while also delineating the confirmed private claims. Deputy Surveyors were contracted and detailed instructions were provided as to how the work was to proceed and the lines and corners were to be marked. The prevailing presumption of the Act of Congress was that the Deputy Surveyor under contract would personally perform the work and insure that the specifications had been met. This was not always the case, however, during the period from 1816 to 1823 of William Rector’s tenure as Surveyor General.

In some cases the contractor took responsibility for the fulfillment of the contract, but did not personally participate in the work. The contractor may have employed several crews or “companies” of workers and split the contracted work between them. Each crew typically included an “assistant surveyor,” two chain carriers, an axe man and a camp keeper. Depending upon the contractor, the rate for an “assistant surveyor” may range from 40 cents per mile to 50 cents per mile. Chain carriers might be paid as much as \$25 per month, while the others may be paid from \$15 to \$20 per month. The contracted rate for the Deputy Surveyor

was \$3 per mile or part of a mile that was actually run and marked, not including random lines and offsets. The contractor fronted the money to provide the equipment and pay the expenses of the operation and the wages of those employed with the expectation of a profit at the successful completion of the contract.

This practice came under scrutiny in 1823 when William Rector was being considered for reappointment as Surveyor of the public lands in the states of Missouri and Illinois and the territory of Arkansas. U.S. Senator from Missouri, David Barton, took it upon himself to ensure that Rector was not reappointed by providing to the President of the United States information about this practice of “sub-contracting.”

Barton capitalized on a pending Chancery case in the St. Louis Circuit Court, James Trimble vs. Elias Barcroft and William Rector, to take depositions concerning this general practice of “sub-contracting.” James Trimble had served as a “sub-contractor” to Charles McPherson. McPherson, apparently, had died before Trimble was paid, so the object of the suit was to obtain the payment of wages that Trimble was owed. William Rector was named a defendant as the contracting agent of the United States Government and Elias Barcroft as McPherson’s administrator (720/3273A1, pages 271-281).

Richard T. Holliday stated in a deposition taken on July 18, 1823 that he had never had a surveying contract of his own, but that he had always surveyed as a “sub-deputy.” In the summer of 1821 he was employed as a sub-deputy surveyor by Thomas and Stephen Rector (both brothers of William Rector) at the rate of 50 cents per mile. He worked in Illinois on a contract involving 130 or 140 townships, of which he surveyed thirteen or fourteen townships. There were eight other sub-deputies working on the same contract under Thomas and Stephen Rector. Thomas Rector worked with the sub-deputies for a few days, but left the field before the work was completed. As far as Mr. Holliday knew, Stephen Rector did not go to the field to survey any part of his contract. In 1822 Mr. Holliday contracted with Whorton Rector (another brother of William Rector) to survey twenty townships for Elias Rector (also a brother of William Rector) at the rate of forty cents per mile. Elias Rector, who was the Postmaster in Saint Louis at the time, did not do any part

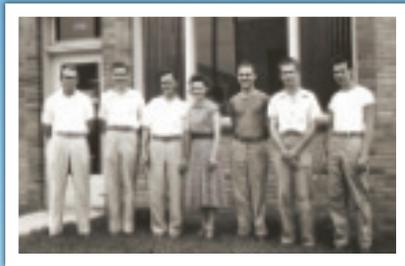
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GLO Sub-Contractors, Sub-Deputies and Assistant Surveyors (continued)

of the work. Mr. Holliday further stated that in each case the field notes were taken in his own handwriting and that he returned them to the Surveyor General's office. The contractor then signed the certificates of survey, certifying that the work was done in accordance with the instructions (720/3270B1, pages 234-236).

Daniel Miller stated in a deposition taken on July 18, 1823 that in 1822 and 1823 he had surveyed about nine hundred and eighty-one miles at the rate of 45 cents per mile and about nine hundred ninety-two miles at the rate of 50 cents per mile under the contract of Thomas C. Rector for forty townships. He also noted that Bartlett Simms performed the work for Elias Rector in 1820 for a contract of sixteen or seventeen townships. Surveyor General William Rector remarked to Miller that Bartlett Simms was a stout strong man, able to undergo fatigue, and that he was a good surveyor, having done much surveying for Colonel William H. Ashley (720/3270B4, pages 237-240).

Stephen W. Miles stated in a deposition taken on July 18, 1823 that in 1821 and 1822 he had surveyed about three hundred miles at the rate of 50 cents per mile under the contract of Henry W. Conway (a nephew of William Rector) for about seventy townships in Arkansas. At the same time there were five other companies at work under the same contract. Miles did not believe that Henry W. Conway had done any part of the work, because Conway was the Receiver of public monies in Arkansas at the time and was engaged with the sales of public lands. Miles recorded the field notes in his own handwriting, but did not sign the certificates of survey. In 1822 Miles surveyed part of a contract for forty townships in Arkansas for Henry W. Conway and James S. Conway (brother to Henry and nephew of William Rector). Under that contract there were three companies performing the work. Neither Henry nor James Conway were believed to have done any of the work, but they, nonetheless, signed the certificates of survey. Miles commented that at the time of his deposition a Mr. Rauls was surveying ten townships at the rate of forty dollars per month under the contract of Mr. January, the brother-in-law of William Rector. Mr. January had informed Miles that he was not acquainted with surveying and wanted to go with someone who understood it until he had learned enough to do it himself (720/3271A2, pages 241-244).

Edward Browne, a clerk in the Surveyor General's office, stated in his deposition on July 18, 1823 that it had been a pretty general practice since and during the year 1819 to have the surveys of the public lands done by way of sub-contracts. The field notes were generally returned in the handwriting of the actual surveyor and the plats were certified by the original contractor. The contractor received payment for the work and the sub-contractor was scarcely ever known in the office. He listed the following contracts entered into in the year 1822:

40 townships	Henry W. Conway & James S. Conway
40 townships	Thomas C. Rector
20 townships	Elias Rector
13 townships	Stephen Rector
20 townships	Whorton Rector
14 townships	William S. Hamilton & Elias Rector, Jr.
13 townships	Lucius & Thomas Thruston
10 townships	Joseph Barton
13 townships	Elias Barcroft
15 townships	Enoch Steen
11 townships	Angus L. Langham
10 townships	William H. Ashley
5 townships	John Jones
5 townships	Samuel P. Browne
5 townships	John L. Robertson

Browne noted that William S. Hamilton & Elias Rector, Jr. and John L. Robertson surveyed their contracts themselves and John Jones and Samuel P. Browne did part of theirs. All of the rest of the contracts were believed to have been surveyed by sub-contractors (720/3271A4, pages 245-246).

Benjamin Fort stated in a deposition taken on July 18, 1823 that he had been employed in Arkansas in 1815 and in Illinois in 1816. In both cases he acted as a hand for Thomas Cox from Illinois, the original contractor. In Illinois Cox ran all of the exterior lines except one township and left the balance for Fort to do, but Fort was unable to finish, because his chain was taken by Indians. In that employment Fort was paid forty dollars per month by Cox. In 1818 Fort worked as a hand under the contract of Joseph Barton, brother-in-law of William Rector. A Mr. Powell was in charge of the fieldwork, but hurt his foot, leaving Fort to finish most of the contracted work. He was paid twenty dollars per

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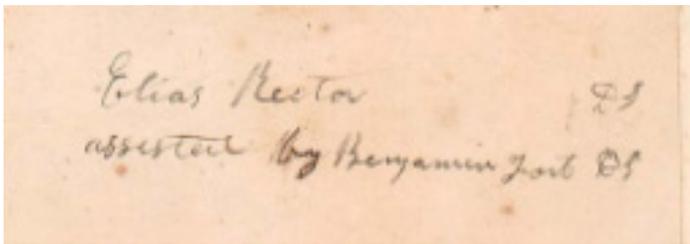


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GLO Sub-Contractors, Sub-Deputies and Assistant Surveyors (continued)

A photograph of a handwritten document on aged, yellowish paper. The text is written in cursive ink. The first line reads "Elias Rector" and the second line reads "assisted by Benjamin Fort D.S.". There are some faint markings and numbers to the right of the text, possibly "83" and "85".

"E. Rector D. S. assisted by Benjamin Fort D.S." Signature on Township plat for Township 35 North, Range 3 West of the Fifth Principal Meridian, dated July 15, 1823, under the contract of Elias Rector of the 18th of March 1821.

month by Joseph Barton. In 1818 or 1819 Fort was again employed by Joseph Barton at the rate of 25 dollars per month on a contract for nine townships up the Missouri River. Mr. Powell did the work, when he was able, and left the rest to Fort. Joseph Barton traveled to where the survey commenced and stayed a few days, but then returned home. Fort was later employed as a hand by Thomas C. Rector. In this instance a Mr. Rowland was in charge of the work. Fort then surveyed about eight townships in Illinois as a sub-deputy at the rate of 40 or 45 dollars per month for Stephen Rector. Next Fort surveyed twelve townships for Stephen Rector on the waters of the Lamine at the rate of 40 dollars per month. He did not believe that Stephen Rector had been on any part of the area surveyed at the time the work was being done. Fort also performed surveys for Elias Rector on the "Merrimack" at the rate of 50 cents per mile. In 1822 Fort surveyed eleven townships for Angus L. Langham at the rate of 40 cents per mile. Fort commented that he generally had four hands, but in the last two cases he had five hands to assist him. At one time he paid them 16 dollars per month and at another time he paid them 15 dollars per month (720/3271B1, pages 247-250).

Jonathan L. Bean stated in a deposition taken on July 18, 1823 that he had surveyed ten townships for Whorton Rector in 1822 at the rate of 40 cents per mile. He was accompanied by two chain carriers, an axe man and a camp keeper. These were paid from twelve to eighteen dollars per month. He noted that he was paid by the person for whom he surveyed and that the payment was partly in loan office certificates and partly in "specie" (i.e., coin money) (720/3271B3, pages 251-252).

George Thomas stated in a deposition taken on July 18, 1823 that he had surveyed thirteen townships for Elias Barcroft in 1822 at the rate of 50 cents per mile. He had contracted with and paid the hands himself and was

reimbursed the expenses by Barcroft. Thomas made out the field notes in his own handwriting, signed them and returned them to the Surveyor General's office. The plats were prepared by Edward Browne and David Deshler, clerks in the Surveyor General's office, and were signed by Mr. Barcroft (720/3271B4, pages 253-255).

