Missouri Surveyor

A Quarterly Publication of the
Missouri Society of Professional Surveyors

Jefferson City, Missouri June 2023

What's in this issue...

BREAKING NEWS

2023 LEGISLATION!

PAGE 39

CALENDAR OF EVENTS

2023

July 1, 2023
Board Meeting
MSPS Office, Jefferson City, MO

August 14-16, 2023
Review Course Jefferson City, MO

September 28-30, 2023
66th Annual Meeting and Convention
Oasis Hotel, Springfield, MO

December 4, 2023
Board Meeting
MSPS Office, Jefferson City, MO

Additional Dates for Spring Workshop
May 1-5, 2024
Lodge of Four Seasons
Lake Ozark, MO

Additional Dates for Annual Conference
October 3-5, 2024
Margaritaville Lake Resort
Osage Beach, MO

Cover: Sarah Lovelady of Allgeier, Martin and Associates, Inc in Joplin; making her way along a stream during a topographic survey. Photo provided by MSPS member Andrew South, PLS.

Donald R. Martin, Editor

Notes from the Editor's Desk

Donald R. Martin

Summer of 2023 has arrived just in time for the June edition of *Missouri Surveyor*, so here it is!

Dr. Richard Elgin reports on a gathering of subject-matter-experts reviewing the state specific test for licensure in *Exam Workshop Held*. Former president of the International Federation of Surveyors professor Rudolf Staiger shares his reflections on the skills and knowledge required for contemporary surveying in *The Surveyor 4.0*. Reports of surveying educational opportunities abounding is evident in two articles; Survey Classes at State Tech by instructor Mike Oetterer and *Land Surveying and Geomatics Program Added to SIUE's Engineering Offerings*.

Gratitude is expressed to those making things happen at the Spring Workshop with our *Thank You Speakers, Sponsors & Exhibitors*. Then MSPS member B. Austin DeSain, PLS shares tales of surveying history and a vacation in *A Trip to Fort Osage and the Santa Fe Trail*. More history is offered to readers in *Professor's Groundbreaking Book Offers Living History of Washington's Surveying Methods*. Finally, more great information for readers in the remaining pages of reports and news. Enjoy it all while learning a bit!

Remembering an Ethical Man

Attorney Curt Thompson of Jefferson City passed away recently. While many of you may not have known Mr. Thompson, he had served long and well as the General Counsel for the Registration Board including the Land Surveying Division. His memoriam in the Board's newsletter included the following about Curt:

> "In addition to Curt's outstanding legal acumen and institutional knowledge, his passion for the protection of the health, safety and welfare of Missouri residents has always guided his counsel to the Board."

Curt was previously a District Counsel for MoDOT. I met him then when the highway department was having to work through non-compliant surveying practices. I was the MoDOT representative when meeting with the Registration Board and MARLS, while he was the legal advisor. He ably helped all parties work towards resolution. While we both stood with and for our employer when right, we sought to guide the organization past refusal when wrong to instead work towards doing what was right.

A couple of years later, Curt left MoDOT. It was another case of trying to advise an unyielding behemoth towards doing right. That time, Curt did not prevail and rightfully chose to leave instead of be party to a wrong thing. It was an ethical conflict, and the right choice cost him a great deal. But Curt knew to have stayed and accepting a "wrong" would have cost much more. I always admired the decision and the man.

After serving the Board, he retired in Jefferson City. I lived down the street from him. Described in his obituary as, "…a fierce advocate committed to uncovering injustice,"

(continued on page 26)

THE MISSOURI SURVEYOR

Published quarterly by the
Missouri Society of Professional Surveyors

OFFICERS

Ray Riggs.....President
Robert Anderson.....President-Elect
Charles E. Quinby .....Vice President
Mark Wiley.....Secretary-Treasurer
Sandra C. Boeckman .....Executive Director
Brad McCloud.....Past President
Michael D. Zahner .....NSPS Director

DIRECTORS

Kirk Baldwin
Christopher Ferguson
Scott Faenger
Matt Thomas
Bart Korman
Phil Grout

ADVERTISING RATES

	4 issues	1 issue
Full Page	650.00	200.00
Half Page (horizontal or vertical)	400.00	150.00
Quarter Page	250.00	100.00
Professional Card	50.00	N/A

COPY DEADLINE

March Issue — February 1
June Issue — May 1
September Issue — August 1
December Issue — November 1

EDITOR

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

PUBLISHER

Sandra Boeckman
722 E. Capitol Avenue
Jefferson City, MO 65101
(573) 635-9446 FAX (573) 635-7823
E-mail: msps@missourisurveyor.org

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

President's Message

Ray Riggs, PLS

When a young surveyor posed a question to me at a conference recently, I was left kind of stumbling over my words and probably gave a somewhat incoherent answer. The question? "If I wanted to aspire to the MSPS President's position, like you, what steps would you suggest I take?" Since then, I have mulled this over and here is (hopefully) a more structured reply.

I appreciate people with ability. Athletes, singers, entrepreneurs, chefs, farmers, medical and emergency personnel… there are just too many to name. Jesus Christ himself appreciated and valued ability, because in His parable in Matthew 25:15, the lord of the servants distributed the talents according to the three servant's abilities.

So, what abilities do you need if your desire is to be a director, and eventually an officer on the MSPS Board of Directors?

In my estimation, the first would be "Avail-ability". Let the men and women you perceive as leaders in MSPS know you are available. This can begin at the local level with the six MSPS chapters scattered throughout the state. Get to know the leadership. Attend the meetings. At the statewide level of MSPS, do the same. Volunteer for a committee or committees. You don't have to be pushy or obnoxious, just make yourself available and you will get noticed.

Next, I believe hand in glove with availability is: "Depend-Ability".

Being dependable can sometimes be very inconvenient. I have been nominated for positions on several boards, councils and committees; and my first consideration is this: "Can I be a dependable member of this group?" I can be the person with great insight, able to see the "Big Picture" and can "play well with others" but if I don't show up, I become a "Li-ability"!

My intention with this message is not to discourage anyone from the path to MSPS leadership but to realize the "Response-ability" that comes with the climb.

And finally. The poet James Whitcomb Riley said that "A Summer's Day" is the time to "*wunder* through the *underbresh*". We surveyors know all about this kind of "Wundering". So, get your bug repellant, sunscreen, wide-brimmed hats and coolers full of water bottles and have a safe and productive summer!

God Bless!

Ray

Exam Workshop Held

by Dr. Richard L. Elgin, PS, PE - Exam Consultant to the Board

A group of Professional Surveyors from around the state and with different practice backgrounds recently met to review all aspects of the Missouri StateSpecific Professional Surveyor Exams. Earning a passing score on these exams is required for licensure as a Missouri Professional Surveyor. Goals of the daylong workshop included: Review the question bank to ensure each question is applicable, reasonable and consistent with current statutes and regulations. The group also reviewed and confirmed the exam format, being in two parts, open book, 1.25 hours exam length for each part and a total of seven subject areas examined.

The group considered, recommended and the Board subsequently approved slight changes in the topic exam percentages. The revised "exam weights" shown will be first used in the October 2023 exams. They are:

Percent of Exams

Part I, General, 1.25 hours

Topic	Percent
Missouri (includes boundary description exercise)	40.5%
Statutes and Board Rules	33.5%
State Plane Coordinates	13.7%
Riparian Boundaries	12.3%
	100.0%

Part II, USPLSS, 1.25 hours

Topic	Percent
Calculation problems on the USPLSS	35.6%
The original GLO surveys	32.7%
Resurveys on the USPLSS	31.7%
	100

"The Board and the profession thank the workshop participants for their time, input and dedication to making these exams the best they can be" said Mark Nolte, PS, Chair of the Board's Land Survey Division.

Missouri Society of Professional Surveyors

Surveyor's Review Course

August 14-16, 2023

Best Western Plus, Jefferson City, MO

PROGRAM

Monday, August 14 — 1:00 - 5:00 pm (In-Person ONLY)

SURVEYING MATH (Bring your NCEES-approved calculator)

- ❑ Calculator Use & Basic Algebra
- ❑ Trigonometry and Geometry
- ❑ Traverse Calculations and Coordinate Geometry
- ❑ Surveying Math Applications

Tuesday, August 15 — 8:00 am - 5:30 pm (In-Person ONLY)

SURVEYING FUNDAMENTALS

- ❑ Errors Analysis
- ❑ State Plane Coordinates
- ❑ Route Surveys, GPS & GIS
- ❑ Exam Preparation
- ❑ Legal Principles & Definitions

Wednesday, August 16 — 8:00 am - 3:30 pm (In-Person or Virtual)

MISSOURI PRACTICE

- ❑ Missouri Standards & Board Rules
- ❑ Missouri's GLO System, Resurveys on Missouri's GLO system (RSMO Chapter 60)
- ❑ Calculation Problems on the USPLSS
- ❑ Other Missouri Statutes, Riparian Boundaries

COURSE INSTRUCTORS

Dr. Dick Elgin, PLS, PE, works for Archer-Elgin Engineering, Surveying & Architecture (Rolla). He authored "The U.S. Public Land Survey System for Missouri" and "Riparian Boundaries for Missouri". **Mike Flowers**, PLS, is the former Missouri State Land Surveyor. He is a former member of the Missouri Board of Architects, Professional Engineers, Professional Surveyors and Landscape Architects. **Dr. Joseph Paiva**, PLS, is a geomatics and business development expert and a former university educator, who is now CEO and Principal of GeoLearn (www.geo-learn.com), an online education company specializing in courses for professionals and technicians in the geospatial industry. All are well known surveying professionals. Joe Paiva helped found the Review Course and for years all three have previously taught parts of it.

The Surveyor's Review Course is appropriate for those who will be taking any part of the surveying licensing exams, or for those already licensed and wish to review surveying topics and receive PDUs.

The course has been approved for continuing education credits from the Missouri Board for Architects, Professional Engineers, Professional Land Surveyors and Landscape Architects for the following hours:

Monday — 4.0 PDUs Tuesday — 8.5 PDUs Wednesday — 6.5 PDUs

Note: If you are currently licensed in Missouri, all 6.5 PDU's on Wednesday are applicable for the 2 hour PDU requirement for license renewal per 20 CSR 2030-8.020 (Missouri Standards and Statutes).

FEE SCHEDULE (Please check appropriate boxes)	MSPS MEMBER	NON MEMBER	Virtual Wednesday (Please check)
❑ **ALL THREE DAYS**	**$900**	**$1,100**	❑ **$100** (Additional)
❑ Monday Only (in-person)	$200	$300	
❑ Tuesday Only (in-person)	$450	$550	
❑ Wednesday Only (in-person or virtual)	$350	$450	❑ **$100** (Additional)

Missouri Society of Professional Surveyors

SURVEYOR'S REVIEW COURSE

August 14-16, 2023

Best Western Plus
1937 Christy Drive
Jefferson City, MO 65101

LOCATION AND LODGING

A block of rooms has been reserved at the Best Western Plus in Jefferson City, MO, at a rate of **$135.95** plus taxes for single king/double queen occupancy and includes a full hot breakfast each morning. Make your reservations by calling 573-635-4175 and refer to the "Missouri Society of Professional Surveyors" rate when reserving your room.
DEADLINE FOR HOTEL RESERVATIONS IS AUGUST 7, 2023.

CANCELLATION POLICY

MSPS reserve 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, minus a $25.00 service charge.
NO REFUNDS WILL BE GIVEN AFTER AUGUST 7, 2023.
(Exception: See policy on Virtual Wednesday sheet.)

REVIEW COURSE REGISTRATION

Name	PLS #
Firm	
Address	
City, State	Zip
Phone	Email

PAYMENT OPTIONS

❑ **Credit Card** (Visa, MC, Discover, AX) ❑ **Check** ❑ **Invoice my Firm**

Card #	Exp. Date
CVV Code	Total Amount $

To Register, detach and mail payment to: MSPS, 722 E. Capitol Avenue, Jefferson City, MO 65101
Phone: 573-635-9446 ~ Fax: 573-635-7823 ~ Email: msps@missourisurveyor.org
Registration Deadline: August 7, 2023

SEILER GEOSPATIAL

Missouri
3433 Tree Court Ind. Blvd.
St. Louis, MO 63122
Office: 314-968-2282

Kansas
11801 W. 86th Terrace
Lenexa, KS 66214
Office: 816-331-3383

Tech Support: 844-266-7266

Providing high accuracy products, superior training and support since 1945

- Total station & GNSS solutions to exceed your productivity needs
- Field and office software that supports your workflows
- Scanning and leading aerial mapping solutions
- Training customized for the way you work
- Experienced and knowledgeable staff
- Service, repair, and rental solutions

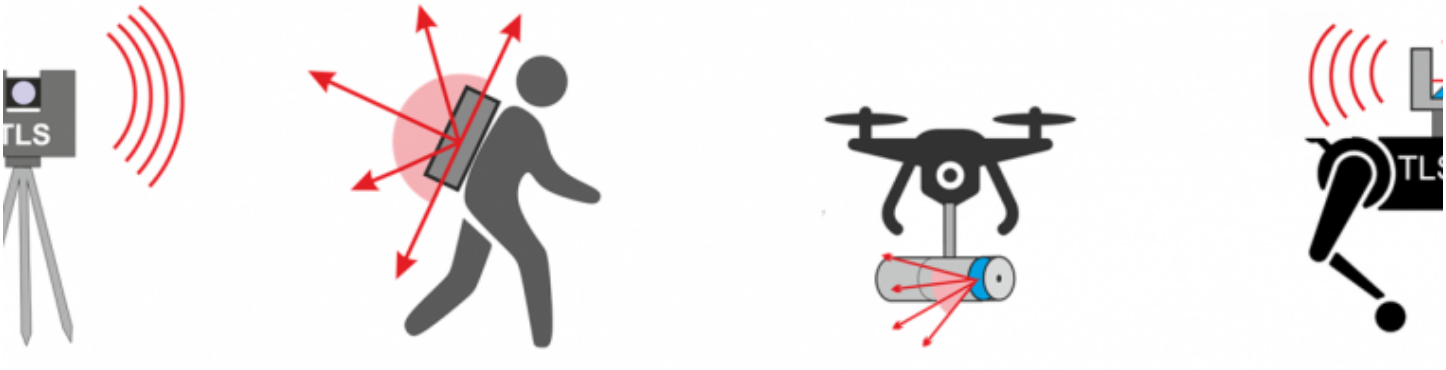
SCAN ME

Trimble Authorized Distribution Partner
Trimble Authorized Service Provider
SPECTRA GEOSPATIAL AUTHORIZED DISTRIBUTION PARTNER
AUTODESK Gold Partner
seco

Sales • Service • Support • Rentals • Training • Consulting

The Surveyor 4.0
Which technical skills are needed today?

by Rudolf Staiger, March 30, 2023



Over the centuries, all four industrial revolutions have influenced surveying instruments and the profession as a whole. This article explores which different skills and capabilities surveyors are required to develop as a result of the latest revolution: Industry 4.0.

Surveying is a classical profession that goes back at least 500 years, and perhaps as many as 3,000. The technical development of surveying instruments has been very well documented over the past 400 years, and many of our classical instruments – levels and theodolites – can be traced back to the Middle Ages. Technological progress in surveying ran – and still runs – in parallel with the developments of the industrial revolutions (IRs). As the instruments and their capabilities change, surveyors are required to develop different skills in order to operate them in the field.

The main drivers of surveying in modern times are military purposes and the desire for land registration (cadastre) and objective taxation. Today's surveyors use a variety of different measurement systems derived from the main instruments of the digital level, the electronic tacheometer (total station) and the GNSS receiver. These systems make it easier to acquire geodetic data (angles, distances, height differences and coordinates) faster and more accurately than before, provided that the surveyor has the right skillset.

Geodetic instruments over time

The archaic phase: Few details are known about the early surveying instruments, but they are thought to have been simple in nature (e.g. the Roman groma). This phase ended in 1590 with the invention of the optical telescope.

The optical phase: During a period of more than 300 years (1590-1924), technical developments produced instruments with opto-mechanical components such as telescopes, microscopes, circles and axes, which allowed the measurement of horizontal and vertical angles. Overall, the pace of advancement was slow. The instruments did not really become handy or easy to use compared to current technology until the early 20th century. Setting up a theodolite involved about an hour of assembly and adjustment at each site before the measurement activities could begin. Then the ingenious Heinrich Wild (co-founder of WILD in Heerbrugg, Switzerland) invented the T2, an instrument that allowed surveyors to begin measuring almost immediately after setting up the theodolite. This was not only the starting point for all modern surveying instruments, but it was also the climax of the optical phase. More famous optical theodolites followed, including the WILD T3 and T4 and the KERN DKM3.

