



MISSOURI SURVEYOR



A Quarterly Publication of the
Missouri Society of Professional Surveyors

Jefferson City, Missouri

March 2014



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CALENDAR OF EVENTS

2013-2015

May 8-10, 2014

Board Meeting and
Spring Workshop
Lodge of Four Seasons
Lake Ozark, MO

July 18-19, 2014

Board Meeting and Pac
Fundraiser Golf Tournament
Minimum Standards Workshop
Capitol Plaza Hotel
Jefferson City, MO

August 20-22, 2014

Review Course
Jefferson City, MO

October 23-25, 2014

57th Annual Meeting and
Convention
Joint Meeting with the Kansas
Society of Land Surveyors
Sheraton Overland Park Hotel,
Overland Park, KS

December 6, 2014

Board Meeting, MSPS Office
Jefferson City, MO

May 7-9, 2015

Board Meeting and Spring
Workshop
Lodge of Four Seasons, Lake
Ozark, MO

Donald R. Martin, Editor



Notes from the Editor's Desk

Donald R. Martin



Welcome to the spring 2014 edition of Missouri Surveyor... and I hope it looks and feels like spring by the time this reaches you. What a winter! Some blame *global warming*, others say it's an *Arctic vortex* while the experienced and learned turn to the ground hog. I checked with my resident land-beaver, Tripod the three-legged ground hog and he reported mixed findings. Shadow seen part of the day, no shadow for the remainder. Hmm...I consulted authoritative texts for the resolution of this puzzle such as *the Farmer's Almanac*, the *Sokkia Ephemeris*, and *Clark on Surveying and Boundaries*. As best I can tell it looks like we could have either six more weeks of winter, or just a month and a half of the dreary season. As with any precise measure this forecast requires application of the qualifying adage, "more or less". Enough meteorology (Tripod limps back to his burrow) and on to this edition...

I want to preview this edition by topic as opposed to chronology. The enclosed news and articles fall into primary categories of MSPS member contributions, articles addressing survey practice, and finally information relative to recent hot topics of education, experience and skills needed to be a surveyor – a triad (or *tripod*) of topics.

Member contributions include a poetic ode to surveyors by PLS Ralph Rigg's son Regan entitled *So God Made a Surveyor*; PLS Chris Wickern notes the challenges of survey planning and research in *The Estimate is WHAT?*; photographs recognizing our three *State Land Surveyors* and the presentation of the *Dan Lashley Scholarship*; PLS Dick Elgin invites reader feedback for his book *the United States Public Lands Survey System of Missouri* and he offers a survey test question (stump the Ol' Professor).

In writings associated to surveying practice and operations we have news of an *OPUS Enhancement* by NGS; a Knud Hermansen thesis, *Surveyors & Title*; an article identifying emerging opportunities for surveyors by Cyn Rene Whitfield, *Bridge Shadows*; and an engaging narrative detailing the course of a surveying project through the execution and actions of a small firm's staff from PLS Andrew Kellie of Kentucky writing *A Line of Retreat*.

For the final topic of education, experience and skills we have news of *the FIG Young Surveyors Network*; from Malaysia Chuah Bee Kim authored *A Nation is Built by Surveyors* (got to love that title!) discussing the challenges of finding and training new surveyors in that Southeast Asian Tiger; a collection of data sheets from the job economists at *the U.S. Bureau of Labor Statistics* illustrating the market and human resource interpretations of what surveyors do and what skills and training are needed in this field.

Enjoy this edition and please feel welcome to participate in this periodical. Writings, stories and ideas from MSPS members are welcome and encouraged. This is our newsletter, and our voice of *surveyors leading the way!*

Donald

THE MISSOURI SURVEYOR

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EDITOR

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

PUBLISHER

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

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President's Message

Robert L. Ubben, PLS



Welcome to winter! I hope all of you are staying as busy as the weather will allow. This cold season makes hard work out of getting any type of field surveying done. You know it is a tough winter when survey crews are taking a rotary hammer drill out to start holes in the dirt for setting rebar property pins.

Every year MSPS has a legislative day giving the surveying community an opportunity to reach out to legislators concerning various bills that impact our profession. This year that day is set for Wednesday

February 19. MSPS encourages participation at this event so the organizations concerns or positions are heard by a larger audience of legislators. If you have never attended, or met the representatives from your area of the state, I would urge you to consider attending the MSPS Capitol Visit Day in future years. There are three bills that MSPS is watching this legislative year. Below is a snap-shot of the bills. More information can be found at www.house.mo.gov and then searching for the bill number.

HCS HB 1204 is related to un-manned aerial surveillance. As currently written the bill would not permit using an un-manned aircraft or drone for surveying and mapping purposes. There is consideration being given to amend the language so that our type of work could be permitted.

SB 704 is the bill that would modify education requirements to enroll as a land surveyor-in-training. This bill phases out the option of enrolling using the 12 semester hours and replaces it with 30 semester hours. This will be the second year of proposing this change, and probably won't be the last. As stated in the September 2013 issue of the Missouri Surveyor, the changes are not intended to discourage individuals from becoming Professional Land Surveyors, but that better educated and knowledgeable surveyors can better serve the needs of the general public in the future.

SB 809 modifies laws licensing Architects, Professional Engineers, Professional Land Surveyors, and Professional Landscape Architects. This act repeals provisions that allow for becoming a Professional Land Surveyor by having twenty years of experience and passing certain exams. It also adds that the practice of professional land surveying includes preparation of property descriptions, surveying and establishment of right-of-ways and easements, and work involving design surveys and expert technical testimony.

Governor Nixon named Richard Fordyce as the Director of the Missouri Department of Agriculture in December. It is good news the department has leadership in place and I look forward to an opportunity to meet with Mr. Fordyce and his staff.

Planning is complete for the 36th Annual MSPS Spring Workshop to be held May 8-10 at The Lodge of Four Seasons in Lake Ozark, MO. The topics are research and investigation, reading railroad and MoDOT maps, interpreting GLO notes and plats, evaluation of data by a judge, resolving boundaries, and final plats.

(continued on next page)

SO GOD MADE A SURVEYOR

*And on the tenth day
God looked down on his creation called paradise
He said I need somebody to measure the land honestly
So God made a surveyor*

*God said I need someone who will wake up before dawn
drive three hours to the boondocks
work all day
drive three hours back home
put on some nice clothes
go to church
stay and talk to friends and family til 9:30
go home
help his children with their schoolwork til eleven
go to bed
get up the next and do the same thing again
So God made a surveyor*

*God said I need somebody to fight gnats
swat flies and mosquitoes
trek through swamps and steep hills
all the while watching for fire ants, wasps and bees
also trying not to find copperheads, cottonmouths and alligators
So God made a surveyor*

*God said I need somebody who can hold a family together
with simple kindness and words of wisdom from experience
who will show his children manners and good conduct
yet will let them know who is in charge of the house
So God made a surveyor*

*God said I need somebody who can settle differences
between two landowners
with justice and fairness*

*God said I need somebody who won't cut corners
go off line
or ignore a landowner's wishes*

*God said I need somebody who will measure straight
respect the law and the surveyors who came before him
and when the time comes
defend what he knows is right
So God made a surveyor*

*God said I need somebody who will smile
pull out his handkerchief
wipe his eyes to hide his tears*

*when his sons say
they don't want to spend their lives
doing what dad did*

So God made a surveyor

*--Regan Riggs
Regan is the son of Ralph Riggs, PLS2175*

President's Message

Planning is under way for the Annual Meeting to be held at The Sheraton in Overland Park, Kansas on October 23-25. The theme is Expanding Surveyors Horizons through Education. This will be a joint meeting with the Kansas Society of Land Surveyors.

In January I was invited to attend the St. Louis Chapters' Annual Banquet. It was a pleasure to attend and meet people from that area. Thank you to their Past-President Jared Minnick for inviting me, and congratulations to Charles Quinby on his new term as their Chapter President. It was great to be there and I appreciated the opportunity to participate in the fun event and enjoy a nice dinner.

This will be Don Martins second newsletter, and I have to say that he "lead the way" in putting together a nice publication. He had many informative articles and resources of information to enlighten or benefit us. Of particular interest to me personally, was the article on the "Final Point". I was not aware of this program between the National Society of Professional Surveyors and Berntsen International that could be used to remember past surveyors. My family experienced such a loss last year in the passing of my brother Doug, who started me out in my career and showed me how to become a better person and surveyor. What a great way to remember surveyors. I am glad that information found its way to me.

I look forward to seeing everyone at the upcoming meetings. Until then, enjoy what is left of winter, and hope for a nice spring season to work in. 🇺🇸

Cover Photo

**Dent County near the Meramec River
-- another rendezvous held in adverse
conditions with 8 to 10 inches of snow.**

Those in attendance were from Left:
Justin Backues, Ralph Kliethermes, Joe Bax,
Marty Wasson, Ben Boyer, Tim Daugherty,
Jim Hayes, Ken Buchanan, Melvin Distler,
Craig Ruble, Loyd Todd, Diane Diebold,
Bob Shotts, Roger Backues, Mark Nations,
Travis Tomson, Mark Schroyer, Karla Ahl,
Michael Johnson, Chris Calandro,
Ron Schwarz, Dwayne Carpenter and
Michelle Elwood;
Not pictured: Ralph Riggs (photographer)



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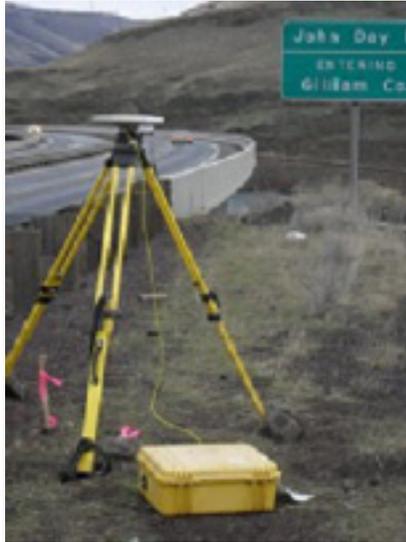
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Popular GPS Positioning Service is Enhanced: OPUS Projects

The National Geodetic Survey (NGS) has enhanced its popular Online Positioning User Service (OPUS) to improve positioning results for GPS field projects consisting of multiple survey locations. The new project option, called “OPUS-Projects,” allows trained engineers, surveyors, and other users to position campaign-style GPS data files with greater accuracy by combining them and constraining them to either national or local reference systems. Collaborators can easily share project tasks from any Web browser, using intuitive map and tabular data visualizations and simple processing menus. 🇺🇸



Missouri USPLSS Quiz

by Dick Elgin

This is the first of several quizzes concerning Missouri’s version of the USPLSS which will appear in subsequent issues of the “Missouri Surveyor.” The first question in this series is:

“Excluding U.S. Surveys, what is the location of the first corner of the USPLSS to be monumented in what became the state of Missouri?”