Joel Campbell stated in a deposition taken on July 19, 1823 that he had sub-contracted with Enoch Steen (brother-in-law of William Rector) in 1819 for the subdivision of townships in the Davidsonville district of Arkansas at the rate of 50 cents per mile. The chain carriers were paid 25 dollars per month and the other hands were paid 20 dollars per month. In 1822 he contracted with John C. Sullivan to finish a contract on the Eleven Point River. He paid half of the expense and shared half of the profits. He recorded the field notes in his own handwriting, signed them and delivered them to the Surveyor General's office. He also prepared the plats, which were then signed by John C. Sullivan. In 1822 Campbell surveyed for Henry W. and James S. Conway in Arkansas at the rate of 50 cents per mile. As far as he knew, neither Henry W. nor James S. Conway surveyed any part of the contract. The chain carriers, axe man and camp keeper were paid by James S. Conway at the rate of 15 dollars per month (720/3272A3, pages 258-261).

Hugh White stated on August 13, 1823 that he had surveyed the contract of Elias Barcroft for four townships in the St. Louis district of Missouri in 1816 at the rate of 50 cents per mile, while Barcroft was a clerk in the Surveyor General's office. He signed the field notes as a sub-deputy and they were certified by Barcroft (720/3268B2, pages 205-206).

Jeremiah Rice stated in a deposition taken on November 20, 1823 that he had been employed by Thomas Rector as a chain carrier in 1816 for surveys conducted in Missouri. Since he understood the business of surveying, Thomas Rector soon employed him to survey two townships at the rate of one dollar per day. In the summer of 1816 he was employed by Stephen Rector to finish some surveys in Missouri. Stephen Rector left for Kentucky and instructed him to see Surveyor General William Rector about getting an advance of money with which to carry on the work. When Rice applied for the money, William Rector informed him that the contract had been given to someone else. William Rector agreed, however, to give him ten townships in Illinois to survey for Stephen Rector, who knew nothing about the change, since he was in Kentucky

at the time. Rice surveyed the contract for Stephen Rector at the rate of 50 cents per mile. He completed the work, made out and signed the plats and descriptions and returned the work to the Surveyor General's office (720/3270A1, pages 227-231).

In a letter, dated April 20, 1824, Henry W. Conway made the following explanation about his role in the surveying process: *"In the Spring of 1820 the President of the United States appointed me Receiver of Public money for the Arkansas Land District in the Territory of Arkansas ... I went to Arkansas to take charge of my office, but as no sale took place until September 1821, the office was not opened until that time. In February 1821, having nothing to do in my office, and there being no lands advertized for sale, I contracted with General Rector to survey a quantity of Public Lands in Arkansas and employed several persons to assist me in the work, viz., Thomas Mathers, John L. Robinson, James M. Harbinson, Sterling McNeal, and John R. Brown, each of whom I understood to have had considerable experience as deputy surveyors. I gave all but Mr. Brown fifty cents per mile for carrying the Compass and taking the field notes, to him [Brown] I paid Forty Dollars per month for his services. Three of the companies consisted of five men each, besides the surveyors, viz., Two chain-men, one Camp keeper, one axe-man, and a hunter. The other two companies were employed in a part of the country where a hunter could be of no service, and consisted of four men each, besides the surveyor. To each man employed I paid Twenty dollars per month. The assistant surveyors were at no expense as they were all bourn by me, and amounted to upwards of Nine Thousand Dollars. I superintended the work and was the most of my time actively engaged in the woods until July when I was taken sick, and was conveyed from the woods to my residence at Little Rock in a wagon, where I was confined until September. In September 1821 the first sale of Public Lands took place in Arkansas. I superintended the sale. My commission on monies received in 1821, on account of Public Lands, amounted to about forty-two dollars. After the Land sale closed in September I went to the woods and had my surveying finished. But previous to this and nie I was lying sick at Little Rock. I received information that Mr. Harbinson was taken sick and carried into the settlements, and that his company was idle. Knowing that Mr. Miles, who was one of his chain-men, was a good surveyor, I sent him instructions to take the compass and complete the work I had assigned Mr. Harbinson, which he did. When I left Arkansas for St. Louis to make my returns to the Office of the Surveyor General, I placed Mr. Thomas Mathers in my Office to transact the business in my absence, and gave him for his services my salary as Receiver of Public monies for the time he had charge of my office. I never absented myself from my office without leaving blanks signed and some*

confidential person to transact the business. In 1822 my commission on monies received for the Government amounted to about five dollars and in 1823 to about Twelve dollars" (720/3279A3, pages 366-369).

David Barton described those who worked under the contract of another and actually ran the lines and returned the field notes as "sub-contractors." William Rector argued that those who carried the compass and took the field notes were "assistant surveyors." The surveyors working under the contract of another often referred to themselves as "sub-deputies." Perhaps it's all just a quibble over the meaning of words, but the fact is that someone other than the person holding the contract may have actually done the work. In 1823 this was regarded as undesirable. In a letter dated October 6, 1823, General Land Office Commissioner George Graham directed William Rector to specify that the contractors should personally perform the work (720/3272B4, page 269). Thus, we can surmise that the practice of "sub-contracting" ended at that time.

All of this is rather interesting, intriguing even, but is there anything here from which we may benefit? As property boundary surveyors we are charged with following in the footsteps of the original surveyor and part of that task is knowing who it is that we are following. We must, therefore, be aware that surveys of the public lands in Missouri, Illinois and Arkansas during the period from 1816 to 1823 may not have been performed by the person holding the contract. In addition there may have been multiple persons working under the same contract. If we intend to try to pattern a particular surveyor or apply a chaining factor, it may be necessary to dig a little deeper into the available information to determine who actually surveyed the particular township in which we may be working. Otherwise, we may be trying to make a comparison between work that is not comparable.

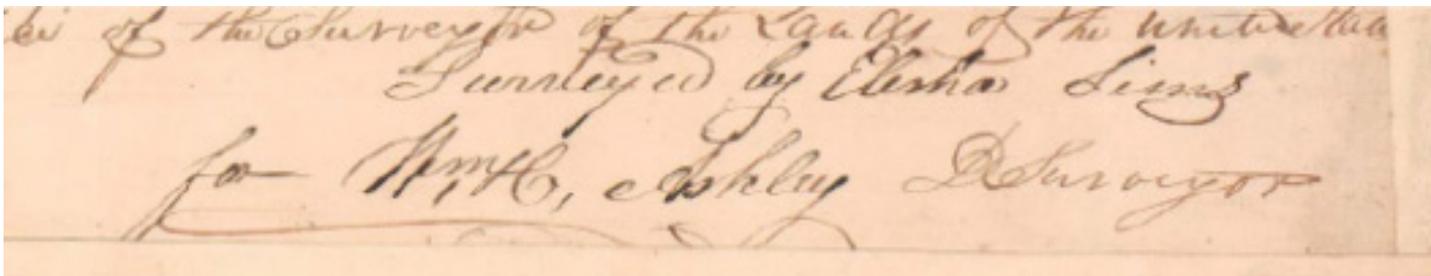
Here are a few tips to consider, when trying to determine who actually performed the work:

1. Take note of the date of the contract and to whom it was given. This information is often noted within the first few pages of the volume of field notes as copied by the Missouri Secretary of State's office (i.e., the field notes that you will usually receive from the Missouri State Land Survey).

If the date of the contract is between 1816 and 1823, you should be aware that someone other than the contractor may have actually done the work. As an example, in Volume 76B of the field notes of Missouri Public Surveys,

(continued on next page)

GLO Sub-Contractors, Sub-Deputies and Assistant Surveyors (continued)



"Surveyed by Elisha Sims for Wm H. Ashley, D. Surveyor" Signature on Township plat for Township 34 North, Range 5 West of the Fifth Principal Meridian, dated January 1, 1822, under the contract of William H. Ashley of the 5th of April 1821.

following the indexes, but before the beginning of the field notes, there is a statement that indicates, "The Surveys described in this Volume were executed under the contract of William H. Ashley of the 5th of April 1821" (721/0433A11). The date of the contract is within the subject range and it was noted in testimony that Bartlett Simms had done much work for Ashley, so it is possible that someone other than William H. Ashley may have performed these surveys.

In addition, the identity of the contractor may be enough to indicate that someone else did the work. For instance, as we have seen from the testimony of eyewitnesses it may be safe to assume that neither Stephen Rector nor Joseph Barton actually performed any fieldwork in Missouri.

2. Look for a "signature" of the surveyor at the end of the subdivision of a township in the field notes. Following our previous example in Volume 76B of the field notes of Missouri Public Surveys, on page 123 at the conclusion of the subdivision of Township 34 North, Range 5 West appears the "signature" of "Wm H. Ashley, D. Surveyor" (721/0435A08). On page 158 of the same volume at the conclusion of the subdivision of Township 34 North, Range 6 West appears the notation, "Surveyed by Elisha Sims for Wm H. Ashley, D. Surveyor" (721/0435D08). So, it appears that William H. Ashley may have surveyed part of his contract and Elisha Sims did the rest.

3. If there is no "signature" following the subdivision of each township, look for a "signature" at the end of the volume of field notes.

4. Look at the "old" township plat, the one that was supposed to be prepared by the contractor, to see who signed it (for more information about the "old" township plats see the article, "See New Plat?", *Missouri Surveyor*, September 2011, page 4). From the testimony given above, we see that the contractor usually signed the plat, but it may be worth a look anyway. The old township plat for Township 34 North, Range 5 West, dated January 1, 1822, is signed, "Surveyed by Elisha Sims for Wm H. Ashley, D. Surveyor." So, maybe William H. Ashley didn't survey the township after all!

It is possible that we may not be able to determine who actually did the work of laying out and subdividing any particular township in Missouri, during the period from 1816 to 1823. If the field notes were not signed and there was no indication anywhere of the participants in the work, there may be no trace whatsoever of who the actual surveyor was. We'll never know, though, unless we look. If we don't look for it, it's almost certain that we won't find it!

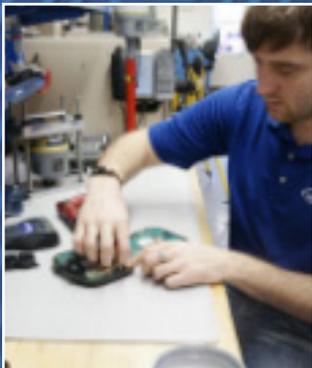
The interesting information for this article was gleaned from "Copies of Sundry Documents Relative to Transactions Between Surveyor General and General Land Office, 1813-1824" found on Missouri State Land Survey microfiche jackets 720/3254 - 720/3285. 📄



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Successful Projects Begin with a Quality Survey, and That Begins with a Complete, Defined Scope of Work

by Scott L'Italien, from *New England Real Estate Journal* (<https://cre.nerej.com>), January 27th, 2017

As a professional land surveyor for a firm that has its roots in retail development, one of the tasks I am most often presented with is preparing a scope of work for the permitting of a renovation and/or expansion for a shopping center. "Just go out and survey the area we are working in because that is all we need," is what I often hear from the owner/developer. In my time at RJOC, I've been fortunate to work with several project managers experienced in obtaining various types of permits for shopping centers and large retail developments, and who understand the permitting process for these types of projects. We have come to the realization that it often is not as simple as just surveying an area of the site, but a process that involves many variables and moving parts.