(continued on page 10)

ZAHNER

AND ASSOCIATES, INC

PROFESSIONAL LAND SURVEYORS

DRIVING RESULTS

your partners in

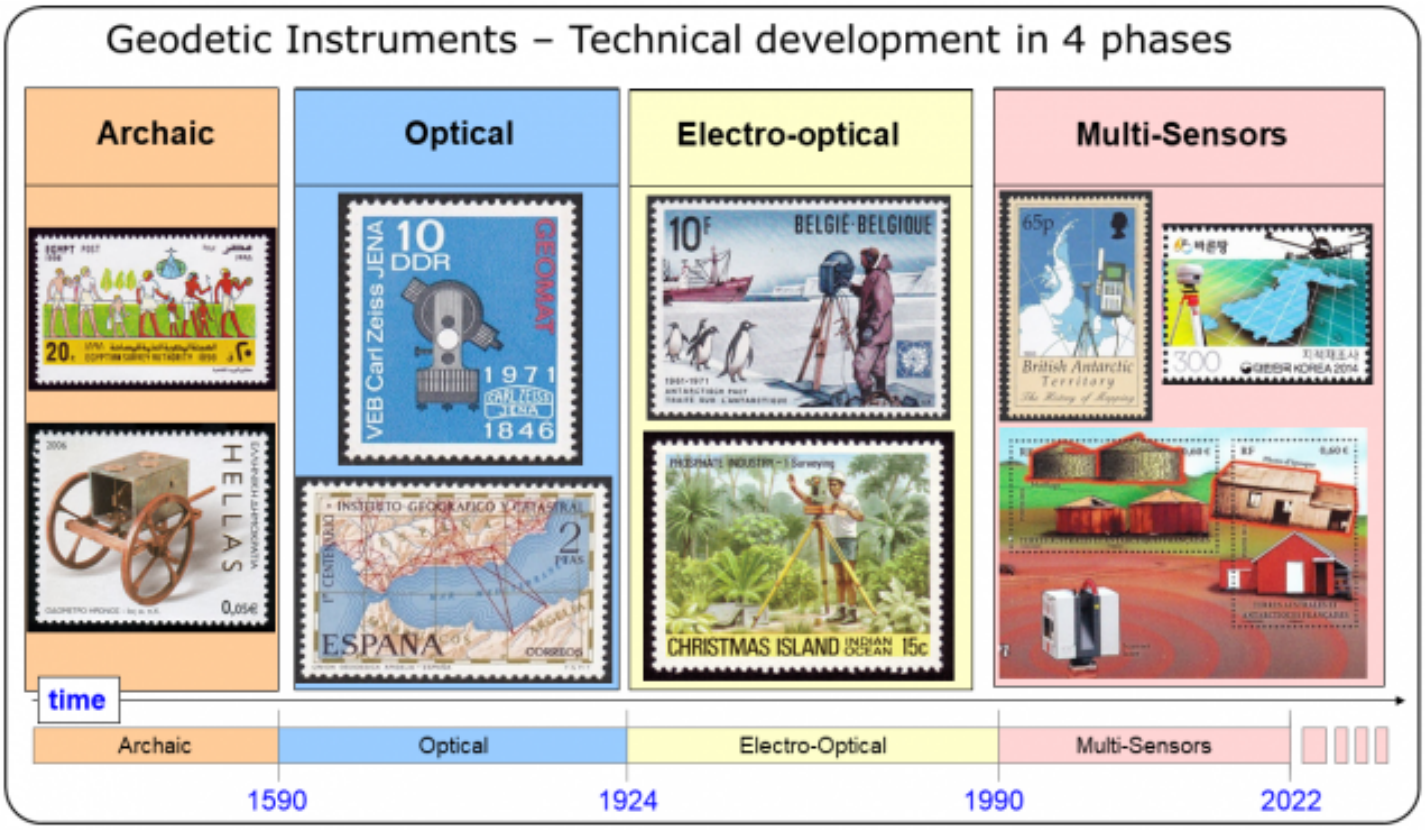
MOBILE LIDAR & TERRESTRIAL SCANNING

Learn more about how Zahner & Associates can help you provide your clients with safer, faster, more accurate data then ever before.

200 Zahner Place
Perryville, Missouri
573.547.1771
info@zahnerinc.com

Visit our website: **www.zahnerinc.com**

The Surveyor 4.0 *(continued)*



The technical development of surveying instruments can be divided into four phases, as depicted on stamps by postal services around the world.

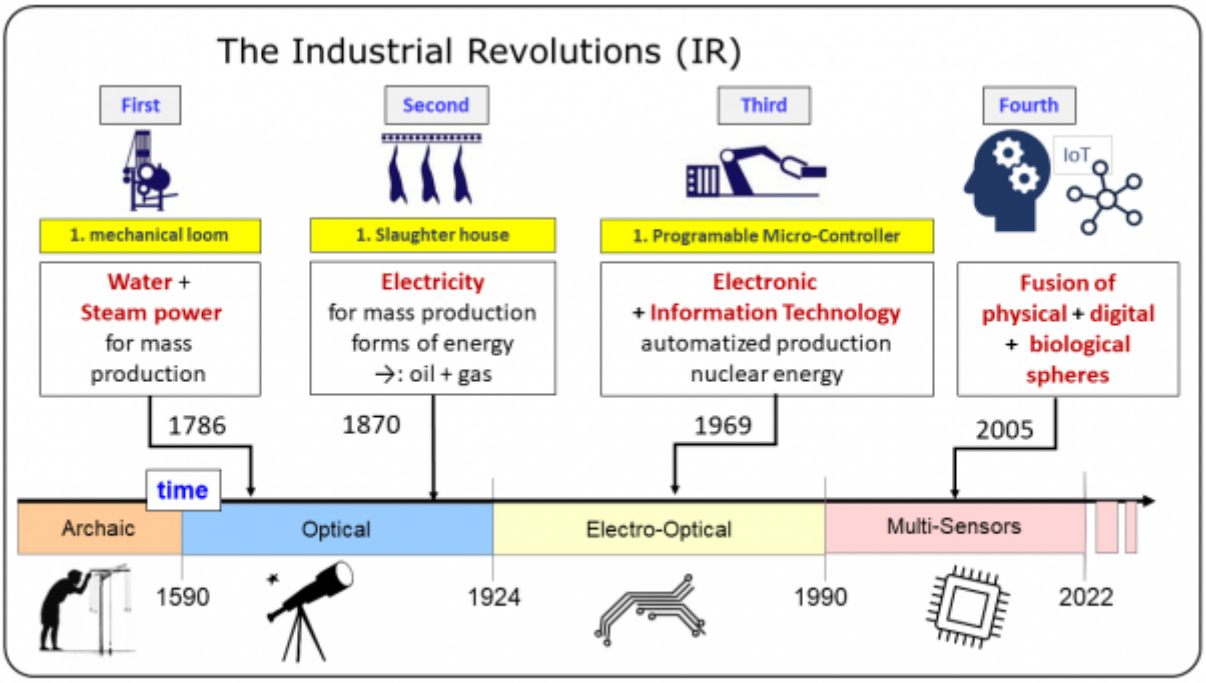
The electro-optical phase: This period was characterized by the arrival of electronic distance measurement, electronic or digital calculators, and digital storage of geodetic measurements and data. It lasted until 1989.

The technical development of surveying instruments can be divided into four phases, as depicted on stamps by postal services around the world.

The multi-sensor phase: This phase took off in 1990 with the rollout of the first digital level, the first usable GPS receivers and the first one-man total station. We are still in this phase.

The impact of the 4 industrial revolutions

The first two industrial revolutions had no significant impact on the technical progress of geodetic instruments. However, the third industrial revolution resulted in significant changes, not only to surveying instruments themselves but also to the surveyor's whole work approach due to the arrival of electronic distance measurement (EDM), the digital storage of measurements, and digital calculators. In the subsequent decades, the development and application of software (e.g. mainframe computers and PCs) became very important and shaped an entirely new job profile for the surveyor.



The four industrial revolutions in relation to the four different phases of surveying instruments.

The multi-sensor phase

The multi-sensor phase began in 1990 with the appearance of the first digital level, the first usable GPS receivers and the first one-man station. In the early years, a technological rally took place between tacheometry and satellite-based surveying (namely, GPS). Today, this competition is over; GNSS receivers are commonly used in combination with total stations. Over the last 30 years, the industry has introduced huge technological progress to the market, and this era is still ongoing (see Figure 3).

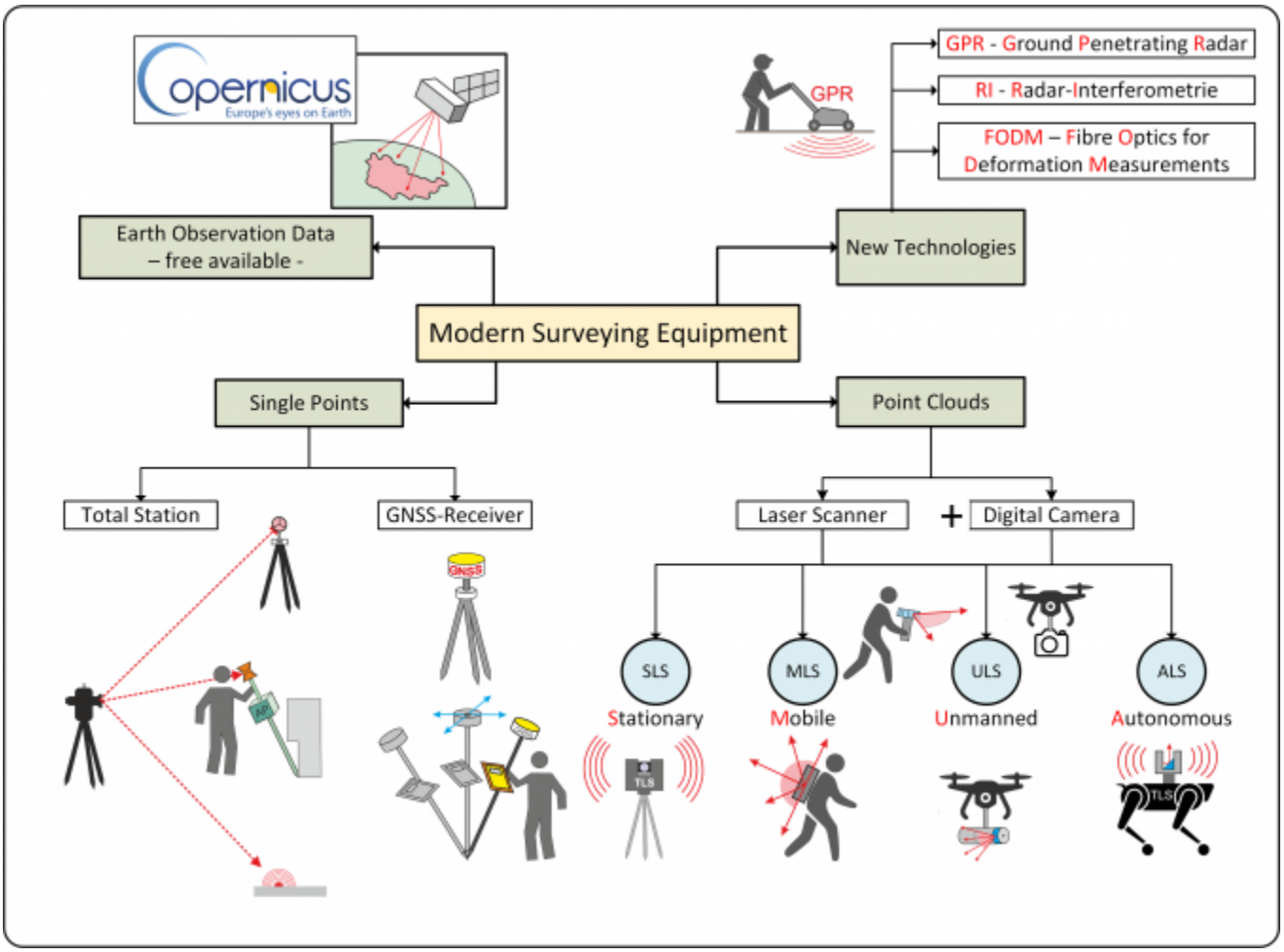
In general, all types of instruments have become significantly more productive, more accurate and more versatile. Productivity is based on a variety of different aspects and criteria, such as the duration of a single measurement, the range of measurable distances, the number of measured distances per battery charge, as well as the skills of the operator needed for high-quality measurements. At the same time, there have been notable reductions in the amount of effort required from users thanks to instruments with a smaller size, lower weight and convenient accessories such as reflectors and tripods. Additionally, the costs have decreased in terms of not only financial investment, but also the time needed to train the operators.

The measurement process, past and present

In the past, operators of surveying instruments were called ‘observers’ because they had a direct influence on the measurements and their quality. Operators of optical levels or theodolites were sharp-eyed, weather-proofed and experienced in manual calculations. Until 100 years ago, they were also skilful mechanics. The observer read the raw observations and eliminated the influence of instrumental errors by numerous repetitions in well-defined observation schemes (e.g. double-face measurements with systematic rotation of the horizontal circle between the sets, reversed order of targets in the opposite face). Such repetitions not only reduced the number of personal errors by the observer, but also ensured effective control against blunders and calculation mistakes.

(continued on next page)

The Surveyor 4.0 *(continued)*



The variety of measurements systems today.

Today's operators, rather than being observers, are users of mobile PCs with geometrical sensors. Apart from the setup of the instrument on site, they have no direct influence on the measurements. The measurement process itself is fully automatic, and the resulting values that the user accesses are the product of multiple automatic readings from one or more sensors, which are numerically compensated based on complex geometrical and physical correction models. Nowadays, 80% of the measurements in the field are executed without any redundancy because the theoretical accuracy of a single measurement by the system is sufficient, given that the measurement devices are properly working within their specifications. Users often believe that their results are true values, without any deviations. Useful checks against known values are not often carried out.

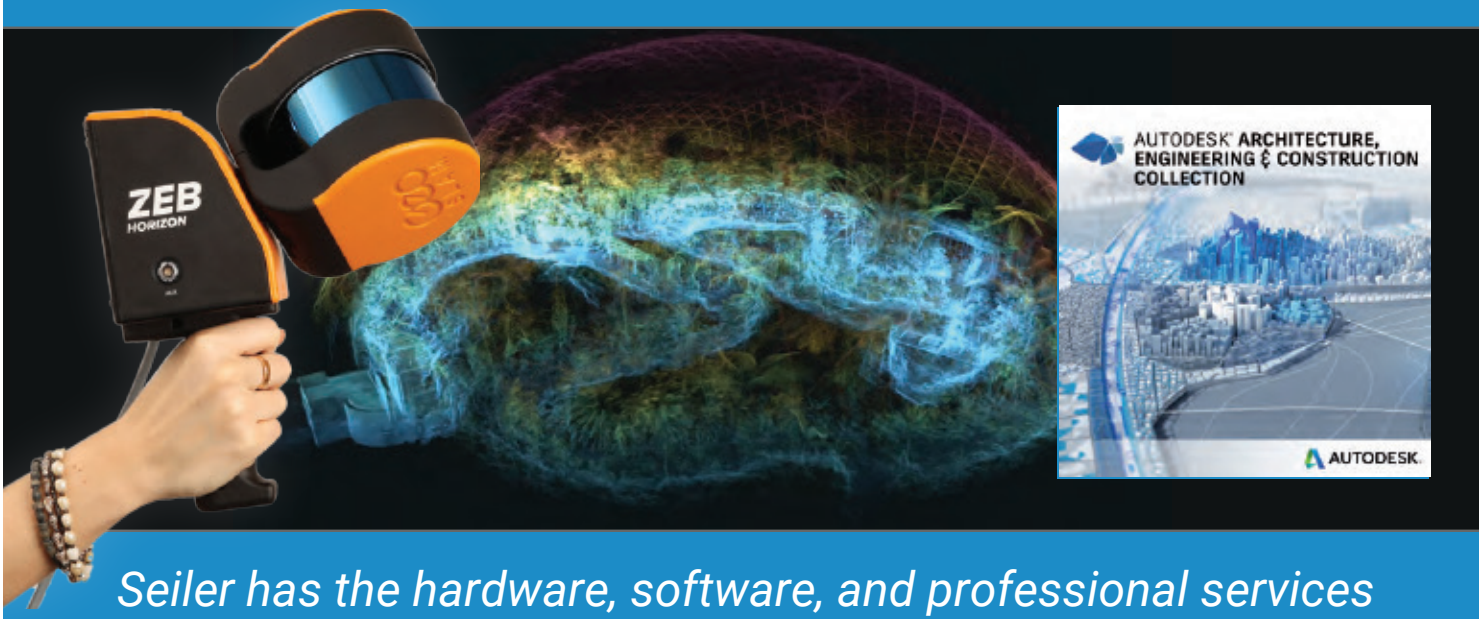
Four measurement technologies

Users can nowadays choose from a rich toolbox of different measurement technologies. These can be divided into four categories.

(continued on page 14)

SEILER
DESIGN SOLUTIONS

From data capture in the field to design and documentation in the office



Seiler has the hardware, software, and professional services to keep you ahead of schedule and under budget.

PRODUCTS & SERVICES WE OFFER:

- Autodesk Software Solutions
- Handheld Scanners
- Hands-on Custom Training
- Template Creation
- Workflow Analysis
- Skills Assessment Testing
- Custom Content Creation
- Complete Support- before, during, and after every sale.
- Services and Sales via Seiler Geospatial; Robotic Total Stations, scanning, imaging, GNSS, and UAV Technology.

AUTODESK
Gold Partner

30 YEARS
PARTNERING WITH AUTODESK

Trimble
Authorized Distribution Partner

GeoSLAM

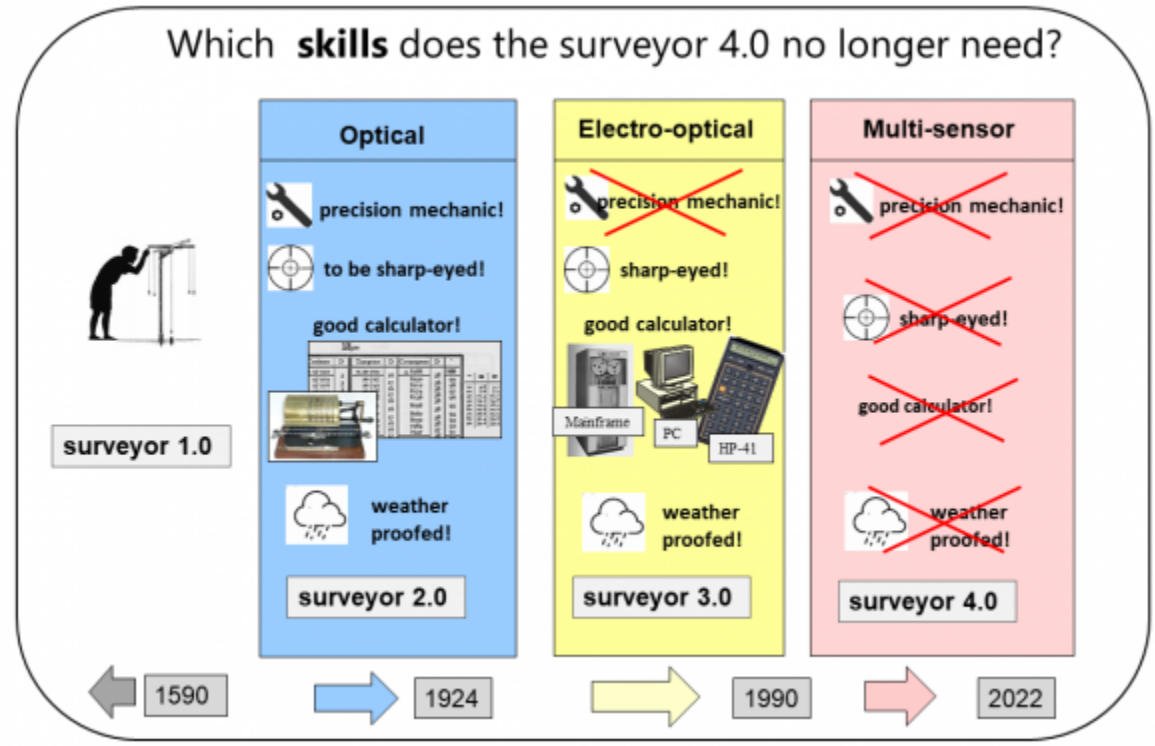
IOWA • ILLINOIS • INDIANA • KANSAS • MICHIGAN • MISSOURI • NEBRASKA • WISCONSIN

cad@seilerinst.com | 1-888-263-8918 | www.seiler-ds.com

The Surveyor 4.0 *(continued)*

Acquisition of single points: The total station and the GNSS receiver are the main devices for capturing single points, which means that each point represents an individual geometrical object. Poles for the antennas and reflectors with integrated inertial measurement units (IMUs) make it unnecessary to set the pole precisely upright. This feature not only allows for the measurement of inaccessible points, but also offers increased accuracy and speed.