Email your answer along with any explanatory information to Dick Elgin at the email address below. The person who responds first with correct answer will win a congratulated in the next edition of the “Missouri Surveyor” and will win an autographed 2006 Sokkia Ephemeris! 🇺🇸

Dick Elgin
elgin@rollanet.org

INPUT INVITED

As you read “The U.S. Public Land Survey System for Missouri” and have comments (good or bad), edits, input, corrections, constructive criticism, or ideas for additional materials, please feel free to transmit them to me by email at: elgin@rollanet.org

Thanks
Dick Elgin
The Author



2014 Spring Workshop The Lodge of Four Seasons May 9 & 10



Plats, Maps & Notes, Oh My!

Topics include: Research, Reading and Interpreting Railroad and MoDOT maps, GLO Notes, Sectional Breakdown, Evaluation of Data, Resolving Boundaries, and Final Plats.

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Missouri's State Land Surveyors



As we await the establishment and appointments to the Land Survey Advisory Commission (Missouri Department Agriculture) here is a photo reflection of all (and the only) State Land Surveyors to serve Missouri.



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The Estimate is WHAT?

by Chris Wickern, PLS

This is a story that many of us know all too well. It begins with a request for a survey in the rural areas of our fair State. A check with the corner master index indicates there is 1 corner of record in the west half of the Township. You continue with your research and find 1 survey of record from the 20th century 2 miles east and a mile north of the Section. This “survey” starts at a corner they set, goes to corners they set, closes to the corner they started at, and has truncated lines drawn to symbols for PLSS corners with no bearings or distances. We’ve all seen these. They are little more than an island floating in space. That’s 2 documents of record in the Section and the surrounding 12 Sections in over a century.

One corner of record and one survey of record not tied to the sectionalized land system. At least the corner document is for a Section corner in the Section we are looking at. We find more information digging back into the record. The original survey, County Surveyors work from the 1840’s, 1850’s, 1870’s and the 1880’s. Several of these state how they set stones perpetuating and restoring the original posts based on original bearing trees. They describe how they set the center of Section, and 1/16th corners. They describe the stones they found and set at the corners with new references. They protected the public by perpetuating the public land system and placing their results in the record for the public to rely on, what a concept.

Funny thing about these ancient stones in rural land, I recall knocking on a door looking for information for one of these stones. The owner invited us in to the house, and we explained what we were looking for. I looked up as we entered and there it was! Set in to the stone work for the fire place. The owner explained this odd looking stone added “character” to the fire place. Even when they are not adding character to a fire place, fences move, roads are built, timber is cleared, and land is cultivated. Many stones set by the County Surveyor 150 years ago are lost. Occasionally we find a survey in the records of a long gone private surveyor, or a land owner in the area. These are usually one of those islands floating in space. There are exceptions, and sometimes a copy actually shows the position of the corner before the stone was destroyed, but it is very rare. It seems that no one in the 20th century seemed to think perpetuating the land system by placing results in the record was important. After all, it’s their record, and a simple matter of a contractual agreement between the surveyor and the client. Much of the rural land has been walked and sold using fences, tree lines, and improvements. These may fit the land lines called for in the deed, but more than likely the improvements are not going to fit the deed. There is little

doubt that the survey results are going to be different than what is expected.

Still, we do have a record, and we do find stones. Most County Surveyors did and still do good work. The County Surveyor was the only surveyor contemplated by law until the mid 1950’s when licensing became law. The County Surveyor has always been required to place their surveys in the public record. It’s a requirement of law enacted for the



Territory of Missouri in 1814, and still exists today. In that sense, a strong record from the 19th century is not surprising. The practical surveyors didn’t do much land surveying until after the Civil War. It seems the late 19th century is when our land survey records started to fall apart. What the County Surveyor had always been required to do (place their surveys in the record) simply did not apply to the practical surveyor. The state didn’t regulate them, they had no requirements to fulfill, and they left very little record evidence of what they did. Maybe that was the reasoning when the state legislature enacted a law that requires the owner of rural land to “cause such lands to be surveyed and a plat thereof made by a surveyor”. The law went on to state it “shall be certified to by the surveyor and recorded in like manner as the plats of towns are required to be certified to and recorded”. This law enacted in 1873 still exists today and the same language is found in RSMo 137.185. The private surveyors thought and trained the next generations of surveyors to think that the law doesn’t apply to them. Technically, they are right I suppose, the law requires the owner to cause this to happen and not the surveyor. I wonder how often the owner is even aware of the requirement. If licensing would have been required before this law, and all surveyors held to the simple standards of the

(continued on page 11)

MO Colleges/Universities Where Land Surveying Coursework is Available

The following list will be updated quarterly as new information becomes available.

Longview Community College — Lee's Summit, Missouri

Contact: David Gann, PLS, Program Coordinator/Instructor —
Land Surveying MCC — Longview, MEP Division
Longview Community College
Science and Technology Bldg.
500 SW Longview Road
Lee's Summit, Missouri 64081-2105
816-672-2336; Fax 816-672-2034; Cell 816-803-9179

Florissant Valley Community College — St. Louis, Missouri

Contact: Richard Unger
Florissant Valley Community College
3400 Pershall Road
St. Louis, Missouri 63135
314-513-4319

Missouri State University — Springfield, Missouri

Contact: Thomas G. Plymate
Southwest Missouri State University
901 So. National
Springfield, Missouri 65804-0089
417-836-5800

Mineral Area College — Flat River, Missouri

Contact: Jim Hrouda
Mineral Area College
P.O. Box 1000
Park Hills, Missouri 63601
573-431-4593, ext. 309

Missouri Western State University — St. Joseph, Missouri

Contact: Department of Engineering Technology
Missouri Western State University
Wilson Hall 193
4525 Downs Drive
St. Joseph, MO 64507
816-271-5820
www.missouriwestern.edu/EngTech/

St. Louis Community College at Florissant Valley

Contact: Norman R. Brown
St. Louis Community College at Florissant Valley
3400 Pershall Road
St. Louis, Missouri 63135-1499
314-595-4306

Three Rivers Community College — Poplar Bluff, Missouri

Contact: Larry Kimbrow, Associate Dean
Ron Rains, Faculty
Three Rivers Community College
2080 Three Rivers Blvd.
Poplar Bluff, Missouri 63901
573-840-9689 or -9683
877-TRY-TRCC (toll free)

Missouri University of Science and Technology — Rolla, Missouri

Contact: Dr. Richard L. Elgin, PLS, PE
Adjunct Professor
Department of Civil Engineering
1401 North Pine Street
211 Butler-Carlton Hall
Rolla, Missouri 65409-0030
573-364-6362
elgin@mst.edu

University of Missouri-Columbia, Missouri

Contact: Lois Tolson
University of Missouri-Columbia
W1025 Engineering Bldg. East
Columbia, Missouri 65211
573-882-4377

Missouri Southern State College — Joplin, Missouri

Contact: Dr. Tia Strait
School of Technology
3950 E. Newman Rd.
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RTI Drafting & Design Student Gage Maben awarded the O. Dan Lashley Memorial Scholarship.

On October 24, 2013, Gage Maben was awarded the O. Dan Lashley Memorial Scholarship at Rolla Technical Institute (RTI) in Rolla, MO. Presenting the scholarship to Gage are selection committee members Darrell Pratte, PLS and J. Michael Flowers, PLS. Gage is from Rolla and will graduate from the RTI Drafting & Design Program in December 2013.

The annual \$500 scholarship was commissioned by O. Dan Lashley, a long-time Department of Natural Resources surveyor and Rolla resident, specifically for an RTI Drafting & Design second year student interested in land surveying. Mr. Lashley had a love of surveying, educating young people about the profession, and encouraging them to consider a career as a Professional Land Surveyor.

Contact: **Don Block**, Drafting Instructor, Rolla Technical Institute
1304 E. 10th Street, Rolla, MO 65401
573 458-0150, 573 458-0155 (fax)
dblock@rolla.k12.mo.us
<http://rolla.k12.mo.us/schools/rtirtc/>



Pictured from left: Darrell Pratte, PLS, Gage Maben, J. Michael Flowers, PLS

The Estimate is WHAT? (continued)

County Surveyor, I wonder if it would have been thought of.

There is a strong record from the 19th century of restoring, perpetuating and establishing boundaries and land corners; then there is essentially nothing from the entire 20th century. The 19th century surveyors were well respected, and even though we call ourselves professional today, our reputation continues to dwindle with the public. They protected the public through and with their records, and we seem to be concerned with the bottom line profit only. The case could be made that we have harmed the public. Our lack of a survey record for the past 100- 150 years burdens today's land owner with oppressive and prohibitive costs to get a proper boundary survey done. That is something to ponder, but my mind is wandering.

Back to the proposal, I'll start by letting them know that there is no way I can provide a realistic estimate without a site visit to investigate and see if there are monuments at corners on, in, or around the Section. There simply isn't enough record information on which to base an estimate. They want a "ball park" estimate, and I can't tell from the record if we are playing on a little league field at the park or a major league stadium.

So, we are looking at proving, restoring or reestablishing 3 Section corners, 4 quarter corners, and the center of Section. Only then we can break down the quarter/ quarter Section owns client owns the east half of. We will need to survey many miles to finally get to what the client has requested, and that is to subdivide a 5 acre parcel to be given to their daughter. Because of the record, and knowing if I do find monuments I still have to prove them. I don't think the client is going to like my estimate starting at \$15,000 for land he is giving away.

It's not surprising we don't get a lot of this work. We are constrained by our Standards for Boundary Surveying, our Code of Conduct, and all of our statutes and laws affecting land surveying. All of us are, but the truth found on the ground says we are not. Those found bars with no cap don't appear in the record today. There was even a time period when private surveyors would set a monument "off" the corner to ensure no one else used "their" work. We have to ask, is it a monument representing a corner, or is it something else? If they set offset monuments to protect their work from using it, it's a pretty safe bet they didn't bother placing the survey in the public record. Isn't it strange that we have a better and more reliable record of the public land system from 150 years ago than we do today? What does that say about our profession and our charge to protect the public? 🇺🇸

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Company Sees Dramatic Growth Becoming Topcon's Largest Dealer in North America

DALLAS, TX – December 5, 2013 – *GeoShack North America, Inc.*, recently celebrated its 10th anniversary. GeoShack's formation changed the distribution landscape for the markets it serves. Since the company's inception, GeoShack has seen extraordinary growth, becoming not only North America's largest overall Machine Control dealer as well as Topcon's largest distributor. The company has seen numerous changes over the past ten years, growing from a small regional dealer with ten locations in three states and one Canadian province; to having a real North American presence with 23 locations in 8 states and two Canadian provinces, and from 60 employees to over 180 employees.