To properly prepare a scope of work that will benefit the client, as well as everyone involved in the permitting process, one must consider many factors including the proposed design documents, the existing conditions, and the requirements of the city or town you will be working in. There are no "off the shelf" scopes prepared for these types of projects, they are always unique and each one presents its own challenges.

One of the most important questions that I like to start with when trying to determine what the scope of survey needed is: does your client already own the property, or will it be changing ownership? The reason this is an important question is because if the property ownership is changing hands, then chances are that there may be an ALTA/NSPS land title survey involved. The benefit of having an ALTA survey is not only will there be a complete boundary survey involved, but a thorough title report will be prepared. The title report will bring to light any restrictions or encumbrances that may exist on the site, including, right-of-ways and easements.

Additionally, beyond the base ALTA requirements there are the optional survey responsibilities presented in the Table A. This is where the knowledge of the permitting process comes into play. The Table A must be properly filled out to include what will be needed for the permitting process, topography, wetlands, utilities, and additional site features, such as parking striping. I like to offer guidance and suggestions to insure that Table A is properly executed, resulting in all of the client's survey needs required for the permitting process being covered.

Should the client already own the property or they don't plan on having an ALTA survey prepared, things tend to become more complicated. I will often be presented with information the client has compiled over the years. Clients will oftentimes be under the misconception that "nothing has changed," and request that I use this information previously collected. More often than not, this is not the case, things change. Although I can't take someone else's product and put my name on it, there are benefits to having this information on hand as it is often a great starting point. Any information provided from the client is almost always helpful in some way. The documents often include legal references such as deeds, plans, or lease agreements that can be pulled off the Registry of Deeds website.

Something that is often overlooked when permitting without the benefit of a title report, is the need for title research at the Registry of Deeds. Even a basic search at the registry could uncover potential hurdles, such as a right of way or utility easement in the area of the expansion. Any plans provided also give you a better idea of what is out there and what you will be up against in terms of field work, along with what property line monumentation has been recovered in the recent past.

One of the most important items that the client and engineers need to be cognizant of, is that any modification to the building that may change the setback to the property line will trigger a boundary survey. The only way to certify a setback to the property line is to have a proper boundary survey prepared by a registered professional land surveyor.

A benefit to working in the commercial/retail sector is that clients are most often developers that have some experience and understanding of the process, and when presented with a properly prepared scope of work they will understand what they need, what they are getting, and why. Successful projects begin with a quality survey, and a quality survey begins with a complete and properly defined scope of work. 🇺🇸

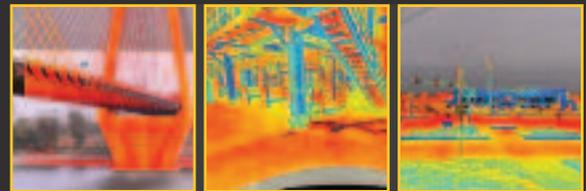


Scott L'Italien, PLS, is the survey manager for RJ O'Connell & Associates, Inc., Stoneham, Mass.

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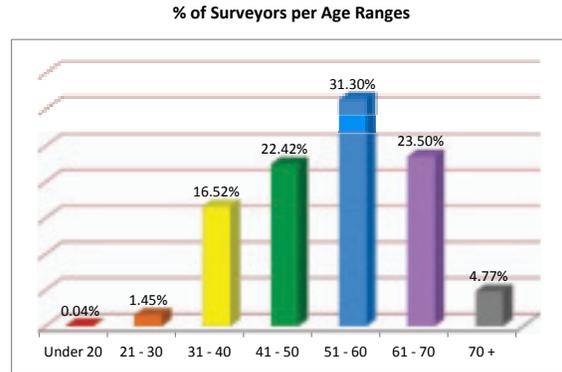
Survey Profession Demographics

As part of their workforce development initiative, the National Society of Professional Surveyors conducted a poll of its members in 2016. With 2400 members participating the following demographics were compiled.

Question - Question 1 - Age:

1. How old are you?

- A. Under 20 (1 out of 2409)
- B. 21-30 (35 out of 2409)
- C. 31-40 (398 out of 2409)
- D. 41-50 (540 out of 2409)
- E. 51-60 (754 out of 2409)
- F. 61-70 (566 out of 2409)
- G. 70+ (115 out of 2409)



Question - Question 2 - age when received license:

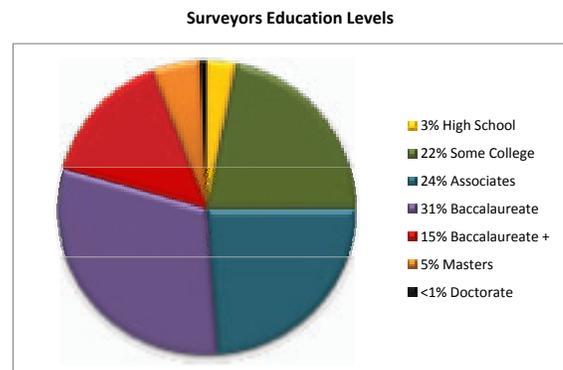
2. How old were you when you received your first survey license?

- A. Under 20 (3 out of 2409)
- B. 21-25 (161 out of 2409)
- C. 26-30 (829 out of 2409)
- D. 31-35 (759 out of 2409)
- E. 36-40 (355 out of 2409)
- F. 41-50 (260 out of 2409)
- G. 51+ (42 out of 2409)

Question - Question 3 - Education:

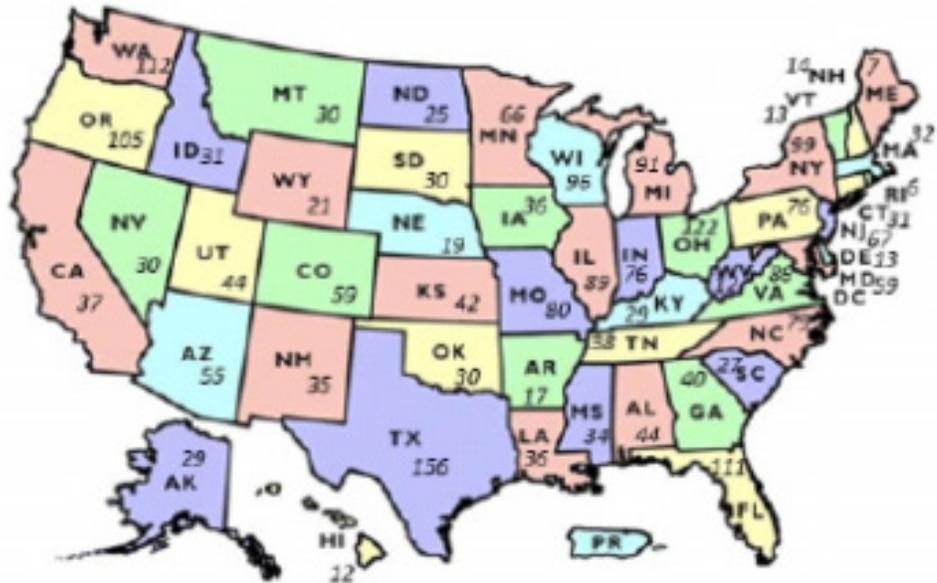
3. What is your highest level of education?

- A. High School (79 out of 2409)
- B. Some College/no degree (523 out of 2409)
- C. Associates (574 out of 2409)
- D. Baccalaureate (735 out of 2409)
- E. Baccalaureate with some advance study (356 out of 2409)
- F. Masters (126 out of 2409)
- G. Doctorate (16 out of 2409)



Question - Question 4 - Primary State of Practice:

4. What state is, or was, your primary state of practice?



Question - Question 5 - Retire:

5. At what age do you hope to retire (or did you retire)?

- A. Under 50 (9 out of 2409)
- B. 51-55 (32 out of 2409)
- C. 56-60 (218 out of 2409)
- D. 61-65 (727 out of 2409)
- E. 66-70 (863 out of 2409)
- F. 71-75 (292 out of 2409)
- G. 76-80 (89 out of 2409)
- H. 80+ (135 out of 2409)
- I. Retired (44 out of 2409)

Question - Question 6 - Employees:

6. How many of your employees, or people working with you, do you think are on the path to licensure?

- A. None (1086 out of 2409)
- B. 1 (691 out of 2409)
- C. 2 (367 out of 2409)
- D. 3 (119 out of 2409)
- E. 4 (64 out of 2409)
- F. 5 (34 out of 2409)
- G. 6-10 (26 out of 2409)
- H. More than 10 (22 out of 2409)

(continued on next page)

Survey Profession Demographics (continued)

Question - Question 7 - how many states license:

7. In how many states do you hold a license to practice as a Professional Surveyor?

- A. None (20 out of 2409)
- B. 1 (1529 out of 2409)
- C. 2 (496 out of 2409)
- D. 3 (174 out of 2409)
- E. 4 (99 out of 2409)
- F. 5 (31 out of 2409)
- G. More than 5 (60 out of 2409)

Question - Question 8 - Salary:

8. What is your current annual salary?

- A. Under 30K (102 out of 2408)
- B. 31-40K (65 out of 2408)
- C. 41-50K (1123 out of 2408)
- D. 51-60K (213 out of 2408)
- E. 61-70K (362 out of 2408)
- F. 71-80K (341 out of 2408)
- G. 80-1 OOK (562 out of 2408)
- H. More than 100K (640 out of 2408)

Question - Question 9 - Gender:

9. Gender

- A. Male (2270 out of 2408)
- B. Female (126 out of 2408)
- C. Other (1 out of 2408)
- D. Prefer not to answer (11 out of 2408)

Question - Question 10 - Ethnicity:

10. Ethnicity

- A. White (2223 out of 2409)
- B. Black or African American (8 out of 2409)
- C. Hispanic or Latino (42 out of 2409)
- D. Native American or American Indian (14 out of 2409)
- E. Asian/Pacific Islander (16 out of 2409)
- F. Middle Eastern (4 out of 2409)
- G. Other (23 out of 2409)
- H. Prefer not to answer (79 out of 2409)

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News & Views from NSPS



SurveyOklahoma | Career in Surveying Workforce Development Initiative

On July 27, 2015, the Oklahoma Society of Land Surveyors (OSLS) and The State Board of Licensure for Professional Engineers and Land Surveyors (State Board) held a preliminary meeting to discuss the formation of a Task Force between the two groups with the purpose to promote the profession of Land Surveying in Oklahoma. The first official meeting of that Task force was held on September 18, 2015. At that meeting the objectives and goals of the Task Force were adopted.