Acquisition of point clouds: Laser scanners first appeared on the market 25 years ago. They produce entire point clouds in a very short period of time. While single points have no specific meaning, subsets of the point cloud represent geometrical elements like planes, spheres and cylinders. Often combined with digital cameras today, laser scanners offer peerless productivity and versatility in the sub-categories of stationary, mobile, unmanned and autonomous laser scanning. The high measurement speed (one million points per second) opened up entirely new fields of application where traditional techniques would fail due to technological and economic limitations.



The evolution of the necessary skills for surveyors.

Acquisition of point clouds: Laser scanners first appeared on the market 25 years ago. They produce entire point clouds in a very short period of time. While single points have no specific meaning, subsets of the point cloud represent geometrical elements like planes, spheres and cylinders. Often combined with digital cameras today, laser scanners offer peerless productivity and versatility in the sub-categories of stationary, mobile, unmanned and autonomous laser scanning. The high measurement speed (one million points per second) opened up entirely new fields of application where traditional techniques would fail due to technological and economic limitations.

Use of new technologies: New measurement technologies have recently appeared, including ground-penetrating radar (GPR), radar interferometry (RI) and fibre optics for deformation measurements (FODM). The latter two technologies focus on the detection of small changes in the objects (deformation analysis) through repetitive measurements.

(continued on page 28)

Land Surveying and Geomatics Program Added to SIUE's Engineering Offerings

April 24, 2023 – SIUE Current News, https://www.siue.edu/news/2023/04

In response to the increased demand and limited number of individuals entering the professional surveying workforce, the Southern Illinois University Edwardsville's School of Engineering (SOE) is announcing the formation of a new four-year degree in land surveying and geomatics. This is the only four-year degree for land surveying that offers a direct pathway to professional licensure in several Midwestern states.

"This program is offered to a broad base of students as it has integrated focused coursework from our surveying specialization, geography and civil engineering programs," said John Cabage, PhD, associate professor and chair of the Department of Construction. "We hope that through this program at SIUE, we can help increase the number of individuals entering the professional surveying field."

SIUE to offer land surveying and geomatics degree in fall 2023.

The gift of more than $214,000 in equipment from Seiler Instrument enabled SIUE to launch this degree program with leading edge technology. Together, the collaboration of SIUE's School of Engineering, College of Arts and Sciences and Seiler Instrument will contribute to a one-of-a-kind degree program that stands out in the Midwest region.

Seiler Instrument presents their gift to SIUE's land surveying and geomatics program. "The land surveying and geomatics skills are in high demand," said Cem Karacal, PhD, professor and dean of the SOE. "The SOE is converting the land surveying specialization program to a four-year degree program by combining it with geographic information systems

Seiler Instrument presents their gift to SIUE's land surveying and geomatics program.

(GIS), global positioning systems (GPS), remote sensing and photogrammetry to collect, process and analyze spatial data. We expect this new program to help our regional corporate partners by providing them a well-prepared talent pipeline."

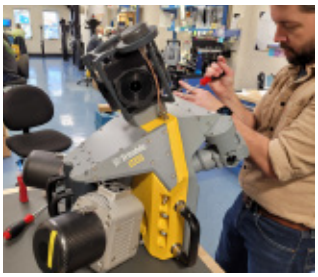
Land surveyors are uniquely qualified to provide fundamental professional services to the engineering, construction, GIS and real estate industries. Upon completion of the program, students can obtain careers as a cartographer, boundary surveyor, design engineering surveyor, federal surveyor, drone pilot and aerial mapper, and other various career paths.

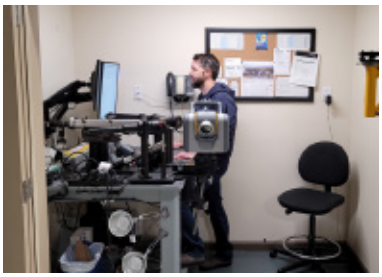
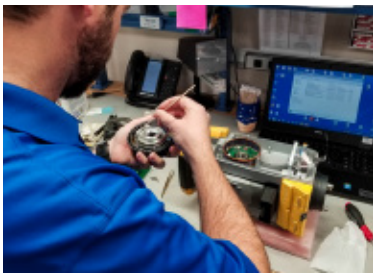
"The program is forming an industry-supported advisory board made up of surveyors from primarily Missouri and Illinois to direct and guide our educational and recruiting efforts," Cabage added. "A new equipment lease program has been developed with Seiler Instruments of St. Louis which will ensure that our program is using the most current technology while we train students to become surveying professionals."

The program has received its professional licensure from the Illinois Department of Financial and Professional Land Surveying Board and will be offered starting fall 2023. For more information about the program visit:

siue.edu/academics/undergraduate/degrees-and-programs/surveying-geomatics/index.shtml.

SEILER GEOSPATIAL



Make sure your instruments are in peak shape and get a free estimate!

Service and Repair

GPS/GNSS/GIS

Data Collectors • NIST Certification

Lasers (Pipe, Grade, Interior) • Levels

Mechanical Total Stations • Clean, Relube

Robotic Total Stations • Trimble Mobile LiDAR

Calibrate and Repair most makes and models

Email: servicedept@seilerinst.com
Toll Free: 877-330-6303
www.seilergeo.com

SCAN ME

Trimble
Authorized Service Provider




Service Centers
ILLINOIS • INDIANA • KANSAS • MICHIGAN • MISSOURI • WISCONSIN

Survey Classes at State Tech

by Mike Oetterer

State Tech surveying students during a 2023 spring semester lab session.

State Tech has been offering four survey classes, which are approved by the Missouri Licensing Board for licensure, since 2014. Each of these classes is a 16-week course and are three credit hours each. This is an effective way for many to get the required 12 semester-hours of surveying coursework needed for licensure. During the time State Tech has been offering these classes, we have seen 335 different students take them. This number doesn't reflect the fact that most of these 335 enrolled in courses more than once, bring the total number of course enrollments to 850.

In Fall of 2014 the average class enrollment was 12-15 students. We have seen the enrollments steadily rise over time. In spring 2023, class enrollments in the two courses being taught reached over 80, though, since some students were enrolled in two courses, the actual number of students was lower. Three instructors have played a pivotal part in the success of these classes. The first was Don Mayhew, then Joe Paiva, and finally Mike Oetterer who joined as the third instructor. Joe and Mike are the current instructors. Paiva teaches SUR 242 Land Records: Researching and Rules of Construction in the fall semester and SUR 243 Legal Aspects of Boundary Surveying in the spring. Oetterer currently teaches SUR 240 Survey l in the fall semester and SUR 241 Surveying ll in the spring.

It should be noted that all of these courses rely on online education. With Surveying I and II, there is a requirement of a series of lab sessions. Students have the option of coming to Linn on four Saturdays for six-hour sessions to cover the basics and then various surveying operations, while keeping an eye on errors that can occur in the work. Equipment is available at the College for this purpose. Because of this requirement, we call these two courses "hybrid."

There is an option for students to find a licensed surveyor as a mentor who will sign an agreement, together with the student and the land survey coordinator. The mentor then assists the student in applying the lab projects to a remote location that the student and mentor agree. The mentor provides tips on the work, and also agrees to make equipment available, and where needed, an assistant to help the student complete their work. This mentor option makes it possible for students who live a considerable distance from Linn, or whose schedule does not permit visiting Linn for any reason to still complete the course requirements. All students are required to complete lab reports and they are all graded without regard to where the projects were completed.

State Tech is currently developing a fifth class that will allow a student to take another three semester-hour class. This course is planned to be available for the latter part of 2024. Once this class is available it will make State Tech the only college in Missouri that offers all the required coursework needed for licensure when the new law comes into effect January 2024. This class will cover various aspects of surveying practice, focusing on reading and writing descriptions, compliance with Missouri standards, specifications, and statutes and related topics such as ethical and business practices.

The success that State Tech has had with the survey classes requires acknowledgment of the employers who send their employees to State Tech for these classes. Many of these employers cover the cost of taking and attending the classes. Many also help with and provide equipment required for the lab sessions and provide guidance to the student when they are completing assignments.

A look at the data from just the last three years shows that the students and their employers come from all corners of Missouri including:

- A Civil Group, ABNA Engineering
- Affinis Corp
- Alberici Constructors
- Allen Surveying Inc
- Allgeier, Martin, and Associates
- Anderson Engineering
- Austin Land Surveying
- BFA Engineering & Surveying
- BHC RHODES
- Barnes & Riddle Surveying
- Benton & Associates
- Cardinal Surveying & Mapping
- Central Counties Surveying
- Civil and Environmental Consultants
- CJW Transportation Consultants
- Clayton Engineering,
- Cleaver and Associates
- Cole and Associates
- CPWG Engineers
- Cross Discipline Engineering
- EDSI
- Emery Sapp & Sons
- Engineering Surveys and Services
- Frazier Land Surveying
- Great River Engineering
- Govero Land Services
- Hasty Surveying
- Houseman Land Survey
- J&H Land Services
- Jeffco Survey
- Lamp Rynearson
- Lee Engineering
- Lewis-Bade, Inc
- Mackey Surveying
- Meridian Land Surveying
- Miller Companies
- MoDOT
- Nelson Land Surveying
- & M Land Surveying
- Premier Design Group
- Shaffer and Hines
- Schaefer Surveying
- Sisco Land Surveying
- Sterling Engineering and Survey
- SWT Design
- Taliaferro & Browne, Inc
- T. Daugherty & Assoc
- THD Design Group
- Trail Consulting
- Wilson Surveying Company Inc
- Wunderlich Surveying & Engineering
- Zahner and Associates

State Tech is fortunate to have been the beneficiary of equipment and other donations. Seiler Instruments has partnered with State Tech to provide Trimble total stations, automatic levels, R12 receivers, and TSC7 data collectors all at no cost to State Tech. Govero Land Services has donated $10,000; SAM has donated $5,000; and the Southwest MSPS chapter has donated $1,000 to the program. This equipment and donations enable State Tech continue to offer good educational experiences to the students and to have the necessary materials to use for the survey classes and labs.

Currently, the coordination of State Tech's land survey program is handled by Mike Oetterer. He does this on a part time basis. His roles include marketing, helping students with information about the program and guiding them to the appropriate website pages and people at State Tech so that they can enroll as effortlessly as possible. Once they are enrolled in classes, he helps them with their progression through the series of courses.

How to Apply for Enrollment

For more information about the survey courses at State Technical College of Missouri and how to enroll please visit State Tech's website at https://www.statetechmo.edu/. Once you are on the State Tech home page click on Start Your Career then select Workforce Training and Continued Education. On this page you will see Land Surveyor License Credit Courses, click on that link. This will bring you to the Surveying page where you can apply to the college for enrollment.

Questions about the Surveying Courses?

If you have any questions or need help applying, please contact Mike Oetterer, State Tech Survey Program Coordinator at mike.oetterer@statetechmo.edu or 314-603-7873.

Spring Workshop

April 28-29, 2023 * The Lodge of Four Seasons

Thank You

SPEAKERS

Robert Bailey ~ Brett Black ~ Sean Cleveland ~ Norm Ellerbrock, PLS
Terry Gammill ~ Daniel L. Govero, PLS ~ Kellan Gregory, PLS
Eric "Ric" C. Harris, J.D. ~ Troy Hayes, PLS ~ Ladd Nelson ~ Ralph Riggs, PLS
Ray Riggs, PLS ~ Terri Rollings ~ Zephaniah Smith ~ Pat Stack ~ Chris Van Tassel
Mark Wiley, PLS ~ Mike Zahner, PLS

SPONSORS & EXHIBITORS

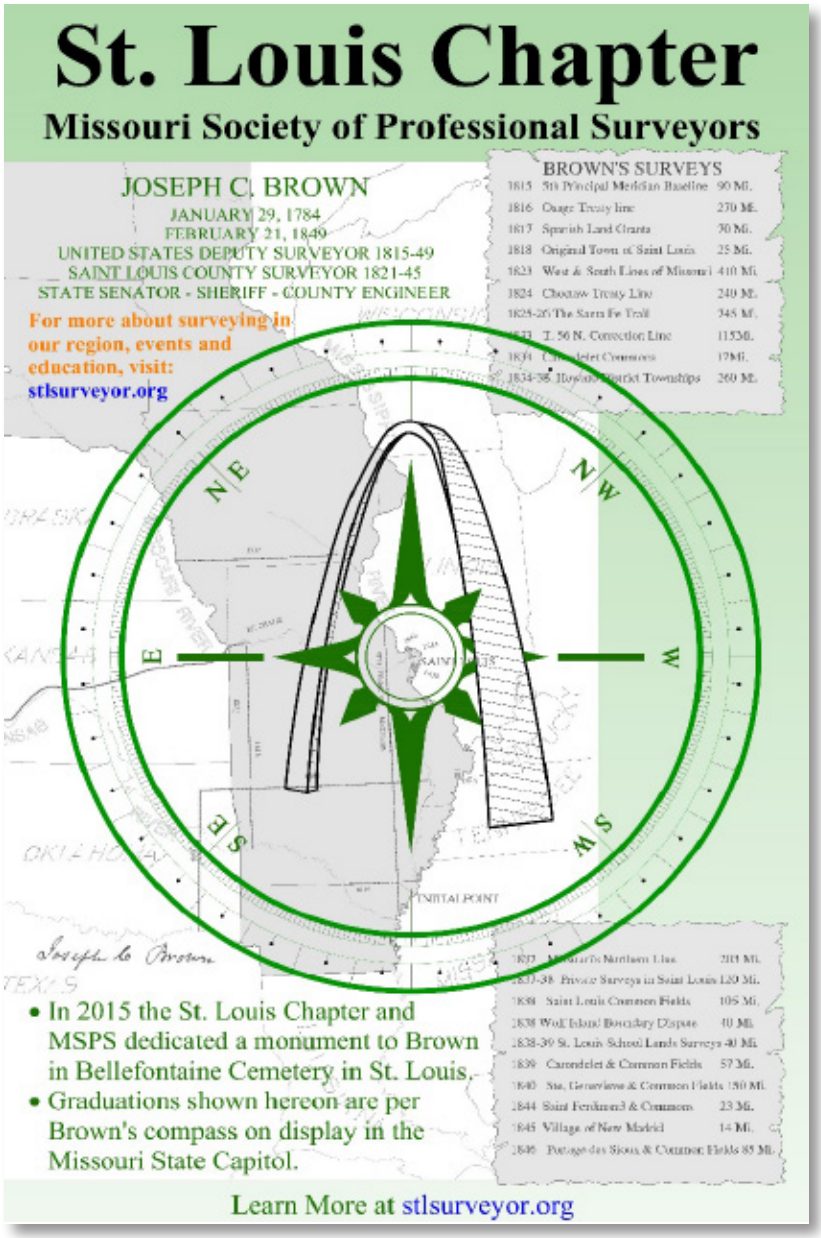
Carlson Software ~ GeoLearn ~ InScope ~ Laser Specialists
Missouri Department of Agriculture-Land Survey Program ~ Ozark Laser
Seiler Instrument ~ SIUE Land Surveying & Geomatics
State Technical College of Missouri ~ Surdex Corp. ~ Surveyors Materials
Topcon Solutions Store ~ Transit and Level Clinic ~ Zahner & Associates

A Trip to Fort Osage and the Santa Fe Trail

by B. Austin DeSain, P.L.S.

A vacation in mid-April worked well with the timing of a large project I had that was wrapping up. Instead of going to the ribbon-cutting, I would go on vacation. We hadn't picked a vacation spot yet though, to be determined.

The first few months of the year, I had been working on a new trade show banner for the St. louis Chapter of the Missouri Society of Professional Surveyors, the retractable kind that stood on its own. The sponsors were all locked in and it was being printed in Lenexa, Kansas. The banner commemorated the life and surveys of Joseph C. Brown, and was intended to draw an audience of surveyors to learn more about the local chapter. The graduations shown were taken from studying the face of the W.L. Potts & Co. Surveyor's Compass that Brown used. Shown were his most famous surveys spanning from 1817 to 1846, with graphics from the stone tablet placed by the St. Louis Chapter and MSPS at Bellefontaine Cemetery in St. Louis, in 2015. It really turned out great, with help and suggestions from Stan Emerick.



The top portion of the new St. Louis Chapter MSPS trade show and meeting banner is full of Joseph C. Brown details.