GeoShack would like to take this opportunity to thank our customers for putting their continued faith in our organization, our employees for their hard work and dedication to supporting our customers, and Topcon, our primary vendor partner, for supplying us with the technology and products to serve our customers.

GeoShack North America, Inc. was formed on October 15, 2003 in response to the rapidly changing marketplace in the construction laser, machine control, GPS and survey instrument markets with the merger of four independent distributors:

- GeoShack in Dallas, Ft Worth, San Antonio and Austin, Texas
- Spectra Laser & Precision Instrument Inc. in Houston, Texas
- Laserline Ontario in Toronto and Exeter, Ontario, Canada
- Blue Beam in Cleveland and Columbus, Ohio & Detroit, Michigan

The industry has also changed significantly over the years – the technology and products have evolved and become more software-driven. GeoShack has had to change with the markets to stay competitive. The company's leadership approach has played a significant role in GeoShack's success, consistently collaborating to deliver industry best products and services while fostering internal professional growth.

"The real foundation of our success lies in the long-term relationships we have established with our customers, our employees and our manufacturing partners," said Mr. Scott Beathard, President and CEO. "We have always operated as an active member in the industries we serve. In our first ten years, we have evolved to serve our customers and the markets, by delivering solutions that have and continue to fundamentally reshape the competitiveness of their businesses. We will continue to invest in our people and will keep looking for ways to better serve our customers so we can be here for them over the next ten years and beyond."

"Strategic acquisitions have been fundamental to the growth of the company and our ability to deliver quality products and services to our customers," added Mr. Tom Brennan, Vice President & Regional Manager for South Texas. "We have made several acquisitions

over the last few years which have expanded the markets we serve. Whether it's through internal development or acquisition, we continue to work hard to deliver the technology and services our customers want." Mr. Brennan was President of Spectra Laser in Houston, one of the four original founding distributors, and continues to serve on the Board of Directors for GeoShack North America, Inc.

"Since forming GeoShack North America, Inc., We have been able to create a dedicated team of Survey and Machine Control specialists that has taken our markets to a new level of professionalism within our industry," added Mr. Robert McIntosh, Board Member for GeoShack. "Given the rapid technology changes with our product lines, we have been able to provide our customer base with unequalled sales, training and product support through all of our markets in both the US and Canada." Mr. McIntosh was President and CEO of Laserline, one of the four founding distributors of GeoShack North America, Inc.

Mr. Robert Makenas, the company's CFO, comments, "Over the years we've had an extremely strong financial track record when compared with other companies in the markets we serve. We have continued to grow consistently even in the difficult economic climate of the last five years. This is a real testament to what can be achieved when we stay focused on the needs of our customers."

ABOUT GEOSHACK

GeoShack operates under the concept, "Everything for Jobsite Accuracy". At each location, contractors, farmers and surveyors can find a wide selection of construction lasers, total stations, robotic instruments, GPS Survey systems, optical instruments, 2D & 3D machine control systems, GPS based agricultural guidance and autosteer systems, variable rate control technology, software for a multitude of applications, and a complete line of supplies and accessories. GeoShack is the retail division of GeoShack North America, Inc., an organization with sales professionals and technical service and support specialists in 23 major market areas in North America with over 180 employees.

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NEWS RELEASE

GeoShack North America, Inc.
2307 Springlake Rd., Suite 514
Dallas, TX 75234
Phone 972-241-6001

World-Wide Young Surveyors Network

Source: International Federation of Surveyors

The FIG Young Surveyors Network (YSN) provides a great opportunity for young surveyors to join together, network and become involved with other young surveying professionals around the world. A Young Surveyor is defined by FIG as a person 35 years old or younger or within 10 years of graduation with a Bachelors or Masters degree in surveying/geomatics.

The YSN was established as FIG Commission 1 (Professional Standards and Practice) Working Group 1.2 Young Surveyors at the FIG Congress in Munich in 2006. In 2009 it became the FIG Young Surveyors Network and currently has the status of a Commission level body within FIG (International Federation of Surveyors). The Purpose of YSN is to:

- To improve the number of young professionals participating within the FIG.
- To help young professionals in the beginning of their careers with contacts.
- To increase co-operation between the commissions and the students and young professionals network.

The first Young Surveyors Conference was held in conjunction with the 2012 FIG Working Week in Rome, Italy. Over 120 young surveyors from over 40 countries participated. The next YS Conference will be held at the 2014 FIG Congress in Kuala Lumpur, Malaysia. The YSN is a great resource for not only networking and becoming friends and colleagues with other young surveyors from around the world but also provides information on opportunities for internships, scholarships, study and training opportunities and jobs around the world.

In September the YSN was involved in the IV International Training Course in Topography for Young Surveyors held in Madrid, Spain. This two-week annual course covers all things related to surveying including traditional surveying techniques, GIS, photogrammetry/remote sensing and laser scanning using the latest in technology. The course is taught in English. Fifty young surveyors are invited to attend and participate. The only cost is the airfare to the venue. All other costs (accommodations, meals, training, etc.) are covered. Details about the 2012 program can be found at www.fig.net/news/news_2012/training_course_topography.htm. In 2012 the 50 young surveyors came from 17 different countries. In 2013 it is anticipated that two American young surveyors will be invited to attend and participate. A truly great opportunity!

The YSN is also involved in many worthwhile endeavors including the UN-Habitat/FIG Global Land Tool Network (GLTN) and Social Tenure Domain Model (STDm) and the FIG African Task Force where young surveyors can become involved and help make a difference in improving conditions in developing countries. The YSN has a very active presence on Facebook (FIG Young Surveyors) and LinkedIn (FIG Young Surveyors Network) and you are invited and encouraged to join in with hundreds of young surveyors from around the world already participating.

The future of surveying is in your hands and the FIG Young Surveyors Network is a wonderful resource and tool to encourage and support your success. More information, including the latest YSN newsletter can be found at: www.fig.net/ys. For more information or questions, the YSN email address is: fig.youngsurveyors@gmail.com. 🇺🇸



Boy Scouts Surveying Merit Badge: Passing Along Your Legacy

by Jeffrey Horneman, PLS, GISP, Reprinted from *The Pennsylvania Surveyor*, Summer 2013

Do you enjoy teaching? Have a passion for surveying? The Boy Scouts of America (BSA) still has the “Surveying Merit Badge” available for the scouts to learn. This was one of the original 57 badges issued by the BSA in 1911.

I have been teaching the Surveying Merit Badge for more than 8 years now, and find the inquisitiveness, intelligence and vigor of the scouts uplifting. Who better to have an interest in surveying than boys who are part of a program that teaches outdoor skills (backpacking, camping, canoeing, orienteering, forestry, environmental science, hiking, pioneering, wilderness survival, etc.) along with first aid and leadership?

Typically, the scouts will range from ages 11-17 and vary in numbers participating, depending on troop size. Many of the boys I taught did not even know what surveying was (“No, I don’t go door to door and get public opinions!”), and had their eyes opened to something they seemed genuinely interested in once they found out more information.

If interested, feel free to contact me. I have surveying videos, PowerPoint presentations, and the requirements for the curriculum available. Depending on the troop or program setup—an existing leader serving as the survey merit badge counselor, and having approved youth protection training, can have you teach the boys under his supervision. If desired, you can also become a certified merit badge counselor and take the youth protection training class yourself.

Share your years of experience with a local troop and not only empower these boys with a possible career they might not know exists, but you can also reap the rewarding feeling in teaching and mentoring possible future surveyors! 🇺🇸



2103 Surveying Badge Requirements

- 1 Show that you know first aid for the types of injuries that could occur while surveying, including cuts, scratches, snakebites, insect stings, tick bites, heat and cold reactions, and dehydration. Explain to your counselor why a surveyor should be able to identify the poisonous plants and animals that are found in your area.
- 2 Find and mark the corners of a five-sided lot that has been laid out by your counselor to fit the land available. Set an instrument over each of the corners and record the angle turned between each line and the distance measured between each corner, as directed by your counselor. With the assistance of the counselor, compute the error of closure from the recorded notes. The error of closure must not be more than 5 feet. From the corners, take compass readings or turn angles to trees, shrubs, and rocks and measure to them. All measurements should be made using instruments, methods, and accuracies consistent with current technology.
- 3 From the field notes gathered for requirement 2, draw to scale a map of your survey. Submit a neatly drawn copy.
- 4 Write a metes and bounds description for the five-sided lot in requirement 2.
- 5 Use one of the corner markers from requirement 2 as a benchmark with an assumed elevation of 100 feet. Using a level and rod, determine the elevation of the other four corner markers.
- 6 Get a copy of the deed to your property, or a piece of property assigned by your counselor, from the local courthouse or title agency.
- 7 Tell what GPS is; discuss with your counselor the importance of GPS and how it is changing the field of surveying.
- 8 Discuss the importance of surveying with a licensed surveyor, the various types of surveying and mapping and applications of surveying technology to other fields, career opportunities in surveying and related fields, and qualifications and preparation for such a career.



NOTE: The above are the minimum requirements; additional skills or presentation may be added.

Helpful Links:

Find a Scout Troop near you:
<http://bsahosting.org/locator.htm>

Find a Scouting District Council near you:
<http://www.scouting.org/LocalCouncilLocator.aspx>

Questions? Contact Jeffrey Horneman, PLS, GISP, at jeffreyhorneman@yahoo.com or 412-592-4126 (cell).

Bridge Shadows

Mean More Work for Surveyors

by Cyn Rene Whitfield, Reprinted from *The Pennsylvania Surveyor*, Summer 2013

Pennsylvanians have all heard the conspiracy theories that surround Punxsutawney Phil who is wanted for fraud...but I have the inside story. The groundhog that actually emerged from his winter hole at Gobbler's Knob on Ground Hog Day was in fact Phil's second cousin Punxsutawney Chill from Siberia who thought it was actually rather nice that day. When the days get shorter and winter closes in, many people feel like hibernating until a prognosticating rodent tells us our fate for the next six weeks.