- I. Develop goals which will support:
 - A. Surveying Education including Continuing Education
 - B. Advancement of Professionalism and Leadership Development
 - C. Advancement of the profession of surveying as it relates to public protection
- II. Advise the State Board about surveying regulations and bring recommendations for revisions.
- III. Study the effects of technological advancements within the profession

One of the first of these objectives to be addressed was the future of Survey education in the State of Oklahoma. Discussions with each of the 4 colleges began almost immediately with the goal to determine what each of the respective programs need to grow and attract new students.

At the same time the Task Force began working on a Career in Surveying campaign designed to attract high school students to the profession. After planning and discussions with various marketing firms, the Task Force began working on **SurveyOklahoma**, a campaign made up of print (poster and brochure) and digital aspects. The central focus of the campaign is the website; www.SurveyOklahoma.com.

In August of 2016 after months of work on content and design the website launched and the campaign began. The campaign begins with a introductory e-mail to all public school counselors in the State of Oklahoma (over 1100) and is followed by each one receiving a campaign brochure and poster to display in their office. Both of these mediums are designed with the sole purpose to direct counselors and students to the website where they can find out all they want to know about the profession. Things such as: average pay, scholarships, history of surveying and much more.

We would like to thank everyone who was involved in this portion of the campaign and look forward to the next phase 



Pilot dies in plane crash in Delaware County

by Sheila Stogsdill, For The Oklahoma Published: January 26, 2017

GROVE — Bob Hudson would travel for miles, sometimes on foot, to take medical supplies and the gospel to the Tarahumara Indians in Mexico’s Copper Canyon.

Bob and Pam Hudson spent the past five years as medical missionaries to Mexico, flying in supplies from their home on Grand Lake.

On Wednesday, Bob Hudson, 61, died when the Cessna 172 he was piloting crashed into a field near Zena in Delaware County, minutes after taking off from a grassy runway. The plane lost power, and Hudson was trying to make an emergency landing when the plane struck a tree, according to the Oklahoma Highway Patrol.

Hudson had just left his friend Alvin Lee; they had been talking about missionary work.

The Cessna had recently been donated to the Hudsons’ Mexico Medical Missions, Lee said.

“I waved at him and watched him take off,” Lee said. “I was going to drive into Grove and pick him up at the airport.”

It was a 10-minute flight from Lee’s airstrip to the Grove Regional Airport. When Hudson failed to arrive, friends began searching on their four-wheelers. An OHP aircraft spotted the wreckage in a field between Lee’s home and State Highway 127, Lee said.

Hudson had been a pilot for seven years. He retired as a land surveyor from Rose & McCrary, a Grove engineering and land surveying business.

Mexico Medical Missions provided health care, food, shelter, clean water and educational aid, according to a brochure. The Hudsons lived in Mexico and were planning to return in about two weeks, Lee said.

The father of four and grandfather of eight was described as a former pastor, a loving husband, a great missionary and a good friend by messages posted on social media sites.

The Tarahumara Indians live at an altitude of about 8,000 feet, Lee said. The roads are poor. The airplanes make it easier to visit the villagers and to take the sick among them to the hospital.



Hudson had several aircraft based at the Grove airport over the years, said Lisa Jewett, airport manager.

“His heart was always about medical missions and his faith in Jesus was important to him. He shared his faith with everyone,” Jewett said.

“He retired just so he could do medical missions. He was such a great and honorable man. He will be missed by so many,” Jewett said.

“How do you come to grips with such a tragic and sudden loss of a man who, along with his lovely wife Pam, gave so much to help desperately poor people in the far interior of Mexico,” said Doug Anderson, a friend.

“Those he selflessly helped, those he left behind and all the many lives he influenced in such a positive way, will feel his death,” Anderson said.

The pilot, Bob Hudson, was a former Missouri surveyor working throughout the Joplin, Oklahoma and Kansas tri-state area. He is remembered and missed by many southwest Missouri surveyors. 🇺🇸

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Jeffery Lucas is in private practice in Birmingham, Alabama. Lucas has been in the surveying business since 1976. He is a licensed land surveyor registered in Alabama, Florida, Georgia, Mississippi and Tennessee. Lucas is a licensed attorney and member of the Alabama State Bar since 2003. Lucas specializes in land boundary issues as an attorney, land surveyor, consultant, mediator and expert witness. He has been a seminar leader on surveying topics that include ALTA/ACSM standards, boundary law, law of easements, water boundaries, surveying evidence and procedures, expert witness testimony, business law, contract law, torts and liability. He has over 30 titles that he has developed in his seminar library. Lucas is the author of "Alabama Boundary Law" (ISBN: 978-0-557-53328-2) and "The Pincushion Effect, The Multiple Monument Dilemma in American Land Surveying," (ISBN: 978-1-257-86758-5). He just recently finished the manuscript for the "Illinois Boundary Law" book that will be featured in February, 2013, at the Illinois Professional Land Surveyors Association (IPLSA) conference in Springfield, Illinois. He has also authored over 100 articles on surveying and boundary issues and writes a regular column for P.O.B. Magazine since 2004.



John Matonich, PS, is the Chairman of the Board of ROWE Professional Services Company, a firm specializing in consulting engineering, surveying, planning, landscape architecture, aerial photogrammetry, and land development services in the Midwest and across the country. John joined ROWE in 1981. He was named a principal in 1992, promoted to president in 1997, and to chief executive officer in 2001 as well as Chairmen in 2006. John retired from management of Rowe in January of 2016. John is licensed as a professional surveyor in Michigan, Ohio, and Wisconsin. He served as president of the National Society of Professional Surveyors, (NSPS) in 2009-2010, and currently serves as the Treasurer of the Wisconsin Society of Land Surveyors. John is also a past president of the Michigan Society of Professional Surveyors (MSPS). John was voted as a Fellow Member of the NSPS, ACSM and MSPS organizations.

In 2010, John was appointed by the Governor to Michigan's Natural Resources Commission and currently serves as the Commission's Chair. He is also a member of the Surveying Curriculum Advisory Committee at Michigan Technological University and has served in that same capacity at Ferris State University. He has also served as adjunct faculty to the University of Michigan - Flint Earth Sciences Department and has been a contributing writer for "Professional Surveyor" magazine and currently is a contributing writer for "American Surveyor."



Locally, John is past-chair of the Flint and Genesee Chamber of Commerce and past chairman-elect of the former Flint Area Chamber of Commerce Board of Directors as well as the past president of the Davison Chamber of Commerce. He is also a member of the Rotary Club, Optimists Club, and is past chair of the Lapeer Downtown Development Authority. John currently serves as a Board Member of the Lapeer Economic Development Corporation, The Genesee Shiawassee and Lapeer Hundred Club and The Food Bank of Eastern Michigan.

John obtained his Bachelor of Science degree in Land Surveying with honors from Michigan Technological University in 1981.

AGENDA

THURSDAY, APRIL 27, 2017

- 9:00 am Board Meeting
- 1:00 pm Golf Tournament
- 6:00-8:00 pm Exhibitor Set-Up

FRIDAY, APRIL 28, 2017

7:00 am Registration, Continental Breakfast and View Exhibits

8:00-9:30 am Survey Evidence & Procedure

There is a line of thinking within and without the surveying community that goes something like this: The surveyor's only role is to deal with the facts as contained in the client's deed; all other issues with regard to boundaries can only be determined by a court of competent jurisdiction. The obvious problem with this line of thinking is that, if this is truly the case, society does not need land surveyors. Boundary determinations boil down to two questions: A question of law and a question of fact. "The question of what is a boundary line is a matter of law, but the question of where a boundary line, or a corner, is actually located is a question of fact." *Walleigh v. Emery*, (Pa.Super.Court. 1960). This seminar will explore both of the questions fully, as well as the topics of evidence and procedures for the determination of a well-reasoned opinion on boundaries. State specific law will be incorporated into this seminar in the process of answering these and many other questions.

Speaker: Jeff Lucas

9:30-10:00 am Break to View Exhibits

10:00-12 noon Survey Evidence & Procedure continued

12:00-1:00 pm Luncheon

1:00-2:30 pm How to Make a Boundary Determination

What are the important issues to know and understand in order to make a boundary determination that will win in court, should you find yourself in court defending your map of survey and your opinion on the location of the property boundaries involved? What is the evidence standard that will be applied, the standard of care for professional surveyors in court, and what is the criterion for boundary determinations? This course studies the relevant evidence standards, different types of evidence, the standard of care, and explores the process of rendering a well-reasoned opinion on the only question that is within the purview of the retracing surveyor—the location question. The importance of deeds in and the role they have in boundary determination, the interpretation of deeds, finding intent, and how and when the boundary establishment doctrines come into play. The "Ultimate Issue Rule" will be discussed and its importance relative boundary determinations and liability. If you eventually find yourself in court over a boundary dispute, losing in court is not an option. The boundary surveyor who has rendered a well-reasoned opinion on the boundaries based on the law and the facts, is in a much better position to win in court than the surveyor who simply applied math and measurements as taken from a deed.