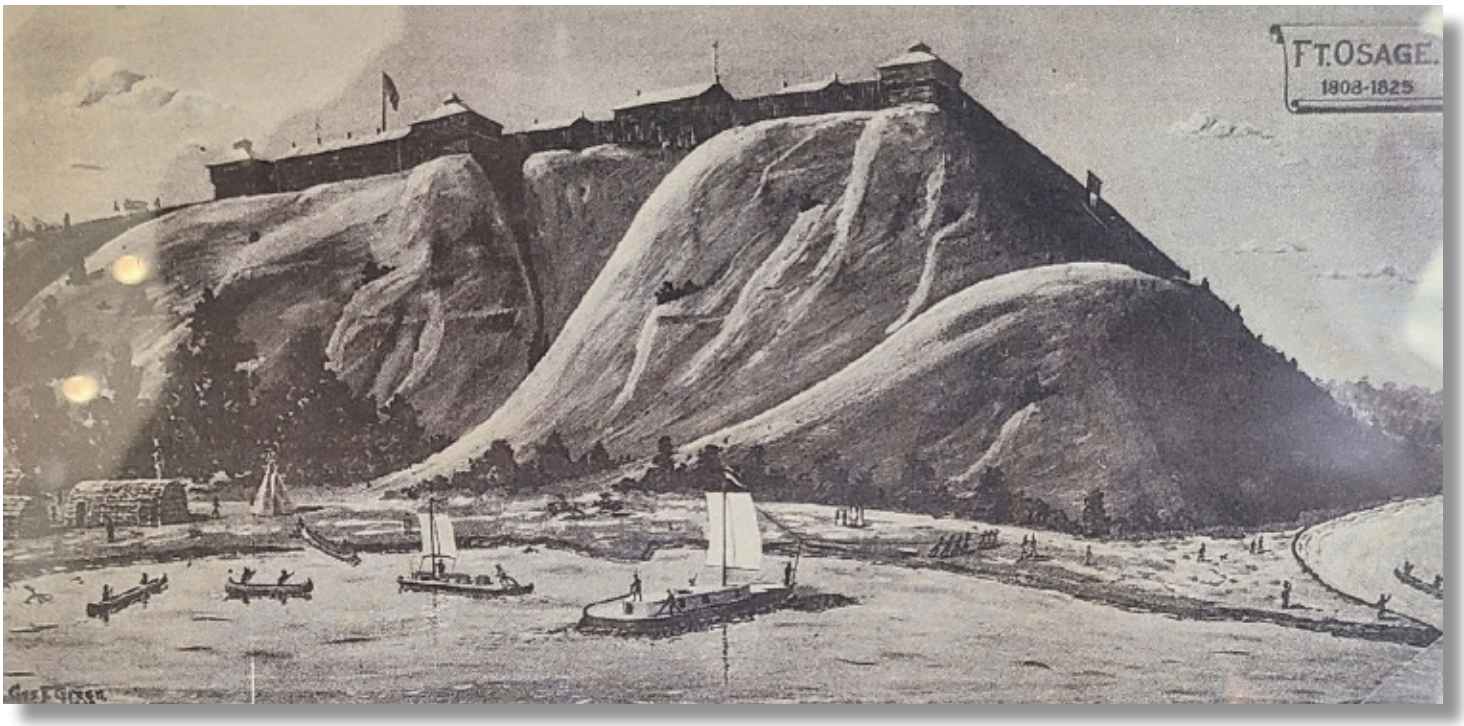
In the weeks leading up to my vacation to somewhere, I'd learned of a one-day expedition planned by a few other surveyors: Darrell Pratte, my dad Kevin DeSain and Milt Denny; and was now on the email chain to discuss an effort to determine the 0+00 station established by JCB at the beginning of his Santa Fe Trail survey. That sounded very interesting, especially since I didn't know anything about the Santa Fe Trail. There was mention of a Fort Osage in Darrell's plan to establish the station, something else that I really didn't know about.

So, it was decided that we would take a family vacation to Kansas City, to do a little surveying, between family time, and I could pick up the banner in Lenexa. I would spend the time until then reading and learning about the trail and the fort, and other attractions around town. I even watched the movie, The Santa Fe Trail, starring Ronald Reagan.

Fort Osage, on the Missouri River, and the Santa Fe Trail, share a place in history. Though the trail has a much longer history. The Santa Fe Trail route has been used by Spanish, Native Americans and western colonist at least since the early 1500s. Fort Osage was built after the United States procured Louisiana from the French in 1803. Lewis & Clark passed by this spot in 1804 on their way west for the Corps of Discovery. Returning to this area in 1808, Clark went back to the bluff to set up Fort Osage, a Factory in the middle of Osage territory.

(continued on next page)

A Trip to Fort Osage and the Santa Fe Trail *(continued)*



Old sketch of Fort Osage before the Bluff was moved by the United States Army Corps of Engineers.

Factories were for trading with Native Americans, and accompanied by a military installation. The Osage signed a treaty with Clark to allow the factory to exist on a 2-league square tract of land. Clark drew the map of the fort and helped set it up with Nathan Boone and others. Daniel Boone visited the fort in his 80s on the way further west for a hunting trip. The northern and western lines of the 2-league square were used as the northern and western borders of the state of Missouri, "The Osage Treaty Lines". These lines represented the extent of the United States. The lands to the West were considered desert and uninhabitable for most people, except "savages" that would live off the bison. Through a series of treaties between 1808 & 1872, the Osage ceded all of their lands in Missouri, Arkansas, Kansas and Oklahoma, except for a small area in northern Oklahoma.

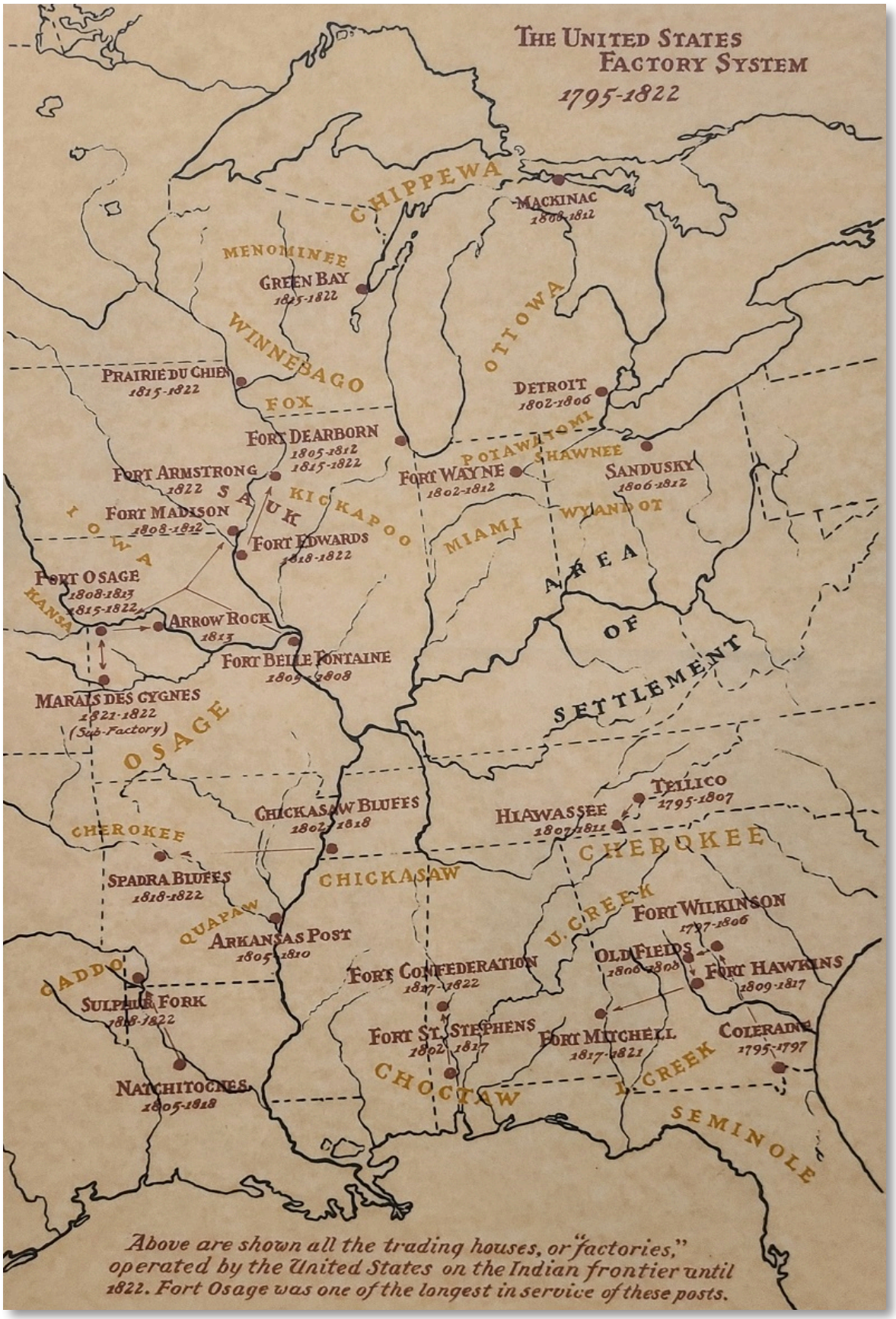
In 2016 the Missouri Society of Professional Surveyors (MSPS) restored the western Osage Treaty Line and set a Bicentennial commemorative stone at Fort Osage. The stone represents the stone used at the southern intersection of the Osage Treaty line with the South Line of the State of Missouri.

After the Osage signed a treaty, in 1825, President John Quincy Adams ordered a survey of the Santa Fe Trail. George C. Sibley, the Factory Manager of the Fort Osage factory, was the Expedition leader, and Joseph C. Brown was the surveyor.

Brown started the Santa Fe Trail survey, plus or minus, 1.75 miles south of the south gate of the fort and took observations for latitude at each campsite all the way to Santa Fe, New Mexico, through the newly ceded lands.

(continued on next page)

The 1816 – 2016 Bicentennial Stone sits at the end of a sidewalk near the current bluff of the Missouri river, between the modern Information Center and the Historic reproduction of the Fort.

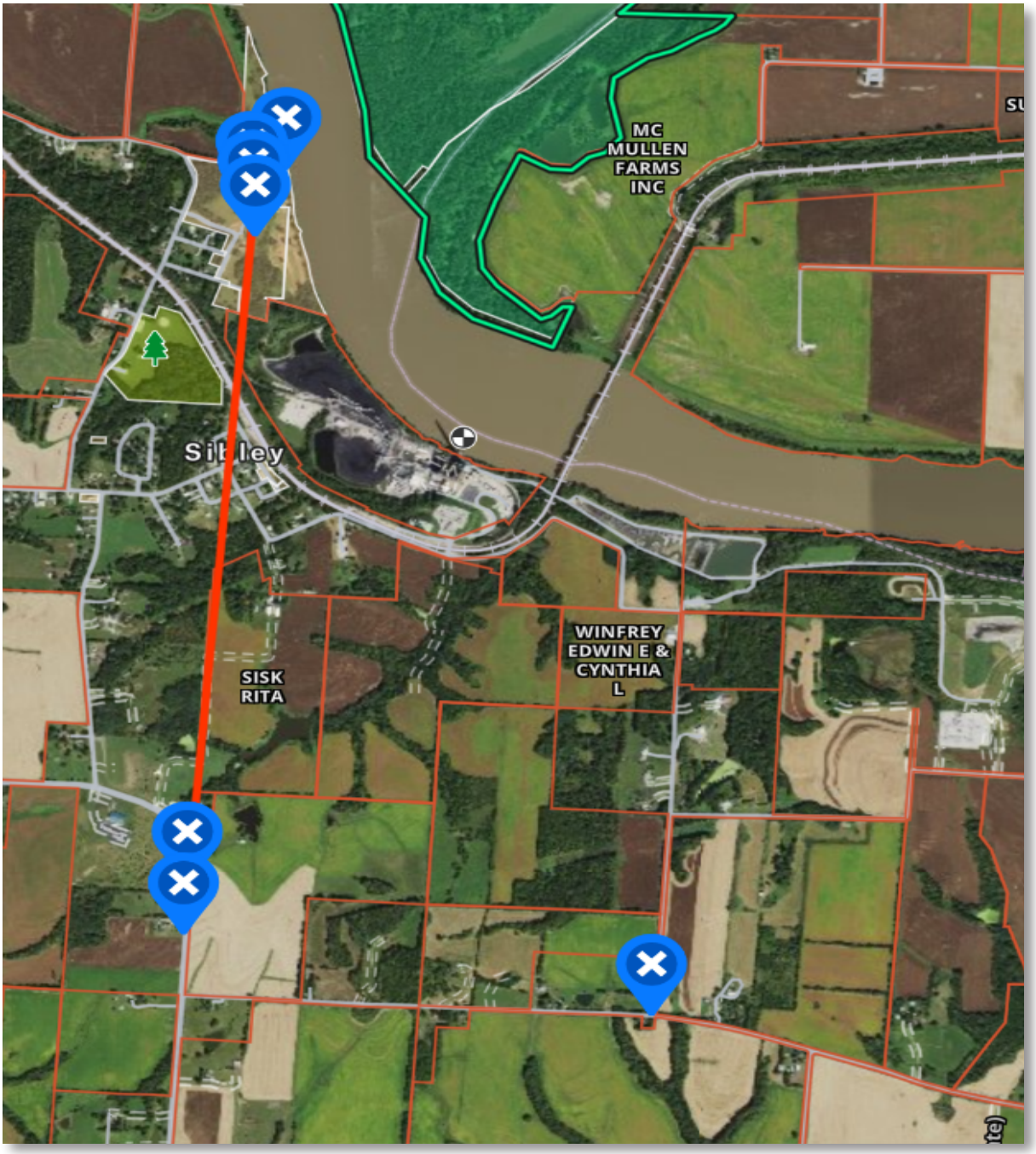


The U.S. Factory System, 1795 – 1822.

(continued on next page)

A Trip to Fort Osage and the Santa Fe Trail *(continued)*

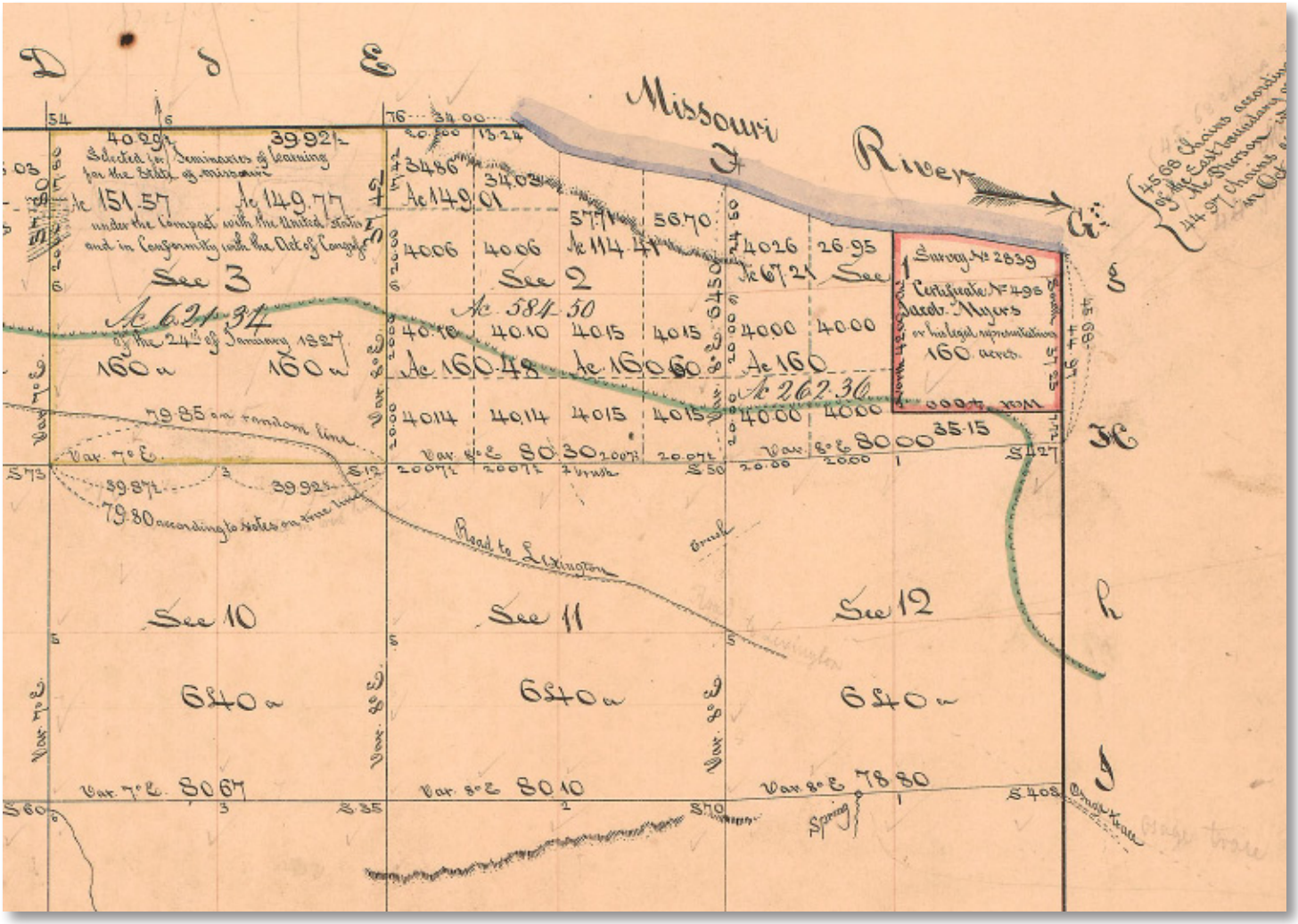
Using the hunting app "OnX", a mobile phone application capable of storing waypoints, measuring distances and viewing limited parcel data, and a positional tolerance of plus or minus three meters, I found a new historical marker sign reading "Santa Fe Trail Crossing", on the Buckner-Tarsney Road with no monuments or anything around it. A few other signs are in the area, without markers or explanations. The Santa Fe Trail Association and MSPS are working together to place a commemoration monument for the commencement point of the Santa Fe Trail survey, or station 0+00.