At Terrametrix we don't exactly brush off our top hats and break out the tuxedos but we are in the shadows answering the call. What started our call for documentation is being driven by the revised standards (23 U.S.C. 151) of the Federal Highway Administration (FHWA) bridge inspection program. The regulations were developed as a result of the Federal-Aid Highway Act of 1968 (sec. 26, Public Law 90-495, 82 Stat.815, at 829), but these 2005 revisions have catapulted a comprehensive effort to unify a nationwide inventory data base. Although the Act established national bridge inspection standards (NBIS) with its primary purpose to locate and evaluate existing bridge deficiencies to ensure the safety of surveyors and the traveling public, Terrametrix is safely providing bridge clearance information for the National Bridge Inventory Database in California, New Jersey and Missouri.

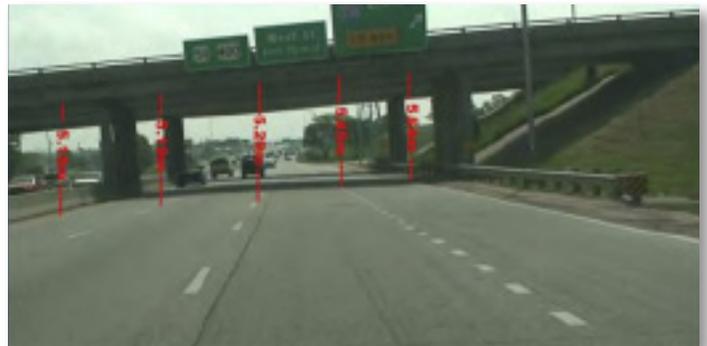
Obtaining survey-grade accuracy for bridge vertical and horizontal clearances at traffic speeds is the most efficient and safe way to measure various structures and roadway features. Bridge height clearances for truck route permitting by traditional survey methods is costly, time consuming, dangerous and presents difficulty in managing the changing data due to continued highway construction resurfacing projects.



"I knew as a surveyor there had to be a safer way to collect road and bridge data," said Michael R. Frecks, PLS, a 35-year surveying veteran, and president and CEO of Terrametrix. "Being in traffic or even on the shoulder trying to topo is the best motivator for finding a safer solution."



Driven by a safer solution in 2008, Terrametrix participated at the National Conference for Highway Asset Inventory & Data Collection Management in North Carolina. Most of the units at the conference were GIS grade units. Survey grade capabilities like the Terrametrix system StreetMapper was rare and its application for bridge clearances was contagious. Steve Varnedoe, chief engineer with NCDOT said "The most exciting application we have seen out of this conference has been within the session on capturing bridge heights while keeping our surveyors safe."



In 2010, Caltrans hired the Terrametrix team using Terrestrial Mobile LiDAR Scanning (TMLS) to document more than 8,000 bridge clearances to date. "Terrametrix already had the speed, safety and accuracy of collection with their mobile platform," Frecks said. "This massive project needed a solution to be just as efficient in the office." And, this need was soon to expand nationwide.

Traveling at posted highway speeds without stopping or needing traffic control, the data acquisition crews average 80 to 150 bridge structures per day per crew depending on the density of the structures. Accuracies of better than 1/2" have been obtained for vertical and horizontal clearances of roadway structures. It is critically important in oversize route planning.

(continued on page 23)

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A Nation is Built by Surveyors

by *Chuah Bee Kim*, *New Strait Times*, Kuala Lumpur, Malaysia, 24 Jan 2012

CHOOSING a profession or career is one of the most important decisions in life. Few choose to become quantity surveyors, land surveyors, property managers, valuers and estate agents or building surveyors, simply because of the lack of awareness of these professions.

A surveyor is an esteemed professional. A quantity surveyor manages all costs relating to building and civil engineering projects. He prepares the feasibility or cost study to ensure the viability of the project. He works closely with the architects, contractors, suppliers and property developers, among others. And the job pays well too.

The land surveyor, officially known as geomatic land surveyor, is involved in matters of boundary marking, hydraulic and engineering surveying, and even mapping surveys. He is also an expert in subdivision and partitioning of lands.

The property consultant wears a few hats. As a real estate agent, he will source properties for the investor. As property valuer, he will assess the market value of the properties. He is able to conduct studies to ensure the optimal and best use of the lands. Sometimes he acts as assessor in the High Court, assisting the judges in determining the compensation to be paid for compulsory land acquisition cases.

Johor is currently facing a shortage of such professionals. With the state experiencing rapid growth spurred by the development of Iskandar Malaysia, surveyors have to be employed from Kuala Lumpur and other countries for projects.

I know this because a close friend of mine, Samuel Tan, is the chairman of the Royal Institution of Surveyors Malaysia (RISM) Johor branch as well

as executive director of KGV for KGV-Lambert Smith Hampton (Johor)

I usually consult Tan whenever I write a report on the Johor property market.

His company offers valuation, estate agency, auction, tender and property consultancy services.

Tan heads the RISM committee of 11 members. The non-governmental organisation (NGO) was set up in 1985 and currently has some 400 members. The Johor branch is turning 25 this year.

RISM, according to Tan, is the only NGO appointed by the Iskandar Regional Development Authority (Irda) for involvement in its policy making-process.

Under the Iskandar Malaysia Property Action Think Tank, there are nine action groups dealing with various issues in Iskandar Malaysia.

RISM members sit on the committee to give professional input.

RISM members are also invited by the state government to sit as NGO representatives on the city and district councils in the last three years.

Though it had always kept a low profile, RISM Johor had recently felt the need to create greater public awareness of the profession.

One building project requires the input of various surveyors. For a start, the real estate agent will source for the land for the investor. The valuer will next assess the market value of the land, recommend the best use for it and study the feasibility of the proposed project.

The land surveyor determines the land boundaries and subdivision of the land into the various planned use. In more complicated cases, surveyors are engaged in mapping, topographical surveys and alignment.

(continued on page 23)



Samuel Tan says good surveyors will put Johor on the map.

Missouri Society of Professional Surveyors

36th Annual Spring Workshop

The Lodge of Four Seasons

Lake Ozark, MO

May 8-10, 2014

Plats, Maps & Notes, Oh My!

Missouri Society of Professional Surveyors
722 E. Capitol Avenue, PO Box 1342
Jefferson City, MO 65102
573-635-9446 * Fax: 573-635-7823
Email: mpps@missourisurveyor.org
www.missourisurveyor.org



Thursday, May 8, 2014

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

Friday, May 9, 2014

- 7:00 am Registration, Continental Breakfast and View Exhibits
- 8:00 - 9:30 pm **Research - What, When, Where and Who**
This presentation will center around 20 CSR 2030-16.030(1) of our current minimum standards. We will discuss "Research and Investigation" and how it impacts the quality of our surveys. We will look at how we conduct research, when and where we need to be looking for information and how to evaluate what's found.
Speaker: Adam Teale, Midland Surveying; Michael Freeman, Freeman Land Survey
- 9:30 - 10:00 am Break to View Exhibits
- 10:00 - 12:00 pm **How to Read and Interpret Railroad Maps & MoDOT Maps**
A presentation on the various types of railroad documents, their use and how to interpret them. Documents included will be railroad deeds, valuation maps, station plans and as-builts. A brief discussion of the various curves and their impact on railroad right of way. We will discuss railroad safety and right of entry. We will focus primarily on the Kansas City Southern Railroad but much of the information will be applicable to other railroads. This session will also focus on how to interpret highway maps from the MO Department of Transportation and how they relate to the deeds written from them. Documents included will be highway plans, deeds and survey plats.
Speaker: Bradley McCloud, MoDOT; Mark Lindenmeyer, Kansas City Southern Railway Company
- 12:00 - 1:00 pm Lunch and View Exhibits
- 1:00 - 3:00 pm **GLO Notes & Plats - How to Read & Interpret and Sectional Breakdowns**
This session will deal with the fundamentals of rural surveying: General Land Office notes and plats, basic corner recovery and re-establishment techniques, and the subdivision of sections. Emphasis will be on the subdivision of fractional and other non-typical sections, with a new look at subdivision by protraction.
Speaker: Jim Mathis III, Mathis & Associates
- 3:00 - 3:30 pm Break to View Exhibits
- 3:30 - 5:30 pm **Sectional Breakdowns continued**
- 5:30 pm Reception with Exhibitors

Saturday, May 10, 2014

- 7:00 am Continental Breakfast and View Exhibits
- 8:00 - 9:30 am **Evaluation of Data by the Judge, Jury, Surveyor and Attorney**
What are the foundational requirements of admitting your evidence to the court to support your client's case. How will the court evaluate statutory rules of authority over case law. (i.e. common law). What data is given more weight by the court. What is the best evidence available to support your client's case. What facts are supported by the data and how the surveyor can assist the court in applying those facts to the law that pertains to the legal issue in dispute. How to make your data and factual evidence more compelling.
Speaker: Eric Harris, Eric C. Harris, P.C.
- 9:30 - 10:00 am Break to View Exhibits
- 10:00 - 12:00 pm **Evaluation of Data continued**
- 12:00 - 1:00 pm Lunch
- 1:00 - 3:00 pm **Resolving Boundaries**
The general process of reconciling record information with ground truth and deciding which legal principles to apply will be discussed. Case studies will be examined to illustrate the concepts and to challenge attendees to be diligent in this effort, because "when it comes to a question of the stability of property and the peace of the community, it is far more important to have a somewhat faulty measurement of the spot where the line truly exists than it is to have an extremely accurate measurement of the place where the line does not exist at all."
Speaker: Steve Weibel, Missouri Department of Natural Resources
- 3:00 - 3:15 pm Break
- 3:15 - 5:15 pm **Final Plats**
Why are we preparing a final plat? Who will use it? What information will the user(s) need? Do they even know they need it? The final plat as a court exhibit; will you be confident—or embarrassed? A check-list for your consideration.
Speaker: Jerry Anderson, Anderson Development Consultants

Registration Information

Registration fee is \$200 for MSPS Members and \$350 for Non-Members. Deadline for registration is April 25, 2014. 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.

Special Rate for Technicians

A special rate of \$150 is available for non-licensed technicians (Associate Members of MSPS). Registration fee plus 2014 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 Ridge 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 2014 Spring Workshop. A block of rooms has been reserved at the Lodge at a rate of \$104.00 for single or double occupancy. Deadline for reservation is April 8, 2014. Make your reservation by calling the Lodge of Four Seasons at 888-265-5500.

Cancellation Policy

Registration Fees	
<input type="checkbox"/> MSPS Members	\$200.00
<input type="checkbox"/> Non-Members	\$350.00
<input type="checkbox"/> Technician (Associate Member)	\$150.00
<input type="checkbox"/> Techs + Associate Membership	\$185.00
<input type="checkbox"/> Golf (per person)	\$85.00

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 26, 2014.**

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.