Speaker: Jeff Lucas

2:30-3:00 pm Break to View Exhibits

AGENDA

- 3:00-5:30 pm Making a Boundary Determination continued
- 5:30 pm Wine, Beer and Cheese Reception with Exhibitors

SATURDAY, APRIL 29, 2017

- 7:00 am Registration, Continental Breakfast and View Exhibits
- 8:00-9:30 am **Ethics and the Surveyor's Role**
As professionals, surveyors are held to a higher standard and are expected to follow a code of ethical conduct and operation. This presentation will examine the elements of this code and how they fit in the surveyors conduct. It will also examine real ethical case situations and discuss why they were or weren't violations of an ethical code.
Speaker: John Matonich, PLS
- 9:30-10:00 am Break to View Exhibits
- 10:00-12 noon **Hourly Pricing-There are Better Options**
This presentation will explain options and aspects of billing and collection for your business. You will learn the full impact Overhead has on a company. What is Overhead? Why is it important? How can it be computed and how can you charge for it? You will be given basic calculations to help you arrive at the figures you need to successfully invoice and add profit. Also addressed will be the collections of accounts and how to avoid receivables. Finally, you will be given options when you have receivables and what to do when clients don't pay.
Speaker: John Matonich, PLS
- 12:00-1:00 pm Luncheon
- 1:00-2:30 pm **Determining Cost and Value for Your Service**
This will be a continuation of the Pricing Session including additional financial information as well as dealing in a contract world. This session will explain why you should manage risk, what is liability, and address what problems claims and disputes can cause. Aspects of contracts will be explored including special provisions, contract essentials and how to negotiate a contract.
Speaker: John Matonich, PLS
- 2:30-2:45 pm Break
- 2:45-5:15 pm **Analyzing Results, Improvements, Strategy to Success...**
Most Surveyors who run a surveying business do so because they love surveying, not because they want to be business owners. This session is intended to provide a better understanding of the aspects of managing a successful business. The presentation will cover various tools, principals and theories used to improve the performance of a business. No matter the size of your firm, this presentation is will cover many things that can help you have a more successful business. It will cover topics including knowing your clients and your employees. Finding, hiring and releasing employees will be discussed along with your legal responsibilities affecting each of them.
Speaker: John Matonich, PLS

REGISTRATION

REGISTRATION FEES

- MSPS Member \$250
- Non-Member \$400
- Technician \$150
- Golf (per person) \$85

Call about per day rates.

Name _____ RLS# _____

Firm _____

Address _____

City, State _____ Zip _____

Phone _____ Email _____

REGISTRATION INFORMATION

Registration fee is \$250 for MSPS Members and \$400 for Non-Members. Deadline for registration is April 13, 2017. After this date, a 10% processing fee will be added to registration fees. The fee includes instructional materials, refreshment breaks, luncheon on both days, cocktail reception and two continental breakfasts. To register, complete the attached form and mail it with your check to MSPS, 722 E. Capitol Avenue, PO Box 1342, Jefferson City, MO 65102. For more information on this course, call Sandra Boeckman at 573-635-9446.

TECHNICIAN RATE

A special rate of \$150 is available for non-licensed technicians (Associate Members of MSPS). Registration fee plus 2017 Associate Membership is \$185. Call MSPS for details at 573-635-9446.

GOLF TOURNAMENT

Register to play in the Golf Tournament Fundraiser for the MSPS Scholarship Fund to be held at The Cove Golf Course, The Lodge of Four Seasons beginning at 1:00 pm. The cost is \$85 per person which includes two mulligans per player.

LOCATION AND LODGING

The Lodge of Four Seasons in Lake Ozark is the location for the 2017 Spring Workshop. A block of rooms has been reserved at the Lodge at a rate of \$118.00 for single or double occupancy. Deadline for reservation is April 4, 2017. Make your reservation by calling the Lodge of Four Seasons at 888-265-5500.

CANCELLATION POLICY

MSPS reserves the right to cancel the program and return all fees in the event of insufficient registration. A participant may cancel a registration up to two weeks before the course date and receive a full refund. **NO REFUNDS AFTER APRIL 13, 2017.**

CONTINUED EDUCATION CREDITS

This course has been approved for 15 PDUs or 15 hours of continuing education (7.5 each day) by the Missouri Board for Architects, Professional Engineers, Professional Land Surveyors and Landscape Architects.

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Mail or fax registration form to MSPS before April 13, 2017.

In Memory of Jim Reed

James Sidney Reed, 86, of Columbia died Sunday, Jan. 8, 2017, in Columbia.

Jim was born Nov. 12, 1930, in Milwaukee, Wis., to Walter and Genevieve Reed. At age 11, Jim's family moved to Columbia, where he lived most of his life. Jim graduated from Hickman High School in 1948 and enlisted in the U.S. Army in 1951, serving on active duty as a commissioned officer during the Korean War. He was released from active duty in 1953 and graduated from the University of Missouri with an engineering degree in 1955. He continued in the Reserves as a Captain, Corps of Engineers, until 1963.



Jim was a licensed Missouri Professional Engineer and was one of the first 100 licensed surveyors (LS-98) in the state of Missouri. As an engineer with a drive for entrepreneurship, Jim founded *Engineering Surveys and Services* in 1957. He retired in 1985, passing on his ownership to his son, Tim Reed, son-in-law Larry Hendren, and friend Dave Bennett. The company was built on Jim's strong principles and continues to prosper.

Jim held offices in many professional organizations, including the *Missouri Society of Professional Engineers* and the *Missouri Association of Registered Land Surveyors* (MARLS, now the *Missouri Society of Professional Surveyors*). He served as MARLS President in 1969, the year that the State of Missouri passed the nation's first legislation creating a land survey authority, and was proud to be an *MSPS Life/Honorary Member*. He also served on state, county and city boards and commissions too numerous to name. He attended Calvary Episcopal Church for 69 years, where he served in roles including the vestry, finance committee and supervised church refurbishment. Jim also was a founder of *Central Missouri Abstract and Title Company* and was actively involved in its growth and success. He spent retirement enjoying golf, friends, and travel. Jim's greatest joy was his family, who affectionately called him "Big." He had much enjoyment organizing "family fun nights," and his lasting legacy is Saturday Night Steak Night, which began in 1978 and continues today.

Jim is survived by Polly, his wife of 65 years; children, Polly Ann (Larry) Hendren of Columbia, Tim (Lisa) of Columbia, Cary Weatherby of Bloomington, Minn., and Mimi (Tom) Boardman of Columbia and Crosslake, Minn.; nine grandchildren; and nine great-grandchildren.

In Memory of Mort Ratliff

Morton Lee Ratliff, 78, of Columbia, MO, passed away Wednesday, May 25, 2016, after a lengthy battle with dementia. Mort was born on July 22, 1937 in Ethel, MO, the son of Harry Earl and Mary Elizabeth (Jones) Ratliff who preceded him in death. He was married to Alberta Henke, who preceded him in death on August 21, 2015. He was also preceded in death by one brother, Bill Ratliff.



Survivors include son, Mike (Tess) Ratliff; daughters, Linda Ratliff, and Christy (Chris) Hayes; five grandchildren, Melissa (Jason) Brault, Tim Ratliff, Jesse, Joseph, and Eric Hayes; brother Kenny Ratliff, sister Harriet (Bill) McNeill, and many nieces and nephews.

Mort was a devoted family man, involved in his children's activities of Scouts, sports, curing hams, and 4-H. He had deep respect for nature conservation and enjoyed outdoor activities such as boating, Cardinals games, sightseeing, and photography. Mort was a member of Our Lady of Lourdes Catholic Church in Columbia, serving his

Fondly remembered for his daily work attire of a plaid shirt, Mort's coworkers paid tribute to him by retiring his "jersey" and employee number.

(continued on next page)

In Memory of Mort Ratliff (continued)

Church through ushering and other activities. Through the years, he served on various boards to shape the direction of Columbia and Boone County, and tirelessly helping friends and neighbors.

Central to his life was his marriage to Alberta. Married for 56 years, the couple created a loving home and family, and enjoyed cruises and trips together. He was quick with a smile and never met a stranger.

Mort was a loyal employee of Engineering Surveys & Services (Columbia), with his career as a land surveyor spanning 52 years prior to his full retirement in 2009. Hired in 1957 by ES&S founder, Jim Reed, as the first full-time employee of the firm, Mort was affectionally referred to by his coworkers as Employee #2. He was also a long-time and active member of MSPS, serving as the organization's President in 1974.

In Memory of Roy Leimberg

Mr. Roy E. Leimberg of St. Louis, MO, passed peacefully on October 22, 2016, at the age of 79.

Born March 6, 1937, and raised in the North St. Louis, his father and paternal grandparents immigrated to St. Louis in 1928, from Elberfeld-Wuppertal, Germany, under the sponsorship of the Krey Packing Co. After a few years working for Mr. Krey, they opened the Leimberg German Style Sausage Co. His maternal grandfather, Wm. J. Brach, operated an Apothecary/Pharmacy at the corner of 14th and Market, where the Peabody Opera House, former know as Kiel Opera House, now stands. This set the stage for Roy's involvement within the Germany community in St. Louis.



Mr. Leimberg started his employment with Pitzman's Co. of Surveyors & Engineers, on February 28, 1955. He became a Professional Land Surveyor, in the State of Missouri, in 1970; and in the State of Illinois in 1975. He was elected President of the company in 1972, and continued in that position until December, 2005. At that time, he was elected President Emeritus and subsequently President Emeritus-Retired, on June 29, 2007.

He served on various Citizens Review Boards for St. Louis Bond Issues; and on the Board of Directors of the Home Builders Association of St. Louis, City Division. He participated on a Special Committee of the Home Builders in reviewing and re-writing Chapter 448, of the "Uniform Condominium Act", of the Revised Missouri Statutes.

Roy was a past president of the Municipal Engineers & Surveyors Association of Greater St. Louis; and the Missouri Society of Professional Surveyors, and served for MSPS as past Governor of the National Society of Professional Surveyors. He was a past president of the St. Louis-Stuttgart Sister Cities, Vice President of the German American Heritage Society and served on the Board of Directors for both groups.

He loved spending time with his family, friends and the German-American community. Roy traveled extensively in Europe and especially Germany. Through the student exchange programs with Stuttgart Germany and housing German musicians in St. Louis for various festivals, Roy made lifelong friends along the way. He also reconnected with his relatives in Germany who were able to expand his knowledge of his family tree. He always had a bounce in his step and a smile on his face and always had a joke, often repeated several times. He will be greatly missed by all.

Survived by Harrison Billy and Carol Leimberg (nee Pelly); children Diane Watson (Steve), Carolyn Rooney (Jim), Robert (Kalen), Marybeth, Kathleen Garazin (Scott); 15 grandchildren, 3 great-grandchildren; brother to Gloria Zacher (Raoul), the late Carl (Annemarie); born to the late Fred W. Leimberg, Jr. and Elizabeth Leimberg-Reeff (nee Brach); nephew to the late Friedel Garza (nee Leimberg).

Roy was remembered with a Brunch/Reception on Saturday, November 5, 2016, at the Deutscher Kulturverein Halle. In lieu of flowers, memorials can be sent to the St. Louis Family Resource Center.

Right: Chip Berniard of Trimble (left) and MoDOT Sr. Survey Tech. Edward Stannard scanning during the “Stan Musial Bridge” project featured on our cover.

Cover photo: MoDOT PLS Stephen Jantosik (holding controller) and Sr. Survey Tech Matthew Schultheiss this past November, baseline surveying the decking and support cables of the new “Stan Musial Bridge” with a Trimble SX 10 Scanning Total Station.