ONX Screenshot, waypoints from top to bottom: Fort Osage National Historic Landmark north & south gates, the Osage Treaty Line Bicentennial Stone, the Santa Fe Trail Crossing sign 1.75 mi. south, Santa Fe Trail: To Historic Route sign, Santa Fe Trail: Segment

The same year the Survey of the Santa Fe Trail is ordered, 1825, the General Land Office begins surveys in areas South and East of confluence of the Kansas and Missouri Rivers. The area that will become, in 1826, Jackson County, Missouri. The Township Plat for Township 50 North, Range 30 West of the Fifth Principal Meridian locates, along the East Line of the Township, the "Osage Trace". This lines up with the "Road to Lexington" as located during the subdivision of the Township.

Fort Osage is located in the next Township North (T.51N.,R30W.) just North of the Town of Sibley. The Osage Treaty Line, running South from the Fort, is very close to the Section Line between Sections 2 and 3, and Sections 10 and 11. It appears the Common Corner of Sections 2, 3, 10 and 11 is in existence, and may have a chain of evidence to the Original Survey, including the Original Stone Monument. The "Road to Lexington" is located from the above cited Section Corner to the West and South. This is probably the best evidence of the location of Santa Fe Trail.



The Road to Lexington passes near the Sec. 3/2/10/11 Cor. and continues in the direction towards the Osage Trace at the bottom right of this image of the 1939 GLO Plat for Township 50 North, Range 30 West.

Darrell has been studying these plats and google earth through the area extensively, and has determined that it looks like the Trail runs along a ridge. The land appears to be farm land with very little rock. The ridge tops have been tilled for years, for generations.

(continued on next page)

A Trip to Fort Osage and the Santa Fe Trail *(continued)*

The only place Surveyor Brown mentions Fort Osage, is a brief description locating the Trail "1 and 3/4 miles from the old fort". Brown may not have measured this line with any accuracy, perhaps guessing he was about a quarter mile North of the Mile Point between the Second and Third Miles of the Osage Line Survey. That being said, the "Road to Lexington" lies at about the described distance from the Fort. Using Google Earth to measure, it is 1.55 miles South of the south wall of the restored Fort, there is not a gate in the south wall, the only gate is in the north wall, adding about 120 feet to the distance.

Santa Fe Trail Crossing sign, in the vicinity of Brown's 0+00, about 1.75 miles south of the current fort.

The Santa Fe Trail point of commencement of 1825 will be dedicated at the same time as the Bicentennial Osage Treaty Line in 2025.

The Fort is a National Historic Landmark with a big concrete and glass museum, and education center. The fort structures were rebuilt 1940-1962 with the factory building still on the original 1808 stone foundation. The bluff was cut by the United States Army Corps of Engineers to help with navigation along the river at the beginning of the steamboat era. The people in the fort are dressed in the era, and tell stories from that from the early Nineteenth Century. It is a fun, and educational visit for anyone who's in the area.

I hope you all enjoyed this read and a little history! Thanks to Darrell Pratte for several of the above details.

B. Austin DeSain, P.L.S. is the Survey Manager, V.P. with The Clayton Engineering Company, Inc.

Notes from the Editor's Desk *(continued)*

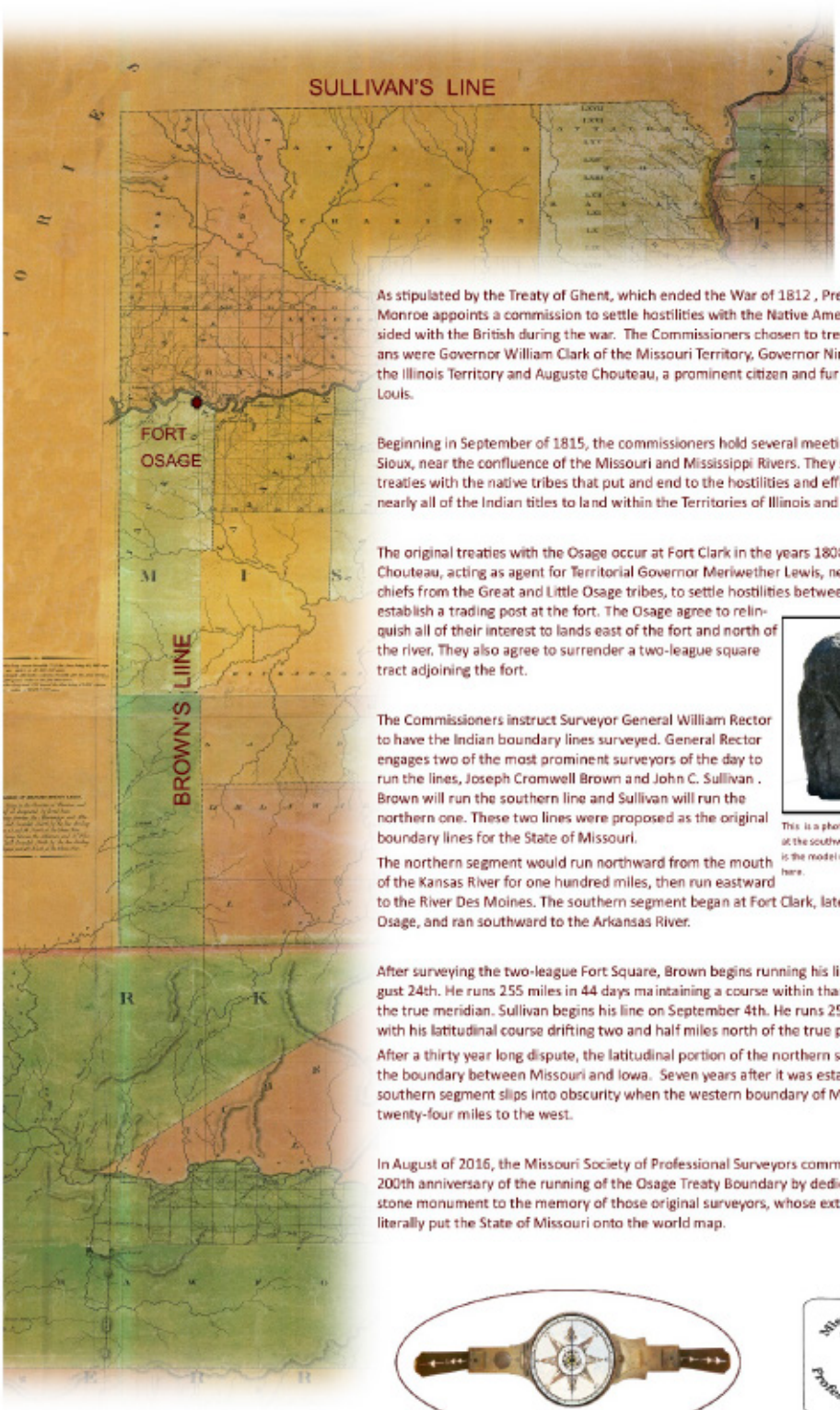
he became somewhat known in our community for his letters to the editor. He was taking on the local institutions who had succumb to group think, cancel culture and mediocrity. It was too much to take for the ol' advocate committed to individual rights, free speech and true equality. He went beyond words, manning the modern front lines of such debates – school board meetings. He didn't always prevail, but he always stood for that which was right. Always.

Curt Thompson was a fine example of an eternal truth. You can't be right when you're doing wrong things. I'm lucky to have met Counsel Thompson. He served our Board of Registration well, and he was a model to those making ethical and professional conduct their choice.

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

Donald

THE OSAGE TREATY BOUNDARY



As stipulated by the Treaty of Ghent, which ended the War of 1812 , President James Monroe appoints a commission to settle hostilities with the Native American tribes that sided with the British during the war. The Commissioners chosen to treat with the Indians were Governor William Clark of the Missouri Territory, Governor Ninian Edwards of the Illinois Territory and Auguste Chouteau, a prominent citizen and fur trader from Saint Louis.

Beginning in September of 1815, the commissioners hold several meetings at Portage Des Sioux, near the confluence of the Missouri and Mississippi Rivers. They sign numerous treaties with the native tribes that put and end to the hostilities and effectively extinguish nearly all of the Indian titles to land within the Territories of Illinois and Missouri.

The original treaties with the Osage occur at Fort Clark in the years 1808 and 1809. Pierre Chouteau, acting as agent for Territorial Governor Meriwether Lewis, negotiates with chiefs from the Great and Little Osage tribes, to settle hostilities between the nations and establish a trading post at the fort. The Osage agree to relinquish all of their interest to lands east of the fort and north of the river. They also agree to surrender a two-league square tract adjoining the fort.

This is a photo of the stone Brown set at the southwest corner of Missouri. It is the model used for the replica set here.

The Commissioners instruct Surveyor General William Rector to have the Indian boundary lines surveyed. General Rector engages two of the most prominent surveyors of the day to run the lines, Joseph Cromwell Brown and John C. Sullivan . Brown will run the southern line and Sullivan will run the northern one. These two lines were proposed as the original boundary lines for the State of Missouri.

The northern segment would run northward from the mouth of the Kansas River for one hundred miles, then run eastward to the River Des Moines. The southern segment began at Fort Clark, later renamed to Fort Osage, and ran southward to the Arkansas River.

After surveying the two-league Fort Square, Brown begins running his line south on August 24th. He runs 255 miles in 44 days maintaining a course within than half a degree of the true meridian. Sullivan begins his line on September 4th. He runs 250 miles in 26 days with his latitudinal course drifting two and half miles north of the true parallel.

After a thirty year long dispute, the latitudinal portion of the northern segment becomes the boundary between Missouri and Iowa. Seven years after it was established, the southern segment slips into obscurity when the western boundary of Missouri is moved twenty-four miles to the west.

In August of 2016, the Missouri Society of Professional Surveyors commemorated the 200th anniversary of the running of the Osage Treaty Boundary by dedicating this replica stone monument to the memory of those original surveyors, whose extraordinary efforts literally put the State of Missouri onto the world map.

This early W.L. Potts Compass is believed to have belonged to Joseph C. Brown. Legend has it that this is one he used to survey the Santa Fe Trail.

Missouri Society of Professional Surveyors Est. 1937

For more information go to www.Missourisurveyor.org

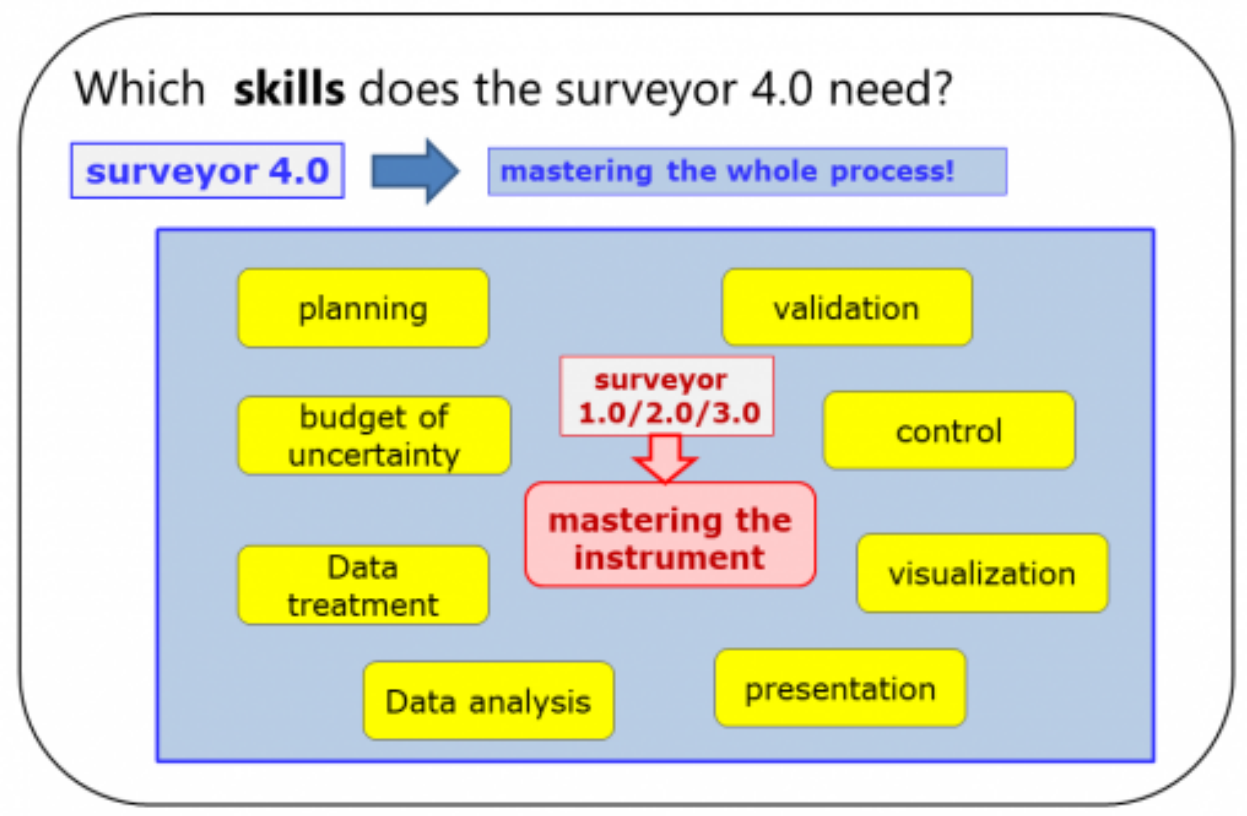
The Osage Treaty Boundary: this is a draft of the sign to be placed by the Bicentennial Stone at Fort Osage, to be amended with monuments found by Joe Clayton's efforts.

The Surveyor 4.0 *(continued)*

Use of freely available remote sensing data: High quality, up-to-date sets of remote sensing data are now available to everyone free of charge, such as from the Copernicus Services, following the open-source strategy of the European Union. However, these datasets require adapted analysis software approaches (big data and AI), because the smallest dataset that can be downloaded amounts to 1.6GB.

Obsolete skills

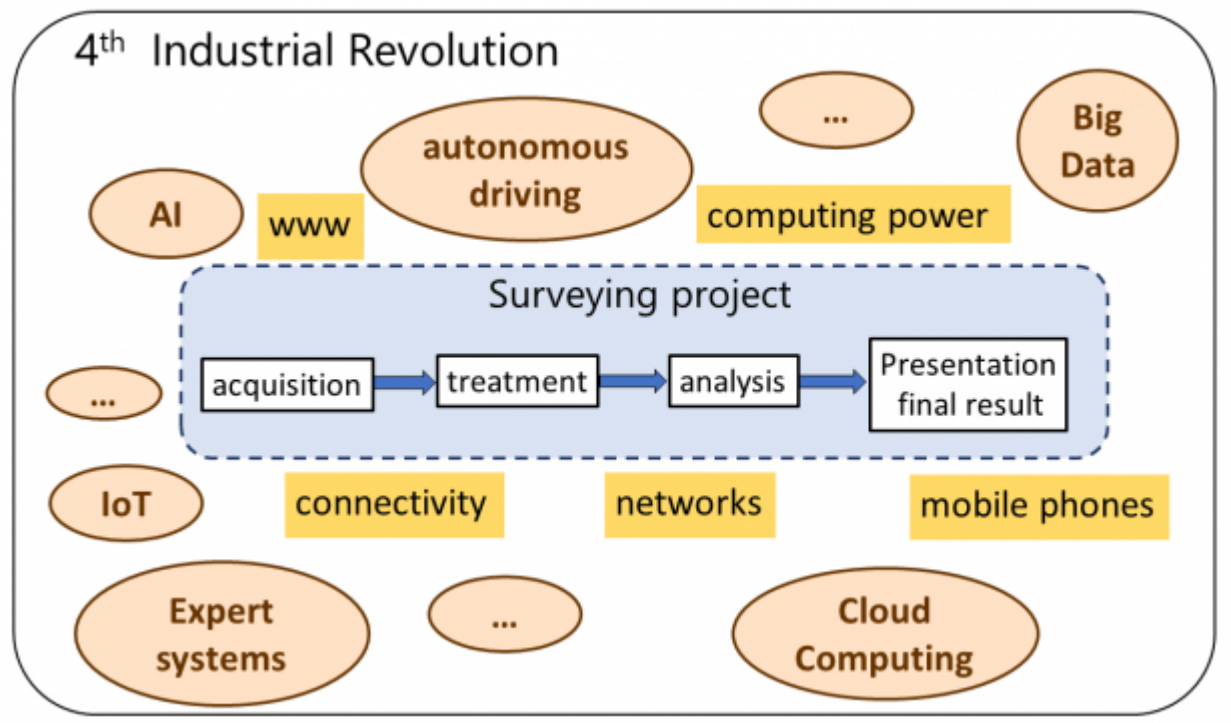
To answer the question of which skills today's surveyors need, it is useful to start by examining which skills have become obsolete. Although there are few details about how the earliest surveyors worked, we know that Surveyors 2.0 and 3.0 were sharp-eyed, weather-proofed and experienced in manual calculations. Their calculation tools changed over time, but a lot of manual work still remained. For the Surveyor 4.0, it is now a very different story, because the measurements have become fully automatic (e.g. with automatic target finding, tracking and laser scanning). There are numerous software packages available for conducting calculations. Meanwhile, the operating time in the field has become much shorter than it was decades ago and in the case of autonomous systems it has often been reduced to almost zero.



The skills needed today.

The Surveyor 4.0

So which skills does the Surveyor 4.0 need? In order to achieve accurate and reliable data, the previous generations of surveyors spent a lot of time and effort on mastering the instrumentation.



Surveying in the fourth industrial revolution.