Conference Registration

Name: _____ PLS #: _____
Firm: _____
Address: _____
City, State: _____ Zip: _____
Phone: _____ Fax: _____
Email: _____

Payment Options

Visa MasterCard Discover Check Enclosed Invoice my Firm

Card #: _____ Exp. Date: _____

Total Amount: \$ _____

*Make checks payable to MSPS ~ Advanced registration is necessary and appreciated!
To register, detach and mail to: MSPS, PO Box 1342, Jefferson City, MO 65102
Phone: 573-635-9446, Fax: 573-635-7823, Email: msps@missourisurveyor.org*

Registration Deadline is April 26, 2014



Missouri Society of Professional Surveyors
722 E. Capitol Avenue, PO Box 1342
Jefferson City, MO 65102

SPEAKERS

Jerry Anderson is a Professional Land Surveyor, initially licensed in Alaska. He has attained licenses in seven more states, most recently in Missouri in 1997. He began his surveying career in 1965 with the Alaska DOT/PF as a construction surveyor, and has worked for many Alaska survey firms. He established the Alaska firm of Ability Surveys in 1974. The firm was sold in 1992, and is still operation in Homer Alaska. Jerry served as the Chief Location Surveyor for the New Mexico Highway and Transportation Department from 1992 to 1997. In 1997 he organized the firm of Anderson Development Consultants, headquartered in rural Missouri, and offers professional land survey services in several states including New Mexico, Wyoming and Alaska. He has been given multiple awards for plats and maps completed by his firm(s).

Michael Freeman is the managing member of Bentley Title Company, an abstract and title insurance company that has been in continuous operation since 1887 in Hermitage, MO. Mike is also the principal owner of Freeman Land Survey and has been licensed as a Professional Land Surveyor since 1987. He was appointed to the Missouri Board of Architects, Professional Engineers, Professional Surveyors and Landscape Architects in 2007 and has served as Chairman of the Survey Division since 2010.

Eric C. "Ric" Harris is a sole practitioner in Park Hills, MO. He received his business degree from Washington University, St. Louis in 1973 and his law degree from the University of Missouri-Columbia in 1976. He has 38 years of litigation experience involving boundary line disputes, easements, quiet title, ejectment, partition of real estate and foreclosure actions. Mr. Harris has been a licensed Missouri Real Estate Broker since 1973 and is a frequent lecturer for the Missouri Bar and MSPS. Mr. Harris has taught at Mineral Area College and is a member of the American Bar Assn, MO Bar Assn, MO Assn of Trail Lawyers, Assn of Trial Lawyers of America, Associate a Member of MSPS and the National Assn of Realtors. He has earned an AV Preeminent Peer Review Rating by Martindale-Hubbell, the highest recognition possible in the legal industry.

Bradley McCloud is a Professional Land Surveyor with combined experience in route, office, construction, and boundary surveying that encompasses almost 18 years. He is currently the Land Survey Coordinator for the Missouri Department of Transportation. In this role Brad is responsible for overseeing the Departments' Land, Route and Construction surveying policies for MoDOT. He is also the lead contact for department on all surveying matters.

P. Mark Lindenmeyer, PLS, CFedS, is Manager Project Design for The Kansas City Southern Railway Company, the primary US subsidiary of Kansas City Southern. Lindenmeyer joined KCSR in 2012. He is responsible for construction and project management, as well as boundary, topographic, construction and control surveys. He has over 30 years of engineering and survey experience with private firms, the Missouri Department of Natural Resources and the US Army. Lindenmeyer holds a diploma from the Geodetic Surveyors Course Defense Mapping School at Fort Belvoir, Virginia and has completed a number of course hours of continuing education in his field. He is a member of the American Railway Engineering and Maintenance of Way Association and the Army Engineers Association.

Jim Mathis, III, owner and operator of Mathis & Associates in Southwest Missouri, has practiced land surveying for over 40 years. He has extensive experience in contract cadastral surveying for state and federal agencies and is responsible for the perpetuation or establishment and registration of over 3,300 corners of the US Public Land Survey System. He is a past member of the Land Surveying Division of the Missouri Board of Architects, Engineers, and Land Surveyors, and currently serves on the MSPS board of directors.

Adam Teale, PLS, CFedS is a professional land surveyor in Missouri, Iowa, and Illinois. He is a 2000 graduate of East Tennessee State University holding a degree in Surveying & Mapping. Mr. Teale is an active member of state professional societies and currently is the President-Elect of the Missouri Society of Professional Surveyors.

Steve Weible is a native of western Sainte Genevieve County, MO, who discovered an interest in land surveying through an opportunity for summer employment after his freshman year of college. He went on to earn a bachelor of science degree in civil engineering from the University of Missouri-Rolla in 1994. Following a different opportunity after graduation, he worked for three years in mining before realizing that land surveying was his real passion. He began working full time in land surveying in 1997 at Govero Land Services in Imperial, MO. He later moved to Rolla, MO, and began work with the MO Department of Natural Resources in 2000 as a land surveyor-in-training. In 2001 he was transferred to the State Park Survey unit and in 2002 he was licensed in Missouri as a Professional Land Surveyor. Since being licensed, he has served as the Professional Land Surveyor for Missouri State Parks.

A Nation is Built by Surveyors *(continued)*

Quantity surveyors are required to estimate the costs of construction as well as to issue the certificate of completion to the developers. This certificate is used by the contractors to claim for work done.

In the recent 2nd anniversary annual dinner, RISM Johor raised funds for three charity organisations. As a professional body, RISM wanted to assist the less fortunate. It is the NGO's first effort but Tan says it will not be the last.

This year, RISM will have several dialogues with their counterparts in Singapore, to brief them on the development of Iskandar Malaysia as well as to exchange knowledge.

Last October, the families of RISM members gathered at the RISM open house held in the hopes that the members' children will follow in their parents' footsteps to become surveyors.

There were at least three career talks in JB, Muar and Kluang on the work

prospects and scope of the surveyor. More of these are being planned to get students more familiar with and therefore more likely to choose the profession.

In March, RISM will hold the Young Achievers Award, whereby schools in Johor are invited to participate in an interactive quiz. The top three teams will represent the state at the national level.

I am pleased to report that Johor had emerged among the top teams in the last few years.

RISM recently published its first bulletin called Jauhari, which reports the activities of the institution.

To strengthen the bond with other professional bodies and students, several initiatives are necessary. An inter-professional badminton tournament is set to start soon. RISM members also recently participated in a futsal tournament with surveying students in Universiti Teknologi Malaysia. RISM

will be holding several forums for the students soon.

For the professionals, seminars are regularly held to keep them abreast with new developments in the industry.

As RISM members advance, qualitatively and quantitatively, it is hoped that the shortage and quality of surveyors in Iskandar Malaysia will improve.

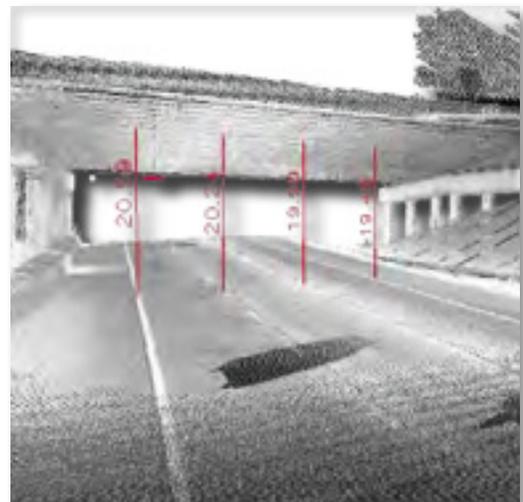
Iskandar Malaysia is currently in the second stage of its growth. There are many more projects to come. The need for surveyors is more urgent than ever. RISM hopes the steps taken now mitigate the shortage in the future.

The surveying profession needs young blood. As the nation develops, competent surveyors familiar with the latest technology are needed to ensure that the development continues unimpeded. 🇲🇾

Bridge Shadows *(continued)*

"We've been busy making the survey profession safer by taking the red zone area concerns out of the equation and showing surveyors how to safely keep the rest of the work in house," Frecks said. The call to updating the National Bridge Inventory Database for clearances is a good fit for the more than 25,000 state-owned bridges, the third-largest in the nation based on PennDOT statistics.

According to Frecks, "This is a good fit for surveyors to take on projects they normally wouldn't because of safety concerns." 🇲🇾



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A Line of Retreat

by Andrew C. Kellie, PLS, Reprinted from *Kentucky Association of Professional Surveyors Newsletter*, 2013

The summer rush had managed to mostly rush by, and I was pleased that even with the government going into hibernation, we were still able to get our work done. To be sure, I assigned the crews to jobs where control was already in place and adjusted. For much of our other work, well, when it comes to some contractor pouring curb and gutter, neither the contractor nor the surveyor are really very dependent on support from the feds.

The new week brought a new client, a new survey, and the opportunity to start on a fresh sheet, so to speak. Samantha was really upbeat. As she described it, we were working from a new deed, everyone seemed to recognize the boundaries, and there was even physical evidence marking the lines. It would be a typical rural survey, but without a lot of the hassle we often encountered. Since I'm the surveyor, I wasn't so sure.

In part, Sam was right. The survey was a rural boundary retracement and the need for a survey followed a recent conveyance between kin. According to the grantor's deed, (Thomas Preston to Samuel Preston, 113/207, June 13, 1911), the land was bounded on the south by "the existing road", on the other three sides by adjoining, and contained 10 acres. According to the deed to our client from the descendants of Samuel Preston, the land conveyed was the "north 5 acres of land of Samuel Preston together with a right-of-way 25 feet in width across remaining land of the grantor herein". Both the grantors and the grantee were either named Preston or had married a Preston, and since the whole family accompanied our client to our office, we had no lack of advice and direction for doing the survey.

To begin, the family conceived of the property as being rectangular. They described the road on the south as being "nice and straight, or nearly so, and the county runs a grader over it every spring." All were agreed that we should place the right-of-way along the west line of the property "right next to Squire Jones, who won't care anyway, and he has his line marked with a fence." I asked what was on Jones's side of the fence. The family agreed: it was cattle—no hogs. The family described the north line as "where Grandpa stopped timbering in 1973", and the east line as where "Tom Taylor's corn begins, or thereabouts and Tom would be glad to show you where he owns."

By the end of the week, I had done the deed research, letters had gone to all the adjoining, and Sam even had a plan for GPS control. Jones's deed described the common boundary with Preston as "running N 10 degrees E by and along the fence". The northwest and northeast corners of the client were described in the deeds of the adjoining on the north and east as hacked or blazed trees. The Prestons were junior to all of the adjoining. The west line of Taylor was parallel (N 10 degrees E) to the east line of the squire. So far, so good.