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Surveying & Mapping Industry Economics

by Lee Lovell, PS

Thirty years ago I was about to complete a BS in Surveying. I was not looking for-ward to graduation because surveying jobs were scarce due an economic downturn caused by the “Savings and Loan” debacle. I was taking a course in small business management. The course involved the preparation of a business plan and I had elected to do a plan for a surveying business. I was struggling to make the financial model generate a positive cash flow given the financial research I had collected. Surveying publications contained very limited business information. I had interviewed several local owners of survey businesses to gain the information I needed. Most of the owners were reluctant to provide information and a few even discouraged me from considering a surveying business. I explained

“To the extent these businesses do well, the profession will do well.”

the situation to my professor and he suggested I should consider another line of business. This is not exactly the advice I had hoped for! As these events unfolded, I was pondering if I should go on to study urban planning or law. The attorneys who I knew said law was a bad career choice. I was tired of a steady diet of Ramen noodles so I graduated and went in search of a job. The company who hired me went bankrupt in 2 years due to cash flow problems. I eventually went to work for a surveyor who was operating a successful business. It did not take long to figure out what was wrong with my business plan and it restored my confidence in a surveying career. The short story .. the difference between a poorly run business and a well-run business is sound business

practices informed by reliable and timely financial data. Like many endeavors in life, success or failure is a function of competence.

I am sharing this story because it seems timely given the circumstances. Most surveyors are employed in small business. To the extent these businesses do well, the profession will do well. This is easier said than done. Statistics from the Small Business Administration and other organizations show a high percentage of small businesses fail or underperform. It is worth noting larger businesses can suffer some of the same performance problems and the causes of the distress are similar. A short article cannot adequately address this subject. What follows is economic data that I extracted from federal agency websites. These agencies publish the data with various caveats. From time to time the agency modifies the data format, therefore a user must manipulate the data in order to combine data sets as I have done. As a result, *please view this data with some caution*. The goal is to present some information that will stimulate further research and discussion into matters that are relevant to the future of surveying.

The economic data shown herein is at the national level of the surveying



and mapping industry. It is possible to obtain data at state, county and metropolitan levels. This aggregate data is useful when basic business planning starts. It is also possible to purchase relatively inexpensive industry financial metrics from a company such as Bizminer. This information is useful for setting up basic financial models. More detailed information is available from consulting firms such as Zweig-Group or PSMJ Resources. And a few AEC business software vendors publish financial metrics. These are not specific to surveying businesses, so it takes some judgement to apply the information. This type of information is typically used for benchmarking business performance. All these sources of information have limitations and the benefits are for creating an awareness of factors to

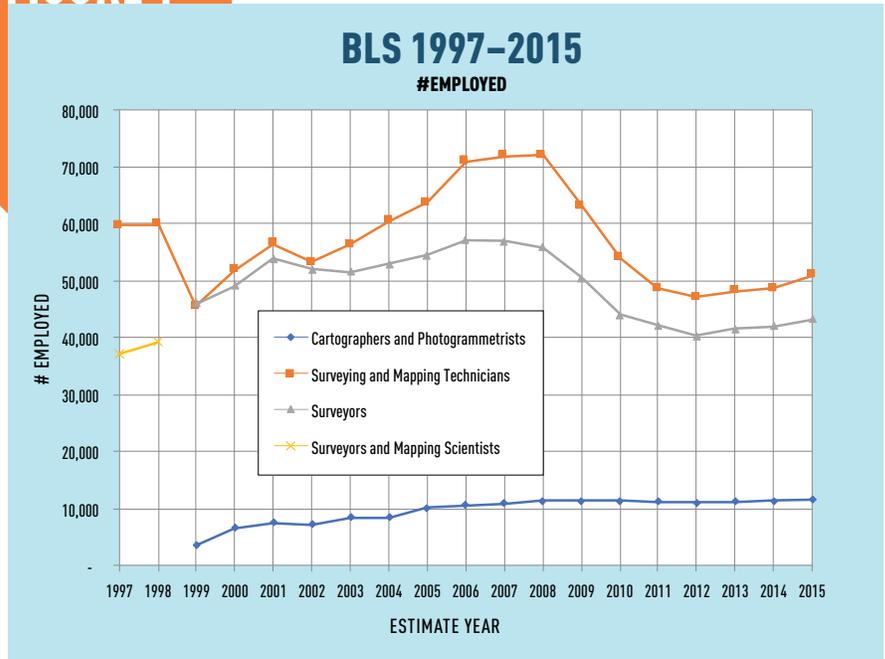
consider in decisions. Actual business performance rests on good practices, effective decision making and the skillful execution of tasks.

Occupational Employment Statistics 17-1022 Surveyors

The Bureau of Labor Statistics (BLS) provides information on labor economics. The Occupational Outlook Handbook summarizes information related to occupations. The BLS also publishes occupational employment statistics related to levels of employment, wages, concentrations of employees in certain industries, concentrations in geographic locations and the number of jobs in the given occupation per 1,000 jobs in the given area. These are **estimates**.

Figure 1 shows the composition of the workforce. The occupation classification system changes from time to time. Geodesists are in the Natural Scientists group and not included in this chart. It is worth noting the cartographers and photogrammetrists did not seem to be as adversely impacted by the 2007 Recession. This may have something to do with their services being used in

FIGURE 1



geospatial solutions while surveyors tend to focus on land development and public infrastructure. The technicians appear to have been most impacted. To some extent the technicians are the pool from which future surveyors are developed.

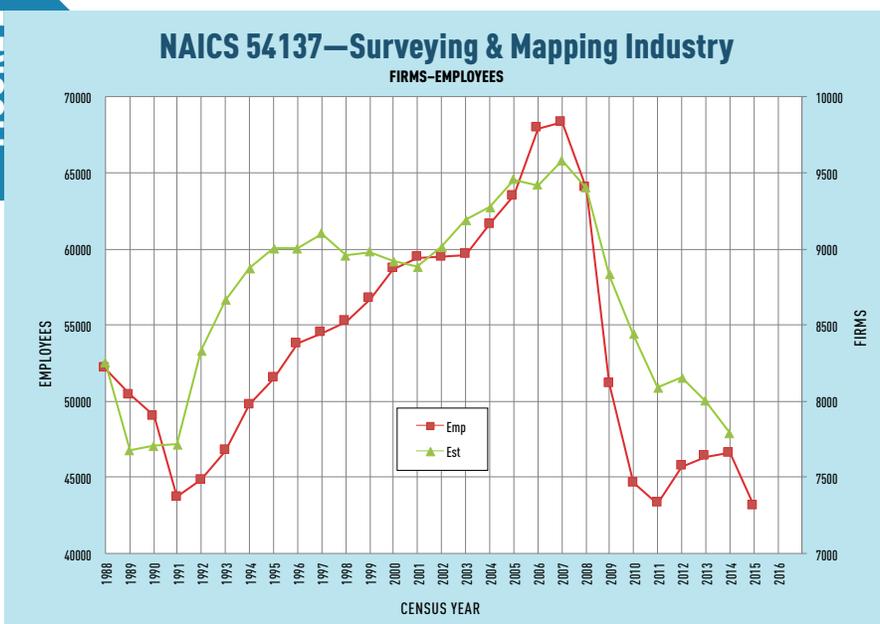
County Business Patterns – 541370 – Surveying and Mapping (except Geophysical) Services

The following is from the CBP website: “... This industry comprises establishments primarily engaged in performing surveying and mapping services of the surface of the earth, including the sea floor. These services may include surveying and mapping of areas above or below the surface of the earth, such as the creation of view easements or segregating rights in parcels of land by creating underground utility easements.”

The County Business Pattern (CBP) data for an industry is published annually. The data can be viewed at the national, state, county and metropolitan level. This data set includes the number of establishments, employment during the week of March 12, first quarter payroll, and annual payroll. The data

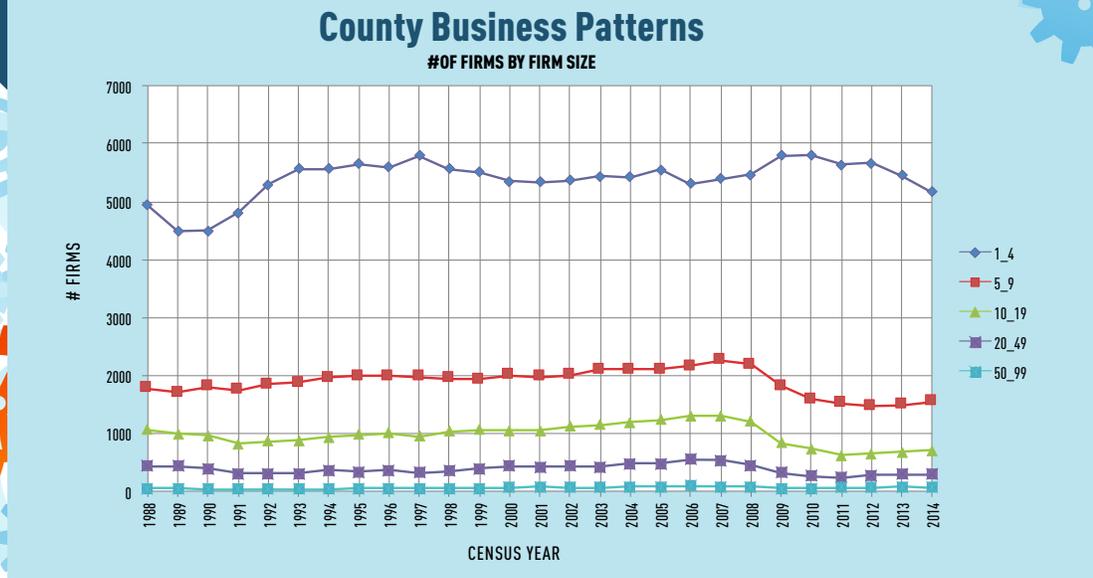
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FIGURE 2



Surveying & Mapping Industry Economics (continued)

FIGURE 3



can be accessed in several different ways. The **American Fact Finder** is an application for parsing out data with certain attributes. The advanced search method provides a relatively simple way to drill down in to the data.