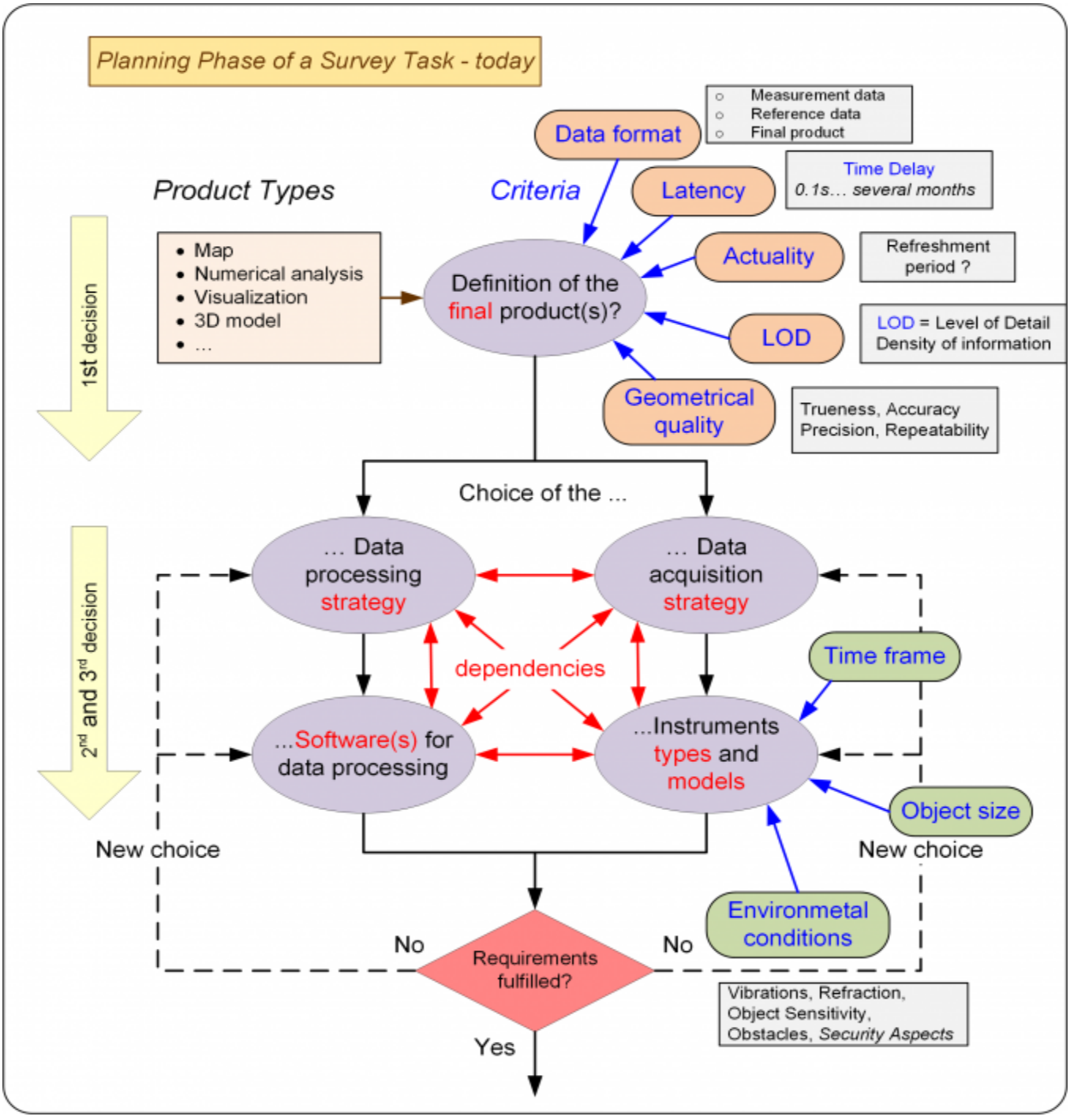
While mastering the instrumentation has become easier over the past years, today's surveyors now have to master not only the instrumentation itself but also the whole process, from the acquisition, treatment and analysis of the data to the visualization and validation of the final result (see Figure 6).

Moreover, what is the impact of the internet, ubiquitous connectivity and computing power that are driving the fourth industrial revolution? It is safe to say that the modern surveyor is already using significant parts of technologies such as AI, big data, IoT, expert systems and cloud computing.

In the past, surveying decisions were relatively simple. There were only a few measurement methods and, in contrast to the current situation, there was no need to choose between different types of instruments because there was a specific instrument for each task. In general, the execution of all data acquisition was guided and controlled by regulations, and there was no room for individual decisions regarding the measurement procedure. The measurements determined only points – in the horizontal positions or heights – and the final results were either a map of predetermined fixed scale or a numerical analysis (Figure 9).

Today, both the possibilities and the actual demands are wider and more varied. A surveying project can be divided roughly into three phases: planning & design, data acquisition, and data treatment (Figure 10). In former times they were executed consecutively. Nowadays, however, the execution phase is preceded by a much longer planning phase, and the first part of the data treatment runs in parallel with the data acquisition phase. Due to the far more efficient equipment used for data acquisition and treatment, a project can be finished much faster than in the past. At the same time, the results can be used for a greater variety of purposes, such as planning, mapping at different scales and with different levels of detail, volume determination, and so on.

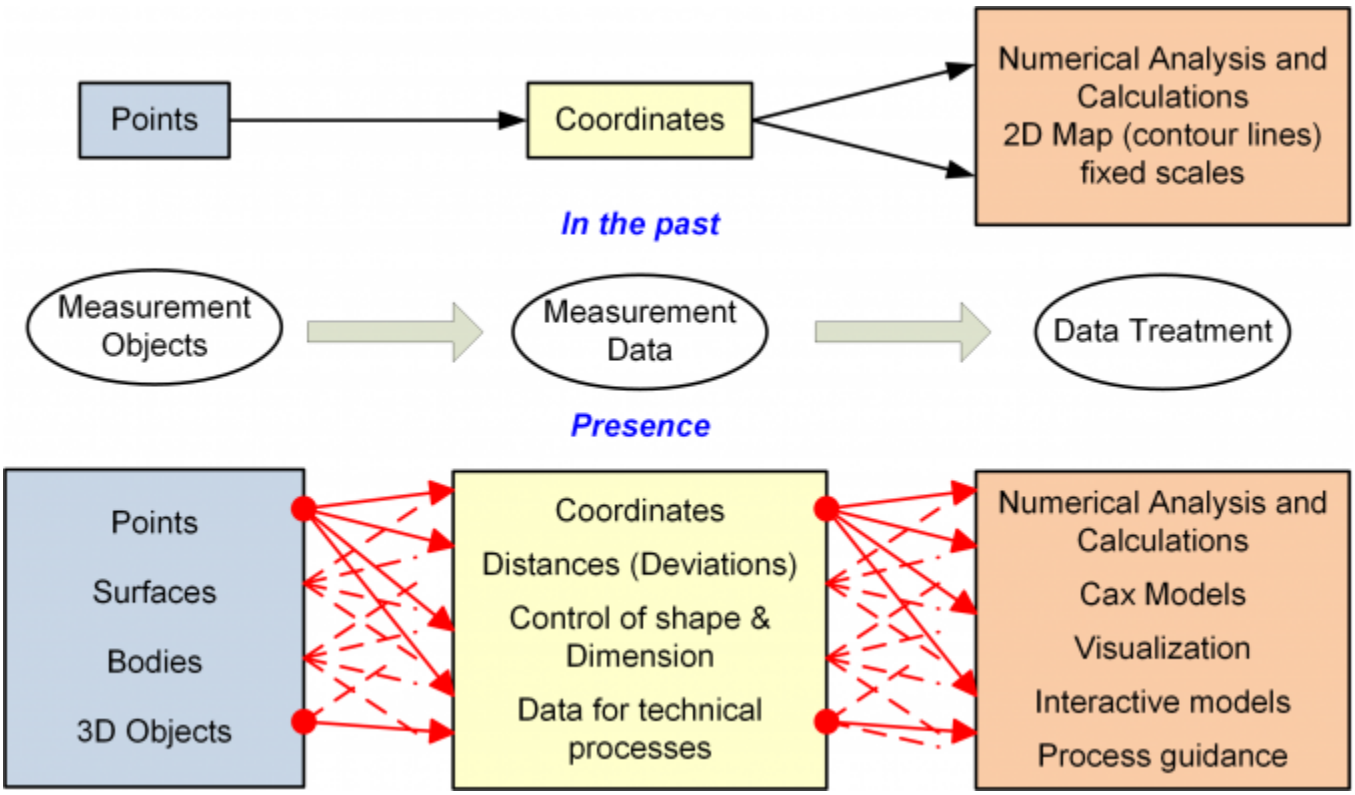
(continued on next page)



The planning phase of a surveying task.

This has transformed the Surveyor 4.0 from a skilled observer into a project manager, creating and producing geodata. At the start of each project, the surveyor needs to define the task, including the type and shape of the final result. Each subsequent step, from the data acquisition to the final result, must then be determined. For the best data acquisition strategy, the Surveyor 4.0 needs to know all about the technical restrictions (e.g. if it is only possible to perform measurements at night time) and the relevant safety regulations, not to mention the economic aspects of the project.

Once a data acquisition concept is established, the Surveyor 4.0 needs to check whether the measurements goals (e.g. accuracy, point density, acquisition speed, required distances between the sensors and the objects) can be achieved. In addition, they are recommended to validate the acquired data.



The surveying tasks in the past and today.

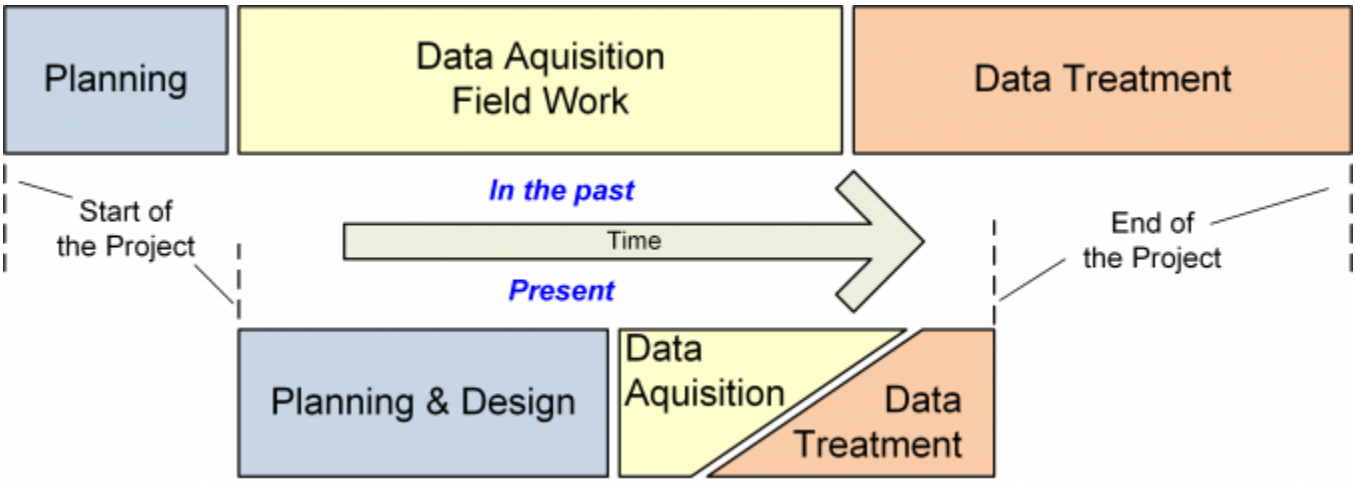
Summary of skills

The skills required by the Surveyor 4.0 to meet the current needs can be summarized as follows:

- **Measurement technologies:** Thorough knowledge of all the potential measurement systems and technologies, including their limitations and restrictions (both legal and technical), is necessary in order to optimally choose the acquisition and data treatment strategy. Knowledge about the quality of the data and the specific output formats is also required.
- **Mathematics:** In particular, mathematical knowledge should cover geometry, statistics, least squares adjustment and blunder detection.
- **Business administration:** To include a comparative cost calculation between the different measurement options in the decision process, knowledge and experience related to calculating costs is needed.
- **Programming:** A project often calls for the surveyor to filter, select, transfer or manipulate the acquired or processed data. Therefore, programming capabilities in appropriate programming languages are required.
- **Soft skills:** The success of a surveying project depends on a close and constructive partnership between the surveyor and the customer, especially during the planning phase. This is supported by soft skills such as communication skills, presentation skills and teamwork.

(continued on next page)

The Surveyor 4.0 *(continued)*



The different phases of a surveying project (not to scale).

Conclusion

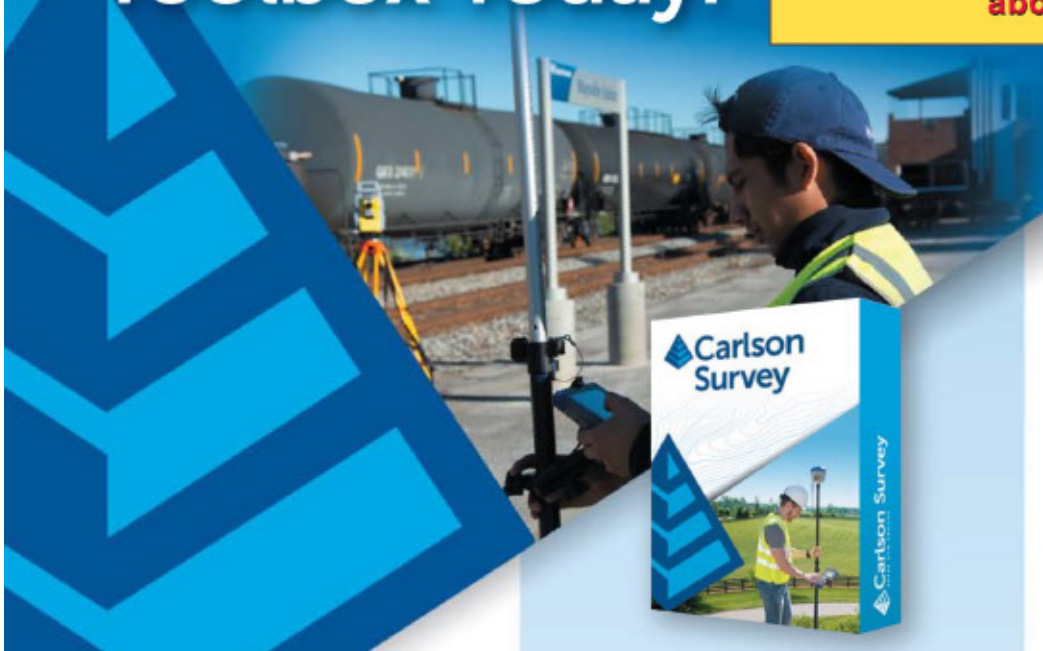
The unique selling point of surveyors has always been their ability to acquire precise and detailed geometrical information about large objects, whether natural or artificial. This has not changed over the last century. However, the surveyor of today has become a versatile producer and manager of precise geometrical data. Whereas in the past it was the only task, mastering the instrument is nowadays reduced to just one task out of many.

The variety of measurements systems today.

Printed with permission from GIM International Magazine. Available as originally published at:
https://www.gim-international.com/content/article/the-surveyor-4-0

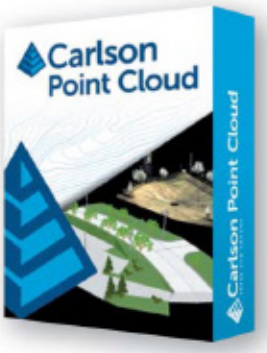
Complete Your Carlson Software Toolbox Today!

Ask your Laser Specialists Representative about these products!



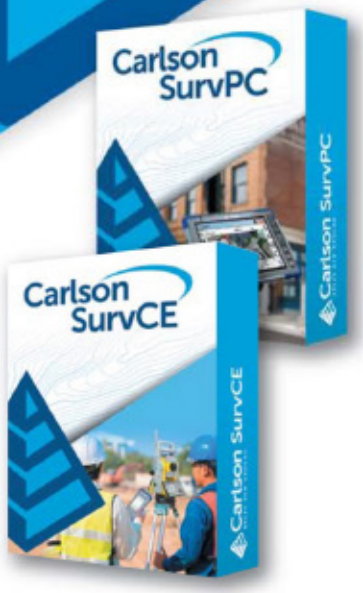
Survey

Powerful Field-to-Finish, Office Platting and Drafting Software, Now with Improved Autodesk Civil3D® and/or MicroStation® DGN Support



Point Cloud

Turn your point cloud data sets into usable models quickly and easily with Point Cloud Basic or Point Cloud Advanced

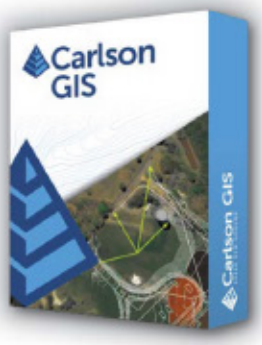


SurvCE/SurvPC

Powerful Field Data Collection Software with Extensive Equipment Support, Now with Hybrid

BRx6+

GNSS RTK performance with triple-frequency tracking and measurement on multiple satellite



GIS

From aerial imagery to data capture, Carlson GIS is the GIS "Swiss Army Knife" for the surveyor

Laser Specialists Inc

www.LaserGPS.com

Matt Todd
(417) 371-1927

Kevin Lindsey
(417) 208-6629

Professor's Groundbreaking Book Offers Living History of Washington's Surveying Methods

by Andrea Honaker – November 17, 2022

Re-enactors survey in the Ohio wilderness in summer 2019. Photo by Dan Patterson

In a canyon in Hocking Hills, Ohio, a group of men wearing 18th century-style clothing used surveying instruments to map the wilderness around them. The methods of the re-enacting surveyors were captured on camera in the heat of summer in 2019, but the scenes would have looked much the same more than 200 years ago.

Re-enacted photography by Dan Patterson and a narrative by Mercer University professor Dr. Clinton Terry combine to bring history to life in Surveying in Early America: The Point of Beginning, An Illustrated History.