After running the control, Sam used GPS to locate the fence on the west line of the client (east line of Squire Jones), and the centerline of the county road. With open sky, good weather, and no ground cover to speak of, production was as good as it gets. To make it even easier, the Squire was running no stock on his side of the fence—and hadn't for

some time judging from the cedars growing on the land. By the end of the first day, Sam was feeling pretty big and bad. She just casually dropped off the data collector to Jason before waltzing out to put the equipment on charge.

Jason, however, was perplexed. To begin, the fence on the west line and the county road on the south didn't imply the existence of the rectangular parcel so beloved by the family. The angle at the southwest corner was closer to 60 degrees than 90. Besides that, Squire Jones's hired help (the Squire himself would have been more particular!) hadn't managed to keep the fence very straight when they had put it up. The

client's west line had a definite bow in it, and the convex part of the bow went onto the client. Oh well, I thought, maybe the family had confused a rectangle with a parallelogram and all would be clear when Sam ran the north and east lines.

The road actually didn't look too bad. Sam had located the center line and the edge of pavement (such as it was). The alignment wasn't straight, of course—there was a large radius reverse curve in the road—but such was to be expected of unimproved county roads. Sam did, however, comment on the grade. "What grade?" I asked. Sam was still feeling perky: "The one that goes up and down except where they have put in some cuts and fills and culverts." I groaned. All I could think of was that part about the width of a prescriptive road

(continued on next page)



A Line of Retreat *(continued)*

as discussed in my boundary law class...the part about the public interest in a public road involving not just the road but all its appurtenance. I mentioned this to Sam. She dropped the attitude and agreed to locate all the road when she returned to the site in the morning.

The north and east lines were a little more challenging, but there were some bright spots. Tom Taylor showed the crew a rusted steel pipe near the southeast corner that he claimed to have set with Samuel Preston “during the winter of 1955... or maybe 1956” which was recognized by the client as “the corner we always used”. Sam found a hacked cypress at the northeast corner that was called in the deeds of the north and east adjoiners. The timbered line on the north wandered a bit but terminated at a blazed oak at the northwest corner of the client (northeast corner of Jones) that was called in Jones’s deed.

Taken all around, in the field, the survey looked pretty good; in the office, maybe not so much. Jason’s plot was far from a rectangle. Neither the east and west nor the north and south lines were parallel. When Jason ran the area, there were only 7.35 acres as measured to the centerline of the road! But Jason was quite smug. “It looks, like, pretty simple to me. The Preston’s only could buy what was there on the ground no matter what it, like, said in the deed so, like, what’s the big problem?” I suggested that he, like, explain a difference of, like, 2.65 acres to the persons who were, like, paying us to survey their land. Sam suggested a more basic solution. “If they said the bearing on the west line was N 10 degrees E, we need to hold that bearing. You always say that what’s in the deed has to control, and the bearing is there, and if they didn’t mean it, why did they say it?” I explained that the bearing described a monument, which was the fence, and the fence was the boundary even if the description of the fence wasn’t exact because monuments control bearing and distance.

Sam wasn’t impressed. The expression on her face said I was just using “weasel words”

So, we had the survey, we had the deeds, we had the graphics. What we didn’t have was a solution, and the whole key to the matter seemed to be the client’s west line. Since I’m the surveyor, it was up to me to get a solution. A starting place seemed to be the Squire’s farm. The Squire was mostly retired, but I found him on his place supervising his field hands stripping tobacco. After we had gotten through the preliminaries, I brought up the question of the location of his east line and how his fence seemed to wander onto the Preston tract. The Squire was shocked. “The fence you are following isn’t the one in my deed...and everyone hereabouts knows that. That fence is long gone. I put up the fence you followed in 1962 when I got into cattle, and Sam Preston hadn’t any objection, just said to take it down when I had

finished. The boundary line goes from the fence corner at the road to the tree your crew found the other day. Pity you didn’t know that since everyone else seems to.” It was clear from his tone that I wouldn’t be doing any surveying for the Jones family anytime in immediate future. However, I was thankful to him for his help, and with a solution in hand, I retreated to my office.

With the boundaries in their correct position, the acreage was very close (10.09 acres +/-) to what was called in the deed, and while the lines weren’t exactly parallel, the Preston’s were satisfied with the outcome. We monumented the right of way and platted and described the property.

To get maximum benefit from the work, I tried to explain to Jason and Sam that to control, a monument must be called for in the deed, identified as that called on the ground, and must be undisturbed. Jason was, like, polite. Sam’s expression was just the same as before: “weasel words”. Even though I had had to admit to a lack of local knowledge on the Jones’s farm, and even though the crew was a little mystified as to why the boundary was where it was, I was still feeling pretty good about tracking down the problem. Sam put it in perspective. “What,” she asked, “would we have done if Squire Jones wasn’t there to tell us about that fence? Would you have used the fence we located?” I looked at her for a while and said, “I really don’t know.” Sam didn’t say anything. After a while, the silence got really loud. I decided it was time to get out the monthly statements and retreated (once again!) to my office. ■

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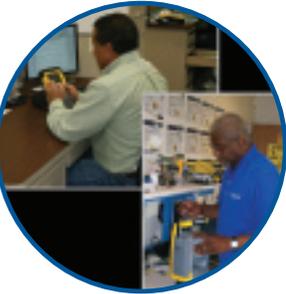
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Surveyors & Title

by Knud E. Hermansen †, PLS, PE, Ph.D, Esq.

Surveyors, as a general rule, stay clear of providing title opinions — rightfully so. Nevertheless, reasonably competent surveying services must rely on some fundamental knowledge of title opinions. A surveyor that is ignorant about the basis for a title opinion could fail to provide relevant information necessary for an attorney to provide a competent title opinion.

A deed is merely evidence of title – not proof of title

One of the fundamental concepts forming the need for an informed title opinion from a competent source is the fact that **the deed is merely evidence of title, not proof of title**. Every surveyor has heard a client or neighbor claiming: “I’ve got title to that property” or “I own that property.” The statement is usually made as they waive their deed about in a manner meant to forestall any further questioning of their right to claim to some boundary. However, unless the surveyor is in one of the few states permitting registered title and the surveyor is actually dealing with a registered title in that state, a deed is merely evidence of title – NOT proof of title. This is true despite the fact the deed is a warranty deed. If a deed were proof of ownership there would be no need for a title search or title insurance.

Since the deed is only evidence of title and not proof, the prudent buyer will obtain a title opinion. A title opinion is founded on two parts: 1) facts and information about the title and 2) an analysis of the facts and information culminating in an informed opinion. The facts are usually portrayed in the form of an abstract of prior records. The abstract is a compilation of information found in deeds, mortgages, releases, and other recorded documents. In the past, an abstract of title was prepared (or an existing abstract added to) for almost every property conveyed. The completed abstract was examined by a knowledgeable attorney who provided an opinion on the title.

A title opinion will opine that the title is one of the following (not always succinctly): clear, marketable, defensible, clouded (unmarketable), or there is merely color of title.

Clear title is title that has no defects. It is title unencumbered by liens, encroachments, or other impediments that would cut short or curtail the complete and reasonable enjoyment of the entire property. In modern practice, title that is encumbered by zoning restrictions is still considered clear unless the current use of the property is in violation of the zoning.

Marketable title is title that a reasonably prudent and intelligent person, informed of the facts and their legal

ramifications, would be willing to accept in the ordinary course of business. Marketable title is generally free from serious encumbrances, material defects, reasonable doubts, and well-founded concerns about its validity. It is title that can be sold or used as security at fair market value and allows the owner quiet and peaceful enjoyment of the property. It is title that does not expose an owner to probable litigation (regardless of the probability that the litigation outcome will be in the owner’s favor). Circumstances that have been found to make title unmarketable include breaks or gaps in the chain of title, encroachments that violate zoning, title founded on adverse possession (but not litigated to quiet title), less than a complete property interest, impairment of legal access, and boundary disputes or potential boundary problems.

Defensible title is title that has potential problems that will not likely cause the loss of title but would cause the prudent buyer to pay less than the market value. Defensible title looks to the probability of the outcome of litigation involving a title defect. Marketable title looks to the probable and reasonable likelihood of litigation exposure.

Clouded or unmarketable title is title that is defective in some aspect sufficient to cause reasonable concern that the buyer will not receive all the benefits they have bargained for. While the buyer may be willing to purchase the property, the price will be less than the fair market value of the property had the title to the property existed without the deficiency.

Color of title is the appearance of title. It is title that is all form without substance. The person has a deed but the deed conveyed no title.

Interjected into the title determination and acceptability of the title opinion is title insurance. Title can be insured against loss, damage, etc., from a multitude of sources, based on the standards of the insurer and the risk of loss. From a practical viewpoint, all title is insurable if the premiums are made large enough or the list of exceptions extensive enough. Consequently, the term “insurable title” has some wide possibilities.

Title insurance can, in some cases, insure the marketability of the title. This has given some people room to argue that title insurance should be able to substitute for marketable title when the title insurance company is ready and willing to provide insurance that will affirmatively cover one or more conditions that may affect the marketability. However, marketable title and insurable title are not the same as they differ by discrimination criterion. Marketable title uses a reasonably intelligent or prudent person criterion based on

(continued on page 30)



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Surveyors & Title (continued)

future prospects for the property. Furthermore, marketable title requires a person accept or reject the title as it stands at the time of conveyance. The buyer or lender cannot qualify or condition their acceptance of the title.

On the other hand, insurable title uses a reasonably prudent investor or insurer criterion. The investor or insurer analyzes the risks, costs, profit margins, and the likelihood of successfully defending the title. The insurer can change the risk and amount of their indemnity by adding exceptions to the policy or using affirmative insurance. Consequently, they have the power to set conditions or stipulations for insuring the title that the buyer or lender does not have when determining if the title is marketable.

Consider the buyer who intends to build a house and a large garage where that person can indulge in his hobby of working on old cars. The buyer chooses a lot that is just sufficient in size to build the house and large garage. The seller is an elderly widow who is motivated to sell and plans to move in with her daughter. As a result, the buyer gets a great deal, purchasing the lot and residence for \$120,000. In the purchase and sales agreement, the buyer agreed to accept insurable title rather than marketable title. As a consequence an abbreviated title examination occurs and an owner's title policy is issued. After purchasing the lot, the buyer discovers the width of the lot is five feet less than described in the deed. As a result of the deficiency in the width, the large garage cannot be built. The buyer files a claim with the title insurer. The title insurer contacts the neighbor to determine the cost and availability of purchasing a five-foot strip. The neighbor demands \$3,000. Next the title insurer obtains an appraisal on the lot with five feet less in width. The appraisal values the lot at \$119,000. The title insurer sends the buyer a check for \$1,000. The buyer has been financially compensated for the loss sustained by the reduced width. The title insurer is obligated to financially compensate for the loss sustained, not satisfy the needs or aspirations of the buyer.