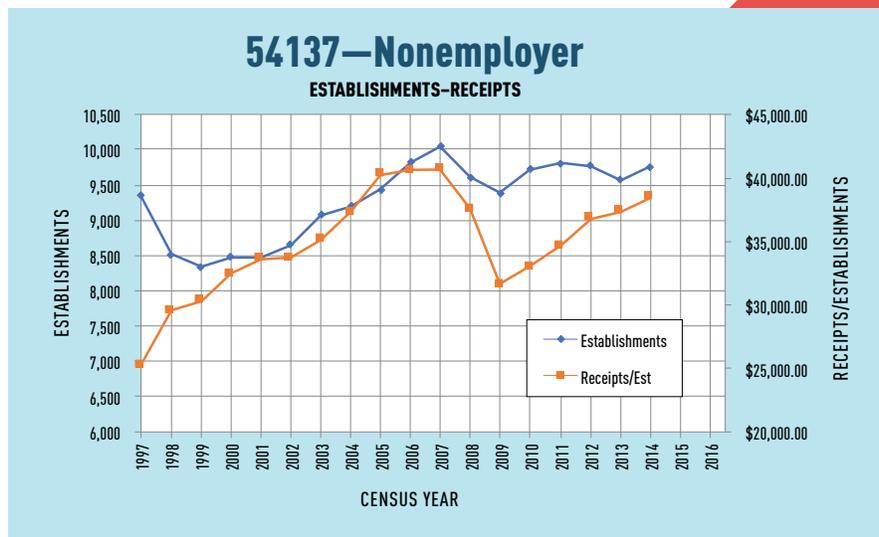
Figure 2 shows national totals for the Surveying and Mapping industry between 1988 and 2014. The red line represents the number of people employed and the green line represents the number of firms in business. Alone this data is a bit unsettling, but some additional information is needed in order to understand what has transpired over time. Behind this data are economic boom/bust cycles, the impacts of technology, demographic shifts, migration across industries, etc. This data suggest there is more to the story than the 2007 Recession.

Figure 3 is another chart developed from CBP data that shows the number of firms that employ a certain number of people. This data reveals about 60% of firms employ 1 to

4 people and the next 20% of the firms employ 5 to 9 people. In other words most surveyors are engaged in small business. This data has all sorts of interesting implications. For example small businesses are often at a disadvantage when it comes to finding vendors for benefit programs or contending with taxation. The owners of small firms often do not have options for an exit strategy.

Considering the demographic shift that is underway, new business formation will become a concern. If only 1 out of 7 professional surveyors start small firms, then a constraint on the industry in the future maybe business competence. The data also tells another story. In the aftermath of the 2007 Recession there was an increase in the number of firms employing 1 to 4 people and this is

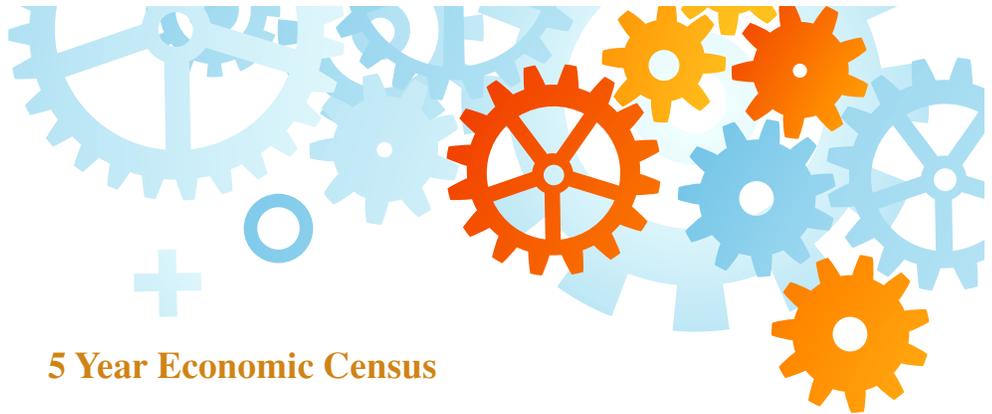
FIGURE 4



likely because larger firms released employees. I suspect some of this was possible because of technology.

Nonemployer Statistics

Figure 4 is developed from Nonemployer data that shows the number of establishments in the Surveying and Mapping industry that operate without paid employees. They may hire contractors. It is worth noting the number of establishments did not decline as much as overall employment did after the 2007 Recession, but the receipts did. The receipts are an average, so this does not show the range of receipts. It is common for companies that have paid employees to complain that they cannot compete on price with these nonemployer firms. While this is a logical conclusion, it is worth pondering what impact these types of firms have on capturing the market's demand for services. The IRS also publishes tax statistics related to surveying businesses operated as a sole proprietor. This includes aggregate income statements which show typical expense categories and net profit. A few of the proprietors file taxes under Schedule C-EZ which suggests these maybe part time businesses.



5 Year Economic Census

Every 5 years there is a detailed census of businesses. The last census was published for 2012. These offer a wealth of information. These show the composition of receipts by services and source and other types of useful information. It is possible to do correlations related to business size and revenue generation. In the past I noticed small firms did not perform as well as larger firms and I attributed this to owners of smaller firms being involved in both the management of operations and delivering service. This tends to limit the amount of time spent on managing. A larger firm has the opportunity to have dedicated management staff. Digital communication and information technology has been addressing this problem, so perhaps the small firms are doing better.

Lee Lovell is a registered Land surveyor in Colorado and Nebraska and has accumulated 34 years of professional experience. He resides in Parker, Colorado where he was part of Western States Surveying for 20+ years. In 2013, Lee completed an orderly wind down of WSS business operations, and after taking a year off, returned to the never boring, sometimes frustrating, and usually rewarding practice of surveying.

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Edward Owen
Vice President

Jack of all trades, some inconvenient drone truth

by Gary Mortimer, sUAS News – the business of drones (www.suasnews.com) February 10, 2017

To fly a drone commercially in the USA you need to pass a straightforward test from the FAA. This has caused a drone gold rush. On paper buy a Phantom, Inspire or eBee and no need to head West. You can make a pot of gold in your very own neighborhood.

I am beginning to see people standing themselves up as experts in making money with a Part 107 and UAV. Offering for a small consideration, of course, the secret sauce. How does that work when they cannot have had a full year's trading as a Part 107 operator?

All is not well in the state of 107

There is a feeling of slight panic surrounding some of the new drone companies.

Asking on Facebook, what and how others charge. Shouting disbelief that they just can't go and fly in the center of town. In most cases having taken the Part 107 test already. This might suggest that the study material is lacking.

These Facebook folks are the first to rush to answer surveys often being placed to help them by those people with all the answers. In reality, their contact emails are being harvested and they must expect false hope for a fee in an inbox soon.

Drone work brokers

Several websites, no names no pax drill aim to connect drone pilots and clients. The websites then take a cut of the job.

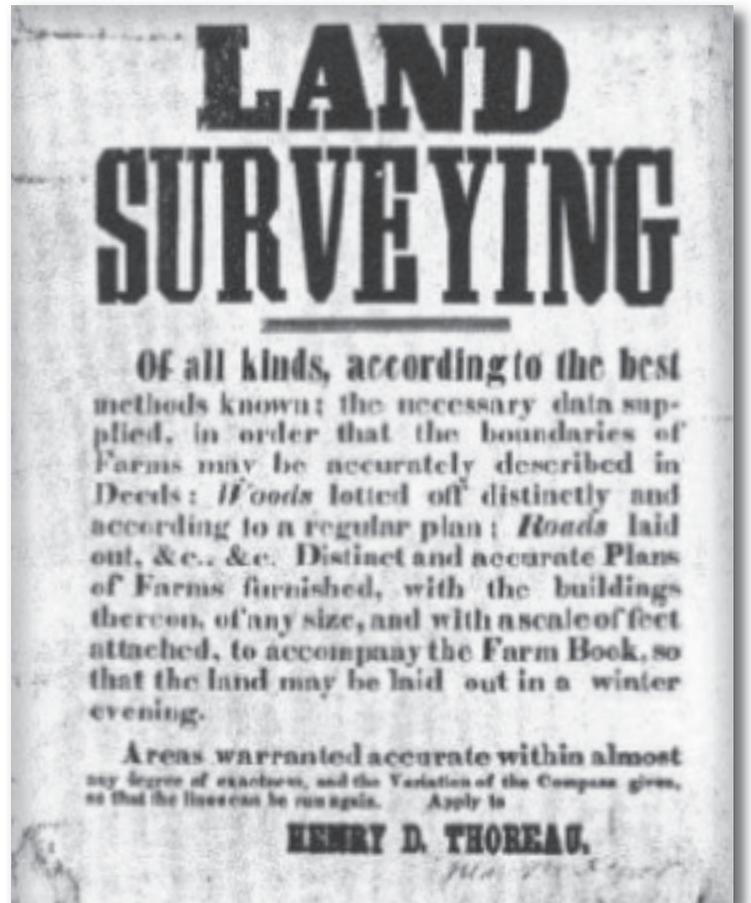
That's fine and dandy, a handy service for all three sides of the coin.

Which gets the thin side, though?

I am concerned that these drone pilots offer a wide range of services and cannot in most cases be qualified to provide the service.

Jack of all trades, master of none

I looked at one of those websites and this is a sample of companies that operate in New York State and what they offer. Names removed to spare blushes.



Agriculture, Boating And Water Sports, Cinematography, Construction, Drone Training, Event, Infrastructure, Real Estate, Roof Inspection, Surveying & Mapping \$200 an hour

Agriculture, Construction, Drone Training, Editing, Event, Infrastructure, Real Estate, Roof Inspection, Surveying & Mapping, Wedding \$350 an hour

Cinematography, Construction, Drone Training, Editing, Event, Real Estate, Roof Inspection, Surveying & Mapping \$450 an hour

Some inconvenient drone truths

To complete a Roof Inspection legally, in New York State you need to be a home inspector licensed by the NYS Department of State.

(continued on page 34)

Seiler Instrument

Over seventy years ago our firm started with optics with manufacturing and servicing surveying instruments and microscopes. We have continuously expanded and evolved with the surveying industry to support, promote, and educate our customers on new GNSS technologies.

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- Autodesk
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Jack of all trades, some inconvenient drone truth (continued)

Roof inspections are a great fit for drones. Nobody needs to be climbing ladders and putting themselves at risk. Nor is expensive scaffolding or rope access work required.

But to be more than flying over a roof and saying it, “looks alright to me!” You should cover the following.



Section 197-5.7 Roof Systems

(a) Home inspectors shall observe and report on readily accessible:

1. Roofing materials and condition;
2. Roof drainage systems;
3. Flashing;
4. Skylights, chimneys and roof penetrations.

(b) The home inspector shall report on the methods used to observe the roof and other components set forth in this section.

(c) All home inspection reports shall describe the observed condition and type of roofing materials and shall describe the methods used to observe the roofing.

(d) Home inspectors are not required to observe and report on:

1. Antennas, lightning arresters or similar attachments;
2. Any flue or chimney interior that is not readily accessible;
3. Other installed accessories.

(e) Home inspectors are not required to operate powered roof ventilators.