The award-winning book, published by the University of Cincinnati Press in February 2021, details the techniques that professional surveyors used to map and divide the land of early America in the late 1700s. While other books have focused on specific surveying projects, this one is dedicated to the art and science of surveying itself, said Dr. Terry, associate professor of history and liberal studies in Mercer's College of Professional Advancement.

Dr. Terry has always been interested in and taught about technologies, including a course he developed called "Technology and Culture in American History." Surveying is something people take for granted, but every piece of property they visit has been surveyed and documented, he said.

The history behind that is interesting and important. Starting in the 1720s, the profession of surveying advanced rapidly and was fully developed by the early 1800s. However, there was little change in surveying technologies until the 1970s, when laser, radio and GPS were introduced.

"I found out that there was relatively little recent scholarship on the topic (of the development of surveying)," Dr. Terry said. "As Dan and I started looking at it, we started asking the question, 'Can we use present-day photography with historical subjects, as a primary source, as evidence for scholarship?' We decided that we absolutely could. The photography is absolutely first-rate. The text is what would be an academic history of the profession in the colonies in the United States."

Re-enactors use surveying equipment. Photo by Dan Patterson

Dr. Terry used 18th century source materials as much as possible in his research, including surveying instruction manuals and the papers of George Washington. While America's first president didn't develop the surveying profession, he used the techniques often and documented his efforts. Therefore, the book prominently features Washington, from his teenage years as a professional surveyor to his military career where he was always in need of better maps to his 1777 request for Congress to establish the Department of the Geographer, a formal mapping unit for the Continental Army.

Today, the Department of the Geographer exists as a re-enactment group, where members follow the 18th century manual as they survey land. They use period-correct methods and equipment, dress in historically accurate clothing and uniforms, and survey in period-correct settings.

This re-enactment group actually sparked the initial idea for the book. Patterson and Dr. Terry have been friends since the 1980s, and they always talked about doing a historical project together. Around 2000, Patterson made contact with the Department of the Geographer, which sparked a project of mutual interest for the pair.

The re-enactors later agreed to be featured in the book, and Patterson photographed them surveying in both civilian clothing and military uniform in two forest locations in what's known as the Seven Ranges of Townships in Ohio. One of the areas is in the process of being allowed to return to "old growth forest" and has not been touched for more than 50 years.

(continued on next page)

Professor's Groundbreaking Book Offers Living History of Washington's Surveying Methods *(continued)*

Dan Patterson and Dr. Clinton Terry. Photo from Dr. Terry

"They are very serious about getting this right. This is more than a hobby to them. When they are out in the field, they are following the unit manual to the letter," Dr. Terry said. "Each of the photographs was a snapshot of them doing exactly what they would do if they were surveying a map. None of this is staged."

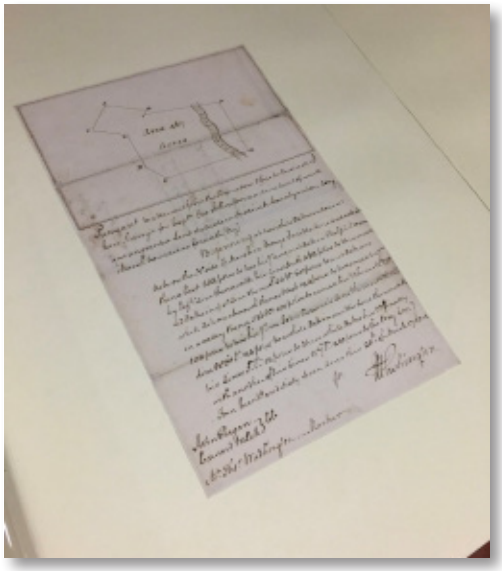
Academic histories have largely consisted of words on paper in the past, but public history efforts in more recent decades have embraced other source materials. The re-enacted photography in Surveying in Early America provides new visuals to better contextualize this chapter of history.

"There are all kinds of new and exciting ways of approaching our study and recollection of the past and its meaning to ourselves in the present and future," Dr. Terry said. "There are a tremendous amount of possibilities here if photography can be used as a primary source. If re-enacting and recreation with attention to historical detail is valid, this was our attempt to do a project with regard to that."

Surveying in Early America has been well-received since its publication. The book won gold in the general history nonfiction category at the 2022 Midwest Book Awards this summer.

The authors have done a number of presentations on their research, including for a Smithsonian Associates online program in July 2021; the George Washington Symposium at Mount Vernon in November 2021; the Filson Club Historical Society in Louisville, Kentucky, in June; and the Nebenzahl Lectures on Surveying Performance at the Newbury Library in Chicago last month.

Re-enactors use surveying equipment. Photo by Dan Patterson



A page of surveying notes by George Washington. Photo by Dan Patterson

Printed with permission from The Den, Mercer University. Available as originally published at:
https://den.mercer.edu/professors-groundbreaking-book-offers-living-history-of-washingtons-surveying-methods/

2023 CFEDS Program Promotions

2023 CFEDS PROGRAM PROMOTIONS

STATE SURVEY SOCIETY INVITATION

May 1st, 2023

Dear Executive Director,

The Certified Federal Surveyor (CFedS) program is an intensive course designed to equip licensed surveyors with an unsurpassed Public Land Survey System (PLSS) knowledge base. Created in 2005 by the Bureau of Land Management, CFedS has become the hallmark program for surveyors wishing to provide cadastral services on federal trust lands while deepening their understanding of working within the PLSS. The non-PLSS surveyor can also benefit from the program by becoming more well-rounded in the many intricacies of our profession.

In early 2022, we embarked on a mission to modernize the CFedS offering, bringing the program online for the first time. While this was no small undertaking, I'm proud to say that the core seven-course training series is now delivered via **www.cfeds.org**. Close to 75 individuals are working through the material as of this writing with another 520+ active professionals among our ranks.

As this initiative is important to both CFedS members and NSPS, we'd like to increase regional engagement via continuing education presentations with societies such as yours. We partnered on 9 such sessions in 2023 and are looking to expand this number in 2024. If you're able to consider a CFedS presentation within your 2024 conference, please touch base with me at the address below.

From a national perspective, the CFedS program hopes to get our message out in as many venues as possible. To make all surveyors aware of this educational opportunity, we've created a range of promotional materials for use within state society publications (full and half page options) + websites which are available at: **www.cfeds.org/media-resources/**

It would be greatly appreciated if you could share these materials with your membership. Interested surveyors can visit our webpage at **www.cfeds.org** or contact me directly at **glen.thurow@cfeds.org** to discuss further collaborations.

I appreciate your consideration of this request.

Glen W. Thurow, NM P.S., CFedS
CFedS Training Coordinator

CFEDS TRAINING COORDINATOR - DIRECT: +1 (505) 274-8571 - WWW.CFEDS.ORG
GLEN.THUROW@CFEDS.ORG - PO BOX 91393, ALBUQUERQUE, NEW MEXICO 87199

The Certified Federal Surveyor (CFedS) program, founded 2005, is produced by the Bureau of Land Management (BLM) in conjunction with the National Society of Professional Surveyors (NSPS).

(continued on next page)

2023 CFEDS Program Promotions *(continued)*

2023 PROMOTIONAL MATERIAL

FULL PAGE PRINT

FULL PAGE PRINT

HALF PAGE PRINT

HALF PAGE PRINT

DIGITAL MATERIALS

UNRESTRICTED USE, DOWNLOAD AT:
WWW.CFEDS.ORG/MEDIA-RESOURCES/

Capitol View
A Look at Surveying Legislative Matters

On May 12th the 2023 Legislative Session of the 102nd General Assembly came to a close. SB138 and HB202 were Truly Agreed and Finally Passed. These bills included modifications sought by the State Land Surveyor (Missouri Department of Agriculture) to make necessary changes to Chapter 60 of the Missouri Revised Statutes governing the Missouri state coordinate system. These needs are associated to the *Modernized National Spatial Reference System* by the NGS. MSPS supported this effort.

Initial sponsors for this legislation were:

- Representative Don Mayhew of Dixon (District 124) – HB638. *Mayhew is a PLS and member of MSPS.*
- Representative Willard Haley of Eldon (District 58) – HB47.
- Senator Mike Bernskoetter of Jefferson City (District 6) – SB403.

Language from sponsored legislation to modify RSMo 60.401, 60.410, 60.431, 06.441, 60.471, 60.480 and 60.510 (all pertaining to coordinate systems, zones and standard units) was eventually included into agriculture *omnibus* bills SB138 and HB202 with the help of Senators Karla Eslinger and Jason Bean.

When these are enacted, the coordinate systems of 1927 and 1983, their three zones, and the US Survey Foot will move to the archives. Locations will be defined within the "Missouri State Plane Coordinate System," multiple zones of low distortion projections may be allowed, and when values are expressed in feet the standard is to be the International foot.

Be a Magazine Cover Model or News Maker!

Highlight your work! Impress your friends! Make your momma proud! Prove to the bankers you are using that commercial loan!

"How" you may ask? By sharing photos, stories and news with Missouri Surveyor! It is really that simple. Just as this edition's cover features Missouri surveyors you and your work may be featured as well. All content is welcome! For the cover, high quality images in landscape format at an aspect-ration comparable to 17"x11" work best; stories and articles merely need to be in Microsoft Word.

Missouri Society of Professional Surveyors
722 E. Capitol Avenue
Jefferson City, Missouri 65101

Missouri Surveyor

A Quarterly Publication of the
Missouri Society of Professional Surveyors

Jefferson City, Missouri June 2023

What's in this issue...

BREAKING NEWS

2023 LEGISLATION!

PAGE 39

Revised Statues of Missouri; Changes for Surveying and Surveyors *(continued)*

60.301. Definitions. — Whenever the following words and terms are used in this chapter they shall have the following meaning unless the context clearly indicates that a different meaning is intended:

(1) "Corners of the United States public land survey", those points that determine the boundaries of the various subdivisions represented on the official plat such as the township corner, the section corner, the quarter-section corner, grant corner, meander corner, **and center of section**;

(2) "Existent corner", a corner whose position can be identified by verifying the evidence of the original monument or its accessories, or by some physical evidence described in the field notes, or located by an acceptable supplemental survey record or some physical evidence thereof, or by testimony. The physical evidence of a corner may have been entirely obliterated but the corner will be considered existent if its position can be recovered through the testimony of one or more witnesses who have a dependable knowledge of the original location. A legally reestablished corner shall have the same status as an existent corner;

(3) "Lost corner", a corner whose position cannot be determined, beyond reasonable doubt, either from traces of the original marks or from acceptable evidence or testimony that bears upon the original position;

(4) "Monument", the physical object which marks the corner point determined by the surveying process. The accessories, such as bearing trees, bearing objects, reference monuments, mounds of stone and other similar objects that aid in identifying the corner position, are also considered a part of a corner monument;

(5) "Obliterated, decayed or destroyed corner", **a position** at whose point there are no remaining traces of the original monument or its accessories, but whose location has been perpetuated by subsequent surveys, or the point may be recovered beyond reasonable doubt by the acts and testimony of local residents, competent surveyors, other qualified local authorities or witnesses, or by some acceptable record evidence. A position that depends upon the use of collateral evidence can be accepted only if duly supported, generally through proper relation to known corners, and agreement with the field notes regarding distances to natural objects, stream crossings, line trees, etc., or unquestionable testimony;

(6) "Original government survey", that survey executed under the authority of the United States government as recorded on the official plats and field notes of the United States public land survey maintained by the Missouri department of agriculture;

(7) "Proportionate measurement", a measurement of a line that gives equal relative weight to all parts of the line. The excess or deficiency between two existent corners is so distributed that the amount of excess or deficiency given to each interval bears the same proportion to the whole difference as the record length of the interval bears to the whole record distance:

(a) "Single proportionate measurement", a measurement of a line applied to a new measurement made between known points on a line to determine one or more positions on that line;

(b) "Double proportionate measurement", a measurement applied to a new measurement made between four known corners, two each on intersecting meridional and latitudinal lines, for the purpose of relating the intersection to both. When the total length of the line between the nearest existing corners was not measured in the original government survey, the record distance from one existing corner to the lost corner will be used instead of the proportionate distance. This exception will apply to either or both of the east-west or north-south lines;

(8) "Record distance", the distance or length as shown on the original government survey. In determining record distances, consideration shall be given as to whether the distance was measured on a random or true line.

(L. 1989 H.B. 190, et al., A.L. 2013 H.B. 28 merged with H.B. 650, **A.L. 2022 1st Ex. Sess. H.B. 3**)

60.315. Lost corners reestablishment — rules. — The following rules for the reestablishment of lost corners shall be applied only when it is determined that the corner is lost: (The rules utilize proportional measurement which harmonizes surveying practice with legal and equitable considerations. This plan of relocating a lost corner is always employed unless it can be shown that the corner so located is in substantial disagreement with the general scheme of the original government survey as monumented. In such cases the surveyor shall use procedures that produce results consistent with the original survey of that township.)

(1) Existent original corners shall not be disturbed. Consequently, discrepancies between the new and record measurements shall not in any manner affect the measurements beyond the existent corners; but the differences shall be distributed proportionately within the several intervals along the line between the corners;

(2) Standard parallels shall be given precedence over other township exteriors, and, ordinarily, the latter shall be given precedence over subdivisional lines; section corners shall be located or reestablished before the position of lost quarter-section corners can be determined;

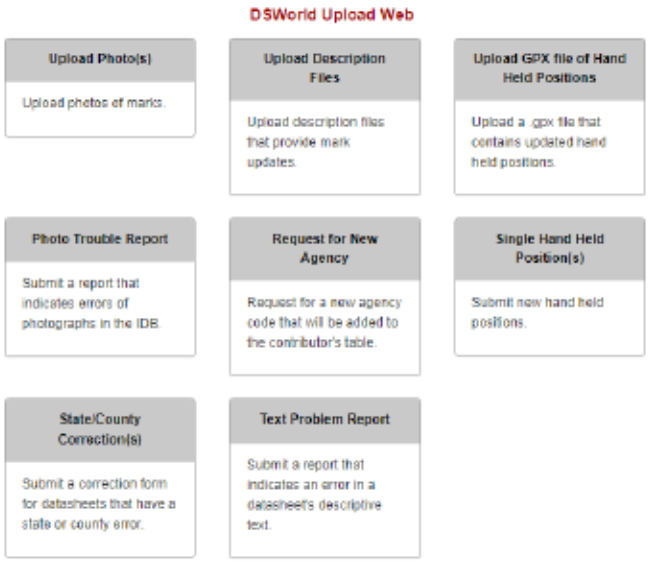
(3) Lost township corners common to four townships shall be reestablished by double proportionate

https://revisor.mo.gov/main/Home.aspx

NGS News & Events *(continued)*

hurricanes. See the imagery at:

https://geodesy.noaa.gov/storm_archive/coastal/viewer/index.html



DSWorld Upload Web Form available at –
https://beta.ngs.noaa.gov/datasheets/dsworld_web/upload_forms/index.html

Register Now to Attend the NSPS Day on the Hill on March 29

NSPS, February 9, 2023

Make plans to attend the 2023 NSPS Day on the Hill scheduled for March 29, 2023. NSPS members will travel to Capitol Hill in Washington, DC to meet with members of the U.S. House of Representatives and Senate, and their staffs, to discuss (1) the need for improved broadband mapping and deployment of the related telecom infrastructure given the billions of Federal infrastructure dollars to be invested; (2) reauthorization and reform of the National Flood Insurance Program (NFIP) in the Federal Emergency Management Agency (FEMA), including the NSPS-backed legislation known as the IMAGES Act; and (3) recognition of the importance of professional licensing in surveying and other design professions to protect public health, safety, and welfare and distinguishing these disciplines from other occupational licenses that have been the subject of de-licensing efforts.

NSPS Officer Election Results

NSPS, January 12, 2023

Davey Edwards – Texas

Linda Foster – South Dakota

Robert Miller - Pennsylvania

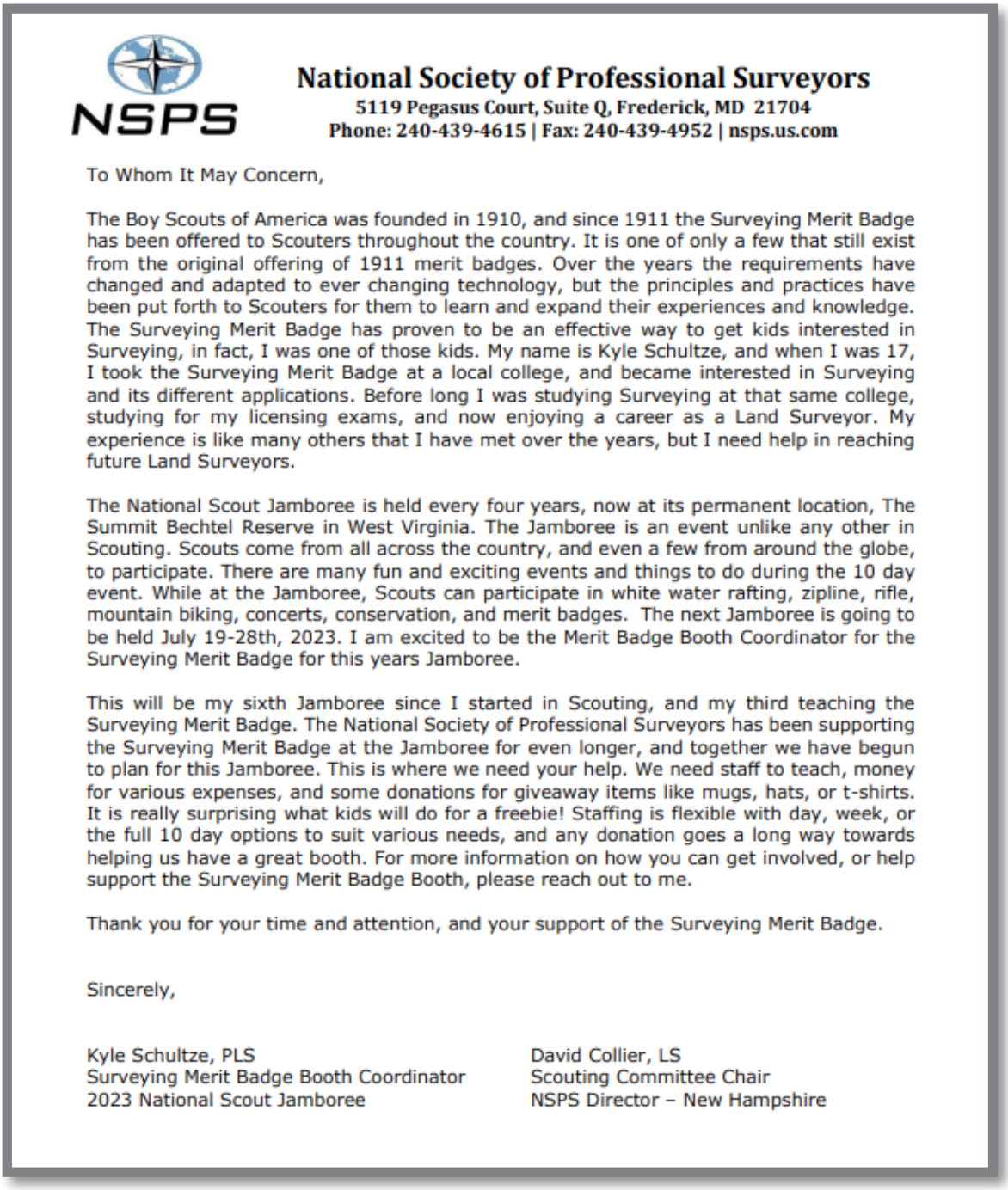
The member votes have been tallied and NSPS is pleased to announce that Davey Edwards and Linda Foster have been elected to serve as the President-Elect and Vice President, respectively, for the 2023/24 term. They will be sworn in as an Officers at the Spring Business Meeting in March. Robert Miller, the NSPS incumbent Treasurer, was unopposed and will serve another two-year term. Please join us in congratulating them on their election and to also thank Steve Gould, Danny Martinez, and Matt Morris for their candidacies.