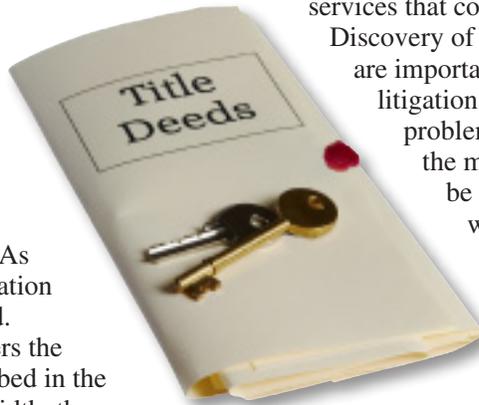
Title opinions have deficiencies. Both the abstract and opinion are only as good as the knowledge, training, and experience of the person preparing the abstract and tendering the opinion. Even a quality title opinion has dozens of caveats (usually unstated). Matters outside the record, defects arising from government regulations (e.g., zoning), encumbrances appearing in the record beyond the period encompassed in the title search, or conditions at the site, to name a few, are often not factored into a title opinion.

Without words to the contrary in a purchase and sales agreement for property, the buyer or lender has the right to expect marketable title from the seller or borrower where a warranty deed is sought and promised.

Every purchaser of land has a right to demand a title which shall put him in all reasonable security and which shall protect him from anxiety, lest annoying, if not successful suits be brought against him, and probably take from him or his representatives, land upon which money was invested. He should have a title which shall enable him not only to hold his land, but to hold it in peace; and if he wishes to sell it, to be reasonably sure that no flaw or doubt will come up to disturb its marketable value. *Hebb v. Severson*, 32 Wash.2d 159, 167-168, 201 P.2d 156, 159 (1948) quoting *Dobbs v. Norcross*, 24 N.J.Eq. 327

Consequently, surveying services involved in the conveyance of property should focus on those aspects of surveying services that could affect the marketability of the title.

Discovery of disputed boundaries and encroachments are important. Even remote chances of boundary litigation will make the title unmarketable. All problems that have a potential detraction on the marketability of the property should be reported. Here is where a surveyor who presumes adverse possession or prescription has occurred and fails to report this deficiency in title does the client a disservice. Without a judgment supporting title gained by adverse possession or prescription, the title is not marketable.¹



Sometimes when a surveyor has discovered a problem and reported the problem, the surveyor has been pressured by a closing agent to obscure or remove the written disclosure from the survey work products in order that the buyer may be led to believe the buyer will be receiving marketable title.

The surveyor should make every effort to provide complete and accurate information for persons to arrive at a competent decision on the status of the title to be conveyed. This caution does always require every problem that exists be discovered or emphasized in a report.

Consider a 500-acre farm that has a one-foot strip of encroachment along an 80-foot section of the farm's boundary. This title is not a "clear title" because of the possibility of adverse possession of the one-foot strip. Nevertheless, the relatively small encroachment along such a small portion of the boundary to a large property will have no effect on the marketability of the title. A reasonable buyer, informed of the encroachment would still be willing to pay the fair market value for the 500-acre farm with or

without the one-foot encroachment. Yet, the same one-foot encroachment on a one-quarter acre urban lot would make the title unmarketable. The reasonable buyer would either refuse to purchase the lot or demand a reduction in the purchase price upon discovery of the one-foot encroachment along a boundary of the one-quarter acre lot.

The concepts that have been outlined in this article point to the basis for many of the requirements set forth in the ALTA/ACSM Land Title Survey. As petty as many of the ALTA/ACSM Land Title requirements may appear to the surveyor, an insurer has judged the presence or, in some cases, the absence of certain features or conditions to have an affect on the marketability of the title or pose an unacceptable risk for the title insurer.

In the day-to-day practice of the surveyor, knowledge of the concepts presented in this article can help the surveyor in deciding what needs to be reported or can be safely ignored. A title analysis when contemplating the detail involved in surveying services and reporting problems discovered comes down to the answer to two simple questions: 1) Would the reasonable buyer be concerned with the problem? 2) Will the condition or problem affect the value of the property? (Both questions are interrelated.)

With these two questions in mind, the surveyor would not likely be faulted for failing to report that the neighbor's driveway cuts across the corner of the client's property (by 0.8 feet). On the other hand, the failure of the surveyor to report the neighbor's well head is five feet within the client's property would likely have adverse consequences on the marketability of the client's title and could result in liability to the surveyor. (Although the surface area of both encroachments is approximately the same.)

Hopefully the concepts explained in this article will help surveyors understand title concerns and how surveying services relate to and may impact on the title.

† Knud is a professor in the college of engineering at the University of Maine. He provides consulting services in the area of alternate dispute resolution, boundary disputes, easements, and land development.

¹See *Ivalis vs. Harding*, 496 N.W.2d 690, 173 Wis. 2d 751 (1993) where the court ultimately determined the boundaries located by the surveyor were in fact the actual boundaries of the property based on adverse possession but nevertheless held the surveyor liable for the cost of the litigation in order to perfect the title to the property by adverse possession. 🇺🇸

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What Surveyors Do

Source: *US Bureau of Labor Statistics*

Surveyors update boundary lines and prepare sites for construction so that legal disputes are prevented. Surveyors make precise measurements to determine property boundaries. They provide data relevant to the shape and contour of the Earth's surface for engineering, mapmaking, and construction projects.

Duties

Surveyors typically do the following:

- Measure distances and angles between points on, above, and below the Earth's surface
- Travel to locations and select known reference points to determine the exact location of important features
- Establish stake sites and official land and water boundaries
- Research land records, survey records, and land titles
- Look for evidence of previous boundaries to determine where boundary lines are located
- Record the results of surveying and verify the accuracy of data
- Prepare plots, maps, and reports
- Present findings to clients, government agencies, and others
- Take notes of land for deeds, leases, and other legal documents
- Provide expert testimony in court regarding survey work



Surveyors provide documentation of legal property lines and help determine the exact locations of real estate and construction projects. For example, when property, such as a house or commercial building, is bought or sold, it may need to be surveyed to prevent boundary disputes. During construction, surveyors determine the precise location of roads or buildings and proper depths for building foundations. The survey also shows changes to the property line and indicates potential restrictions on the property as far as what can be built on it.

In their work, surveyors use Global Positioning System (GPS), a system of satellites that locates reference points with a high degree of precision. Surveyors interpret and verify GPS results.

Surveyors also use Geographic Information System (GIS)—a technology that allows surveyors to present data visually as maps, reports, and charts. For example, a surveyor can overlay aerial or satellite images with GIS data, such as tree density in a given region, and create computerized maps. They then use the results to advise governments and businesses on where to plan homes, roads, and landfills.

Surveyors take measurements in the field with a crew, a group that typically consists of a licensed surveyor and trained survey technicians. The person in charge of the crew (called the party chief) may be either a surveyor or a senior surveying technician. The party chief leads day-to-day work activities.

Surveyors may be involved in settling boundary disputes. When property is sold or new construction takes place, such as the building of a fence, issues may arise due to lack of up-to-date records or the misinterpretation of available records. A surveyor would be called in to settle the dispute, and may even have to provide testimony in court if the involved parties do not come to an agreement.

Surveyors also work with civil engineers, landscape architects, and urban and regional planners to develop comprehensive design documents.

Some surveyors work in specialty fields to survey particular characteristics of the Earth. 🏔️



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How to Become a Surveyor

Source: US Bureau of Labor Statistics

Surveyors typically need a bachelor's degree. They must be licensed before they can certify legal documents and provide surveying services to the public.

Education

Surveyors typically need a bachelor's degree due to greater use of sophisticated technology and mathematics. Some colleges and universities offer bachelor's degree programs specifically designed to prepare students to become licensed surveyors. Many states require that a bachelor's degree come from a school accredited by ABET (formerly the Accreditation Board for Engineering and Technology). A bachelor's degree in a closely related field, such as civil engineering or forestry, is sometimes acceptable as well.

Many states require individuals who want to become licensed surveyors to have a bachelor's degree from a school accredited by ABET and about 2 years of work experience under a licensed surveyor. In other states, an associate's degree in surveying, coupled with several years of work experience under a licensed surveyor may be sufficient. The amount of work experience required varies by state. Most states also have continuing education requirements.

Work Experience in a Related Occupation

Many states allow candidates with significant work experience to become licensed surveyors. To receive credit for this experience, candidates must work under a licensed surveyor. Many surveying technicians become licensed surveyors after working for as much as 10 years in the field of surveying.



Licenses, Certifications, and Registrations

All 50 states and the District of Columbia require surveyors to be licensed before they can certify legal documents that show property lines or determine proper markings on construction projects. Candidates with a bachelor's degree must usually work for about 2 years under the direction of a licensed surveyor in order to qualify for licensure.

Although the process of obtaining a license varies by state, the National Council of Examiners for Engineering and Surveying has a generalized process of four steps:

- Complete the level of education required in your state
- Pass the Fundamentals of Surveying (FS) exam
- Gain sufficient work experience under a licensed surveyor
- Pass the Principles and Practice of Surveying (PS) exam

Important Qualities

Communication skills. Surveyors must provide clear instructions to team members. They must also be able to receive instructions from architects and construction managers, and explain the job's progress to developers, lawyers, financiers, and government authorities.

Detail oriented. Surveyors must work with precision and accuracy due to the legal nature of the documents they produce.

Physical stamina. Surveyors traditionally work outdoors, often in rugged terrain. Therefore, they must be able to walk long distances for several hours.

Problem-solving skills. Surveyors must figure out discrepancies between documents showing property lines and current conditions on the land. If there were changes in previous years, they must figure out the reason for the changes so that property lines can be reestablished.

Technical skills. Surveyors use sophisticated technologies such as distance- and slope-measuring "total stations" and GPS devices to collect land survey data.

Time-management skills. Surveyors must be able to plan their time and their team members' time on the job. This is critical when pressing deadlines exist or while working outside during winter months when daylight hours are short.

Visualization skills. Surveyors must be able to envision new buildings and distances. 🏡

Job Outlook for Surveyors

Source: US Bureau of Labor Statistics

Employment of surveyors is projected to grow 10 percent from 2012 to 2022, about as fast as the average for all occupations. Employment growth will result from increased construction related to improving the nation's infrastructure.