(f) Home inspectors are not required to determine the remaining life expectancy of roof coverings, manufacturers' defects, installation methods or recalls or to determine the number of roof layers present.

(g) Home inspectors are not required to walk on or access a roof where to do so could result in damage to the roof or roofing material or endanger the health and safety of the home inspector.

Is handing client images and letting them decide a roof inspection?

Becoming a qualified home inspector takes a chunk of work, more may I venture than a Part 107.

Qualifications for licensure

An applicant for a license as a home inspector shall:

(a) have successfully completed high school or its equivalent; and

(b) (i) have successfully completed a course of study of not less than one hundred forty hours approved by the

secretary, of which at least forty hours shall have been in the form of unpaid field-based inspections in the presence of and under the direct supervision of a home inspector licensed by the state of New York or a professional engineer or architect regulated by the state of New York who oversees and takes full responsibility for the inspection and any report provided to a client; or (ii) have performed not less than one hundred home inspections in the presence of and under the direct supervision of a home inspector licensed by the state of New York or a professional engineer or architect regulated by the state of New York who oversees and takes full responsibility for the inspection and any report provided to a client; and

(continued on page 36)



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R.B. @ Ragan-Smith Associates



Specialization
Building
Civil Infrastructure
Government

Value Added Services
Consulting Specialized
Product Support Specialized
Authorized Training Center
Authorized Certification Center



Jack of all trades, some inconvenient drone truth (continued)

(ii) have performed not less than one hundred home inspections in the presence of and under the direct supervision of a home inspector licensed by the state of New York or a professional engineer or architect regulated by the state of New York who oversees and takes full responsibility for the inspection and any report provided to a client; and

(c) have passed a written or electronic examination approved by the Secretary and designed to test competence in home inspection practice as determined by a recognised role definition methodology and developed and administered to the extent practicable in a manner consistent with the American Educational Research Association's "Standards for Educational and Psychological Testing." An applicant who has passed an existing nationally recognised examination, as approved by the Secretary, prior to the effective date of this article shall be in compliance with this paragraph; and

(d) pay the applicable fees

So that's roof inspection, **what of surveying?**

A New York licensed land surveyor (LS) is a professional who uses applied mathematics and other technical and research skills to measure and plot:

- the dimensions of any portion of the earth's surface (including natural and other structures);
- the lengths and directions of boundary lines; and
- the contour of the earth's surface.

Licensing Requirements

The practice of land surveying or use of the title "land surveyor" within New York State requires licensure.

To be licensed as a land surveyor in New York State you must:

- be of good moral character;
- be at least 21 years of age;
- meet education requirements;
- meet examination requirements; and
- meet experience requirements.

The specific requirements for licensure are contained in Title 8, Article 145, Section 7206-a of New York's Education Law and Part 68 of the Commissioner's Regulations.

Education and Experience Requirements

To become licensed as a professional engineer in New York State you must complete a combination of education and experience for which years of credit are awarded. The credit awarded for your education determines the required number of years of experience you need:

- A total of 6 years of credit is required for admission to the Fundamentals of Engineering examination
- A total of 12 years of credit is required for admission to the Principles and Practice examination for licensure.

Examination Requirements

To be licensed as a professional engineer in New York State, you must pass:

- The Part A, the Fundamentals of Engineering (FE) exam, and
- The Part B, the Principles and Practice of Engineering (PE) exam.

Examinations are developed by the National Council of Examiners for Engineering and Surveying (NCEES) and administered by CASTLE Worldwide, Inc. or Pearson VUE Testing Centers.

All exam applicants are required to read the "NCEES Examinee Guide" prior to being allowed to register for the exam. Please use this link to access the "NCEES Examinee Guide" at: <http://ncees.org/exams/examinee-guide/>

As we saw above all three companies listed these services as well as others.

This means that they must have or have on staff a qualified building inspector and surveyor. As well as of course that Part 107 pilot.

It might seem a uniquely American problem; it's not, the same sort of rules and regulations are in place around the world.

They are in place to protect the customer.

My free advice for those wanting to start in the drone business is to exploit a niche you are expert in and make your drone a force multiplier within it.

You should be the best at what you do, not the cheapest.

There is no rapid route to riches in the RPAS business.

Beware false prophets! 

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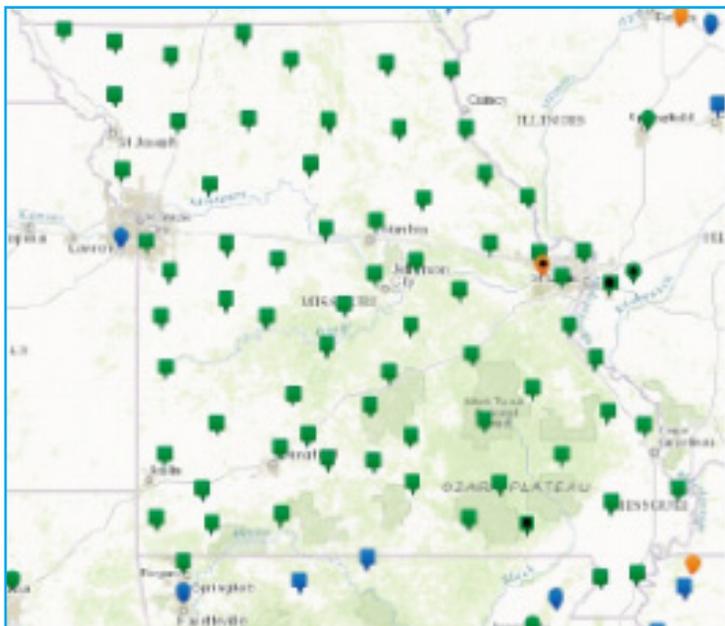
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Notes from the National Geodetic Survey

February 1, 2017

Improved CORS and OPUS Share Maps Available to Beta Test

Improved CORS and OPUS Share Maps Available to Beta Test. Improvements to NGS' popular Continuously Operating Reference Station (CORS) and Online Positioning User Service (OPUS) applications include: scaling maps to fit mobile devices, clustering information within geographic areas for faster loading, and enhanced searching/filtering options to find data of interest. Additionally, as more users share their OPUS solutions, the improved map application will help ensure information is accessible to the broader surveying community.



Map applications are an efficient way to identify geodetic information in an area of interest, including continuous GNSS sites (CORS) and GNSS-derived coordinates at survey marks (OPUS Share solutions). The CORS and OPUS Share maps provide information about two of NGS' most popular products. The new, Beta versions of these applications scale to fit any viewing device, including mobile devices, includes features for faster loading, and contain added functionality for searching and filtering. All of these improvements will improve usability and ultimately increase the accessibility of NGS data to the public.

Thursday, January 5, 2017

Improvements to NGS' Online Positioning User Service (OPUS)

NGS recently upgraded OPUS, which provides simplified access to high-accuracy National Spatial Reference System (NSRS) coordinates, to improve results in areas where Continuously Operating Reference Stations (CORS) are distributed unequally. By considering both base station direction and proximity, OPUS now selects CORS more appropriately for Rapid-Static (RS) GPS data processing. This will increase OPUS-RS availability from 93 percent to 98 percent in the central United States, and should improve positioning accuracy under more challenging atmospheric conditions. OPUS allows users who upload a GPS data file collected with a survey-grade GPS receiver to obtain an NSRS position via email. This latest improvement provides enhanced NSRS access for users, advancing NGS' mission "to define, maintain, and provide access to the NSRS to meet our nation's economic, social, and environmental needs." 🇺🇸



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Rich Rewards from NOAA's CORS and GRAV-D Programs

Since 1807, **NOAA's National Geodetic Survey (NGS)** and its predecessor agencies have partnered with surveyors in both the public and private sectors to place hundreds of thousands of survey marks throughout the United States, **determining positional information** for each mark. Each survey mark is published with accurate horizontal and/or vertical information such as latitude, longitude, and/or height. This collection of more than 1,500,000 points, plus more than 1,300 **Continuously Operating Reference Stations (CORS)** which the National Geodetic Survey coordinates and monitors, form the **National Spatial Reference System (NSRS)**. **The NSRS provides more than \$2.4 billion in potential annual benefits to the U.S. economy**, according to a new independent study. The study finds that the NOAA CORS network alone provides an estimated \$758 million per year in benefits.

The study estimates that an additional \$522 million in annual economic benefits could be generated by the implementation of a new vertical reference system, allowing users to **determine more precise elevations using the Global Positioning System (GPS)**, with approximately \$240 million saved from improved floodplain management alone. Development of this new reference system would result from the completion of a new NOAA initiative, **Gravity for the Redefinition of the American Vertical Datum (GRAV-D)**, which will allow surveyors and scientists to employ GPS to **determine more precise and accurate elevations than currently possible, in less time and with less effort**. Because the current



vertical datum is anchored by less accurate, more costly survey monuments, there are elevation errors ranging from 16 inches to 6 feet relative to sea level. When GRAV-D is successfully completed and the new elevation system is accessed using the CORS network, **these elevation errors will be reduced to just under an inch.**

The study, conducted for NGS by Leveson Consulting of Jackson, New Jersey, will be followed by a more refined evaluation of the benefits of the CORS network and the future impact of the new NOAA GRAV-D initiative designed to replace the existing North American Vertical Datum established in 1988 (NAVD88).

For more information, contact NGS:

- **On the Web**
geodesy.noaa.gov
- **NOAA Office of Legislative Affairs**
202-482-4981

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Migar Enterprises, Inc.	J. Bernard Baldus	PO Box 528	St. Charles, MO 63301
Bax Engineering Co., Inc.	Dale Bax	221 Point West Blvd.	St. Louis, MO 63101
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Allstate Consultants, LLC	Ron Shy	3312 Lemone Industrial Blvd.	Lee's Summit, MO 64063
Anderson Survey Company	James Anderson	203 NW Executive Way	Cape Girardeau, MO 63701
Koehler Engineering & Land Surveying, Inc.	Chris Koehler	194 Coker Lane	Marshfield, MO 65706
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Syllabus for Land Surveyor Exam, Charles Safford
River & Lake Boundaries, by James A. Simpson (like NEW!).
Boundaries and Landmarks; A Practical Manual, by A.C. Mulford, (this is a 1987 reprint by Carben Surveying Reprints of the 1912 manual).
 1965 reprint of 1963 *Restoration of Lost or Obliterated Corners Manual* &
 1974 reprint of 1973 *Restoration of Lost or Obliterated Corners Manual*.
Federal Instructions from 1785-1843.
 1811-1844 *Instructions to Deputy Surveyors in AR. MIS. LA. FL*.
 1973 *Manual of Instructions*, paperback.

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