An increasing number of firms are interested in geographic information and its applications. For example, Geographic Information Systems (GIS) can be used to create maps and information for emergency planning, security, urban planning, natural resource exploration, construction, and other applications. Surveyors will also be needed for legal reasons to verify the accuracy of the data and information gathered for input into a GIS.

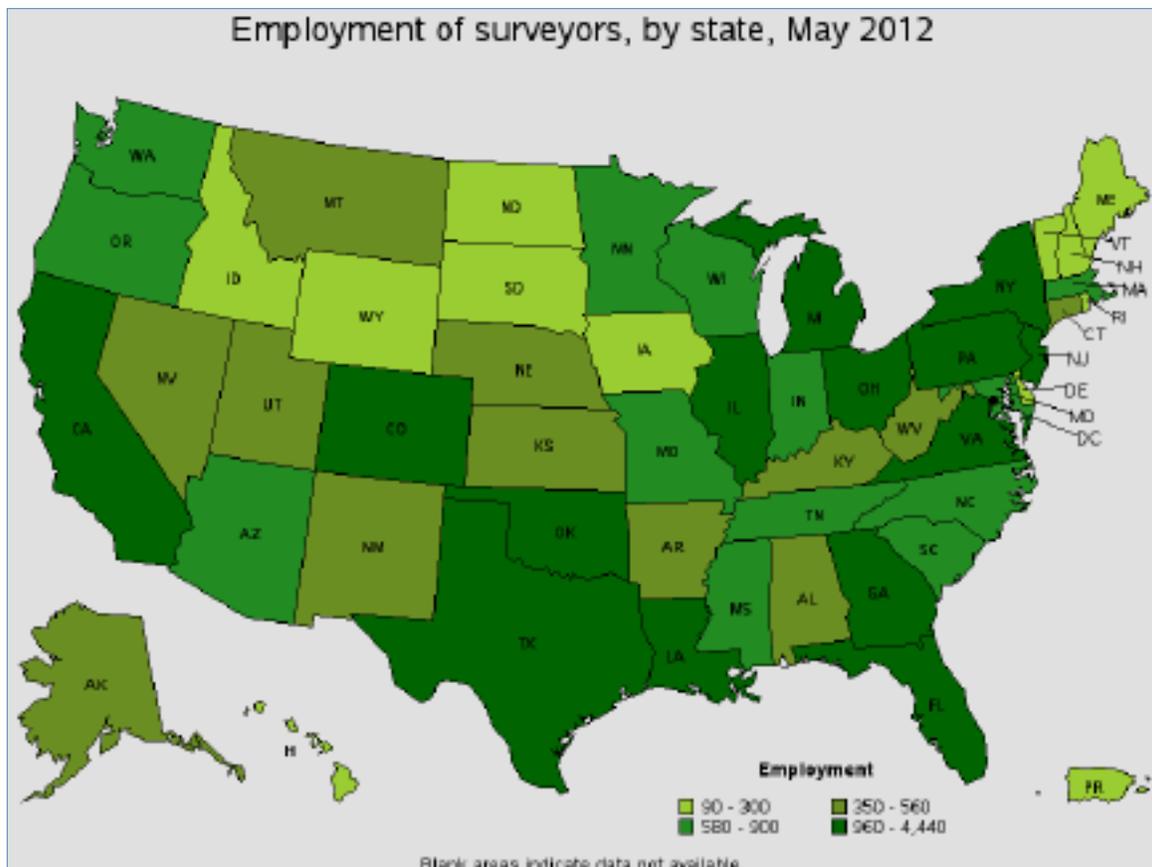
Surveyors will continue to be needed for construction and resource extraction projects. States rich in oil and gas may continue to see higher demand for surveyors due to growth in extraction projects in those areas. In addition, some will also be hired by county and state governments for land boundary clarification.

Job Prospects

Job opportunities for those with a bachelor's degree in surveying or a related field are expected to be excellent. Increased use of sophisticated technology and mathematics has resulted in higher education requirements. As a result, those with the right combination of skills and a bachelor's degree from a school accredited by ABET will have the best job opportunities.

Demand for traditional surveying services is closely tied to construction activity and job opportunities will vary by geographic region, often depending on local economic conditions. When real estate sales and construction activity slows down, surveyors may face greater competition for jobs. However, because surveyors can work on many different types of projects, they may have steadier work than others when construction slows.

Job prospects should be particularly excellent in fast growing industries, such as oil and gas mining. 🇺🇸



Surveyor KSA's

by Don Martin

In the realm of profession specific jargon, the acronym “KSA’s” (knowledge, skills and abilities) is considered vital in the trades of human resources, management theory and job economics. These are purported to be the vocational and personal attributes needed to perform a specific occupation.

As regulatory boards and professional societies go about the work of representing the surveying profession they ultimately must consider just what traits are required in those honored to practice. Missouri’s registration board and the MSPS Directors are engaged in trying to set forth suitable laws regarding the education and experience needed by those to be licensed as surveyors. It is an effort to set the standards of learning and doing needed to impart *Surveyor KSA’s* in future land surveyors.

Below are KSA’s (source: O*NET) referred to by federal job economists. How do these align with your own perceived *Surveyors KSA’s*?

Knowledge

Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

Law and Government — Knowledge of laws, legal codes, court procedures, precedents, government regulations, executive orders, agency rules, and the democratic political process.

Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.

Administration and Management — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.

Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.

Geography — Knowledge of principles and methods for describing the features of land, sea, and air masses, including their physical characteristics, locations, interrelationships, and distribution of plant, animal, and human life.

Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

English Language — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.

Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.

Customer and Personal Service — Knowledge of principles and processes for providing customer and personal services. This

includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.

Skills

Reading Comprehension — Understanding written sentences and paragraphs in work related documents.

Mathematics — Using mathematics to solve problems.

Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

Speaking — Talking to others to convey information effectively.

Writing — Communicating effectively in writing as appropriate for the needs of the audience.

Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.

Coordination — Adjusting actions in relation to others’ actions.

Time Management — Managing one’s own time and the time of others.

Complex Problem Solving — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.

Management of Personnel Resources — Motivating, developing, and directing people as they work, identifying the best people for the job.

Abilities

Mathematical Reasoning — The ability to choose the right mathematical methods or formulas to solve a problem.

Number Facility — The ability to add, subtract, multiply, or divide quickly and correctly.

Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.

Oral Expression — The ability to communicate information and ideas in speaking so others will understand.

Speech Clarity — The ability to speak clearly so others can understand you.

Written Comprehension — The ability to read and understand information and ideas presented in writing.

Written Expression — The ability to communicate information and ideas in writing so others will understand.

Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).

Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.

Speech Recognition — The ability to identify and understand the speech of another person. 🇺🇸

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Firm	Street Address	City	State	Zip	Office Phone	email
ABNA Engineering, Inc.	4140 Lindell Blvd.	St. Louis	MO	63108-2914	314-454-0222	aadewale@abnacorp.com
Affinis Corp.	7401 W. 129th St., Ste. 110	Overland Park	KS	66213	913-239-1100	
Allstate Consultants, LLC	3312 Lemone Industrial Blvd.	Columbia	MO	65201	573-875-8799	
Amsinger Surveying, Inc.	101 S. Crittenden, Rm. B-3	Marshfield	MO	65706	417-859-5516	dennis@amsingersurveying.com
Bartlett & West, Inc.	1719 Southridge Drive, Ste. 100	Jefferson City	MO	65109	573-634-3181	
Cardinal Surveying & Mapping, Inc.	PO Box 278	Cottleville	MO	63338	636-922-1001	shelly@cardinalsurveying.com
Bax Engineering Co., Inc.	221 Point West Blvd.	St. Charles	MO	63301	636-928-5552	dbax@baxengineering.com
Bowen Engineering & Surveying, Inc.	2121 Megan Drive	Cape Girardeau	MO	63701	573-339-5900	info@bowenengsurv.com
Cochran	530 A E. Independence Dr.	Union	MO	63084	636-584-0540	mail@cochraneng.com
Cole & Associates, Inc.	401 S. 18th St, Ste. 200	St. Louis	MO	63103	314-984-9887	twesterman@colestl.com
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Engineering Solutions	50 SE 30th Street	Lee's Summit	MO	64082	816-623-9888	esinfo@es-kc.com
Frontenac Engineering Group, Inc.	2725 Sutton Blvd. B	St. Louis	MO	63143	314-644-2200	billb@fe-stl.com
Govero Land Services, Inc.	5929 Old State Rd.	Imperial	MO	63052	636-464-9380	glisland@goverolandservices.net
Integrity Engineering, Inc.	PO Box 700, 1714 E 10th Street	Rolla	MO	65402	573-341-2100	terris@integrityeng.com
John R.M. Nelson, Inc.	PO Box 482	Bolivar	MO	65613	417-326-2777	jnkn@yahoo.com
Koehler Engineering & Land Surveying, Inc.	194 Coker Lane	Cape Girardeau	MO	63701	573-335-3026	ckoehler@koehlerengineering.com
Migar Enterprises, Inc.	PO Box 528	Grandview	MO	64030	816-966-0839	
Minnick Surveying, LLC	7905 Big Bend Blvd., Ste. 101	Webster Groves	MO	63119	314-721-9500	info@minnicksurveying.com
Musler Engineering Co.	32 Portwest Court	St. Charles	MO	63303	636-916-0444	rich@muslereng.com
Olsson Associates	7301 W. 133rd St., Ste. 200	Overland Park	KS	66213	913-381-1170	pward@oaconsulting.com
Phoenix Engineering & Surveying, LLC	3855 S. Northern Blvd	Independence	MO	64052	816-743-9000	wes@phoenix-llc.com
Pickett, Ray & Silver, Inc	22 Richmond Center Court	St. Peters	MO	63376	636-397-1211	dskomia@prs3.com
Pitzman's Co. of Surveyors & Engineers	2725 Sutton Blvd.	St. Louis	MO	63143	314-781-5665	
Schlagel & Associates, PA	14920 W. 107th St.	Lenexa	KS	66215	913-492-5158	
Schmitz, King & Associates, Inc.	18900 West 158th St., Ste. G	Olathe	KS	66062	913-397-6080	dave@schmitzking.com
Shafer, Kline & Warren, Inc.	1700 Swift Ave., Ste. 100	N. Kansas City	MO	64116-3821	816-756-0444	graham@skw-inc.com
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Tri-State Engineering, Inc.	702 S. Main St.	Joplin	MO	64802	417-781-0643	slewis@tristate-engineering.com
West Wildwood Surveying, LLC	8023 Waddell Avenue	St. Louis	MO	63125	636-394-6090	wwsurv@att.net
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**Missouri Society of
Professional Surveyors**
P.O. Box 1342
Jefferson City, Missouri 65102

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