National Scout Jamboree - July 19-28, 2023

NSPS, February 2, 2023

NSPS is once again coordinating the Surveying Merit Badge program being held at its permanent location, The Summit Bechtel Reserve in West Virginia on July 19-28, 2023. While we have returning volunteers to help teach and promote surveying to the scout during the event, we are looking for more participants to add to the ranks of Jamboree attendees. For more information on the Jamboree and how NSPS is involved check out the following link –

https://www.nsps.us.com/page/BSMeritBadge



National Society of Professional Surveyors
5119 Pegasus Court, Suite Q, Frederick, MD 21704
Phone: 240-439-4615 | Fax: 240-439-4952 | nsps.us.com

To Whom It May Concern,

The Boy Scouts of America was founded in 1910, and since 1911 the Surveying Merit Badge has been offered to Scouters throughout the country. It is one of only a few that still exist from the original offering of 1911 merit badges. Over the years the requirements have changed and adapted to ever changing technology, but the principles and practices have been put forth to Scouters for them to learn and expand their experiences and knowledge. The Surveying Merit Badge has proven to be an effective way to get kids interested in Surveying, in fact, I was one of those kids. My name is Kyle Schultze, and when I was 17, I took the Surveying Merit Badge at a local college, and became interested in Surveying and its different applications. Before long I was studying Surveying at that same college, studying for my licensing exams, and now enjoying a career as a Land Surveyor. My experience is like many others that I have met over the years, but I need help in reaching future Land Surveyors.

The National Scout Jamboree is held every four years, now at its permanent location, The Summit Bechtel Reserve in West Virginia. The Jamboree is an event unlike any other in Scouting. Scouts come from all across the country, and even a few from around the globe, to participate. There are many fun and exciting events and things to do during the 10 day event. While at the Jamboree, Scouts can participate in white water rafting, zipline, rifle, mountain biking, concerts, conservation, and merit badges. The next Jamboree is going to be held July 19-28th, 2023. I am excited to be the Merit Badge Booth Coordinator for the Surveying Merit Badge for this years Jamboree.

This will be my sixth Jamboree since I started in Scouting, and my third teaching the Surveying Merit Badge. The National Society of Professional Surveyors has been supporting the Surveying Merit Badge at the Jamboree for even longer, and together we have begun to plan for this Jamboree. This is where we need your help. We need staff to teach, money for various expenses, and some donations for giveaway items like mugs, hats, or t-shirts. It is really surprising what kids will do for a freebie! Staffing is flexible with day, week, or the full 10 day options to suit various needs, and any donation goes a long way towards helping us have a great booth. For more information on how you can get involved, or help support the Surveying Merit Badge Booth, please reach out to me.

Thank you for your time and attention, and your support of the Surveying Merit Badge.

Sincerely,

Kyle Schultze, PLS
Surveying Merit Badge Booth Coordinator
2023 National Scout Jamboree

David Collier, LS
Scouting Committee Chair
NSPS Director – New Hampshire

(continued on page 47)

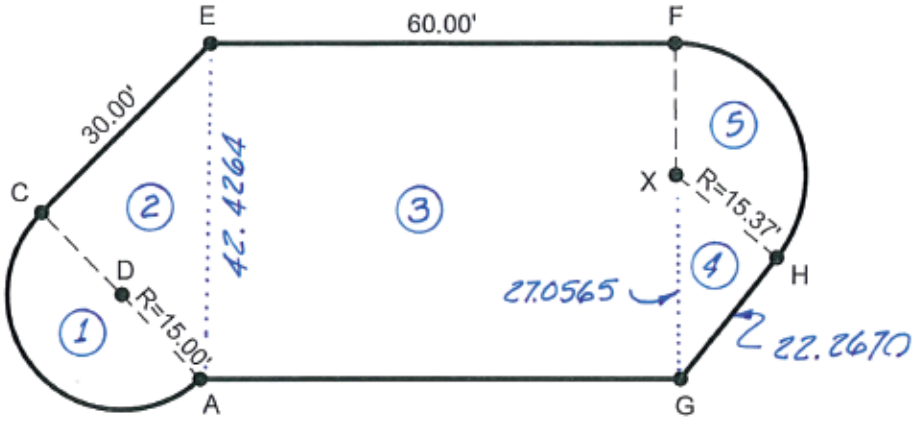
Geometry Solutions

by Elgin

No. 1

Solution:

Divide the figure into parts 1 through 5:



Semicircle 1:

$\pi R^2/2$, Area = ... 353.429

Triangle 2, a right $\triangle$

$(CA)(CE)/2$, Area = ... 450.000

Rectangle 3

Area = ... 2545.584

Triangle 4, a right $\triangle$

$(GH)(HX)/2$, Area = ... 171.121

Sector 5

Angle HXF = 124°36'56.6"

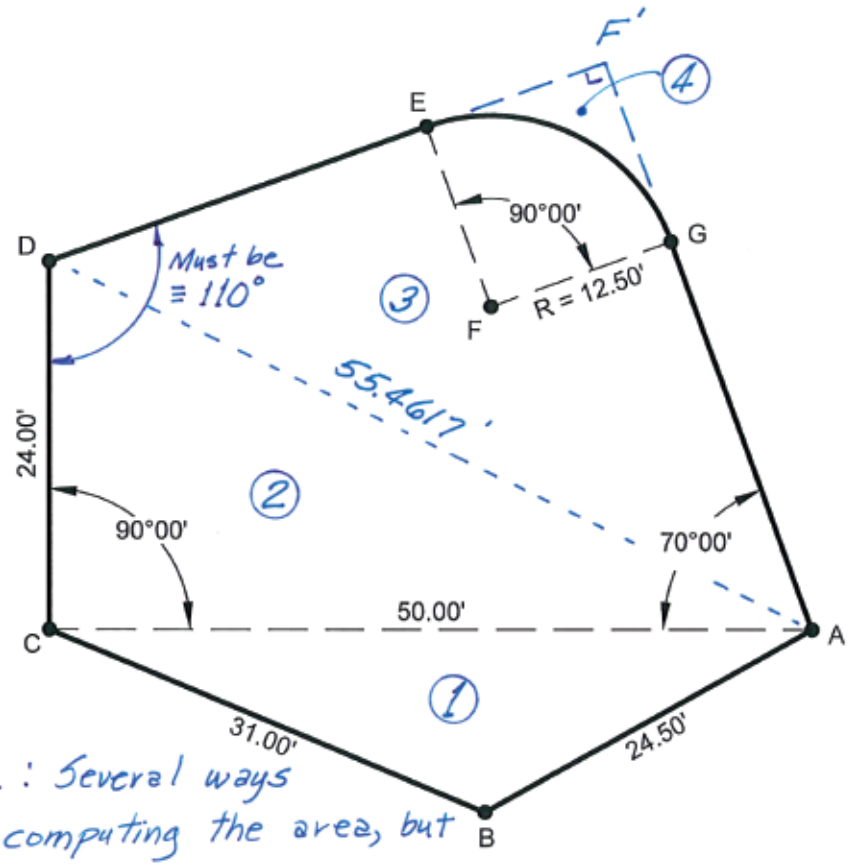
$\pi R^2 (\measuredangle HXF/360°)$, Area = ... 256.902

Figure's Area = 3777.04 ft²

Solution to geometry problem posed by Dr. Richard Elgin, PS

Solution : No. 2

First recognize ∡F'DA ≡ 110° (∡CF' ≡ 90°)
Cut the figure into △'s 1, 2 and 3 and
the fillet, 4.



△1 : Several ways
of computing the area, but
Area = ---------- 298.550

△2 : Simple, Area = ---------- 600.000

△3 (DF'E): Several ways, Area = ----- 768.810

The fillet, 4:

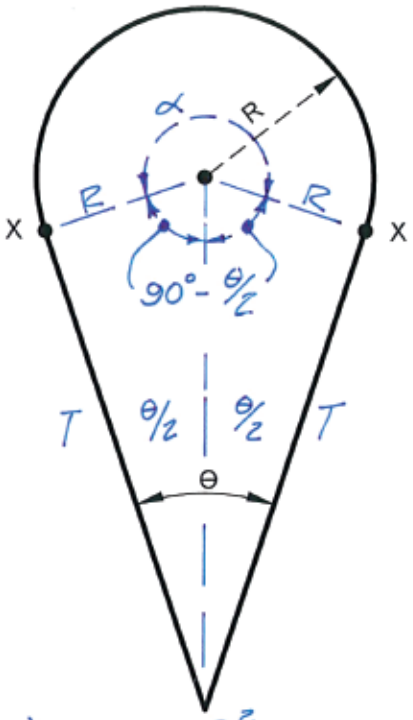
$R^2 - \frac{90}{360} \pi R^2$, Area = ------- (-) 33.537

Solution to geometry problem
posed by Dr. Richard Elgin, PS.

Figure's Area = 1633.83 ft²

(continued on next page)

Solution and a check: No. 3



So -

$\alpha = 360^\circ - 2(90^\circ - \theta/2)$

$\alpha = 180^\circ + \theta$

Total figure area =

$RT - \frac{\alpha}{360^\circ}(\pi R^2)$

Substituting:

$$\text{Area} = R\left(R/\tan\frac{\theta}{2}\right) + \frac{\alpha \pi R^2}{360^\circ}$$

$$\text{Area} = R^2 \operatorname{cotan}\frac{\theta}{2} + \frac{(180^\circ + \theta)\pi R^2}{360^\circ}$$

$$\text{Area} = R^2 \operatorname{cotan}\frac{\theta}{2} + \frac{1}{360^\circ}(180^\circ \pi R^2 + \theta \pi R^2)$$

The Equation → $\text{Area} = \operatorname{cotan}\frac{\theta}{2} R^2 + 1.570796327 R^2 + 0.00872665 \theta R^2$

The Test → For $\theta \equiv 45^\circ$ and $R \equiv 100$ ft,

$\text{Area} = 43,777.09 \text{ ft}^2$

Solution to geometry problem posed by Dr. Richard Elgin, PS.

Virginia Senate Panel Exempts Surveying from Licensing Reciprocity Bill

NSPS, January 26, 2023

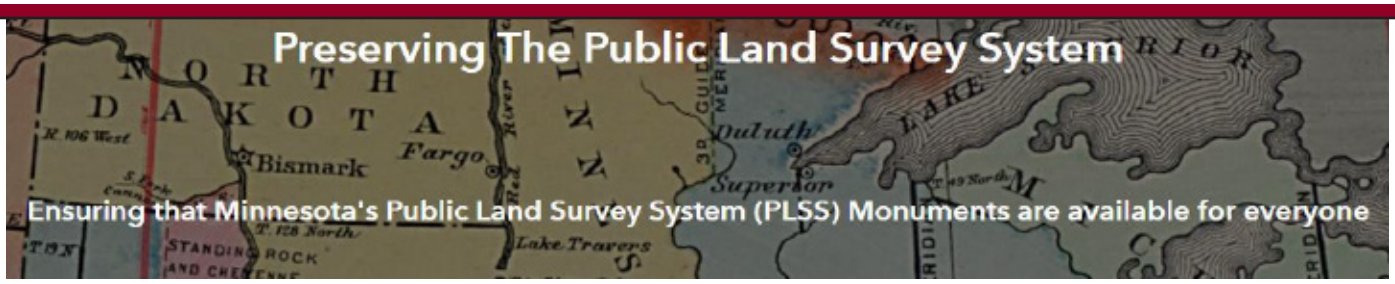
A state legislative bill that takes a broad brush to licensing by permitting anyone licensed in any occupation in another state to get a blanket comity or reciprocity to be licensed in Virginia was amended in a Virginia State Senate Committee last week to exempt land surveying and other professions, thanks to an amendment sought by the Virginia Association of Surveyors. SB1213 as introduced failed to take into account the impact on engineering and surveying and their effect on the public health, safety, and welfare. The exemption appears on line 50 of the bill. This is a big victory as VAS protects the integrity of the surveyors' license in the Commonwealth. The bill is consistent with a model bill, the Universal Recognition of Occupational Licenses Act, promoted by a coalition of organizations, which has been enacted in some form in 19 other states.

VAS
VIRGINIA ASSOCIATION OF SURVEYORS

USGS 3DEP for Western Federal Lands Cited in Appropriations Document

NSPS, January 20, 2023

The Congressional Research Service (CRS), an arm of the Library of Congress that provides analysis to lawmakers, issued a recent report that found for fiscal year 2023 the National Geospatial Program of the U.S. Geological Survey (USGS) increased by $6.1 million, of which $3 million was for the 3D Elevation Program (3DEP), a NSPS-supported program, with such funds targeted for high-resolution topographic elevation data on western federal lands.

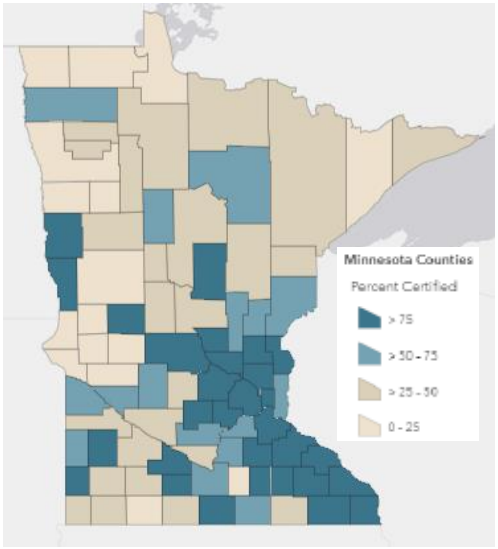


Importance

PLSS monuments are the basis for 100% of boundary descriptions in the State and, as such, are vital in terms of the land tenure system. The PLSS also serves as the base infrastructure for accurately locating state, county, municipal, and private development projects. Additionally, the PLSS serves as the underlying framework for geospatial data. The geospatial data, in turn, supports data driven decisions, providing better outcomes for all Minnesotans

Investment Need

Over 315,000 original PLSS monuments were placed in MN between the 1840's and early 1900's as part of the 1785 Land Ordinance Federal program. In general terms, these monuments were placed at ½ mile increments and served as starting points to further subdivide land. Unfortunately, the passage of time has caused the location of **over half** of these vital monuments to become uncertain and introduced an unnecessary risk to land ownership, economic development, and policy decisions based on spatial data



Certifying one monument costs roughly $1,800 and can place an undue burden on stakeholders. However, State funds can help restore and maintain this infrastructure; positioning all of Minnesota for success.

Proposed Solution

Allocating financial resources now achieves the best opportunity to preserve the PLSS for future generations. Starting now rather than waiting for more monuments to disappear is crucial. Experiences from other states such as Michigan, Wisconsin, and Utah demonstrate that a proactive investment is cost-effective, saving millions of dollars later. A state funded legislative approach of $10M per year would:

- **Proactively restore monuments in priority areas within 35 to 40 years**
- **Maintain existing monuments to reduce the possibility of future loss**

Benefits to Minnesota

Like roads, bridges, and underground utilities, PLSS monuments are important infrastructure that require support and maintenance. PLSS monuments:

- Support all activity on and under the land
- Give the everyone an assurance in the land tenure system and have a positive effect on efforts related to boundary location.
- Unify geospatial data to a well-known infrastructure which informs effective decisions and positive outcomes.

View or connect with us at:

URL: https://mnplss-umn.hub.arcgis.com/ Email: mnplssinitiative@gmail.com

NCEES Completes Research Study to Better Advance Licensure

October, 2021, NCEES Licensure Exchange

NCEES recently partnered with research and marketing consultants McKinley Advisors, based in Washington, D.C., to uncover the types of resources, information, and initiatives needed to raise awareness of and boost recruitment in the professions of engineering and surveying.

NCEES Marketing and Outreach Strategist Jacob Barker worked with McKinley Advisors to define the goals of the research. He explained NCEES' reasons for undertaking this project: "With objective, third-party qualitative and quantitative research, we can use evidence-based findings and recommendations to guide the organization and its communication efforts in the future."

Research goals

The primary focus of the research was to capture the perceptions and needs of elementary and college educators, high school guidance counselors, engineering and surveying college students, and current practicing engineers and surveyors.

Barker noted that these audiences play a critical role in raising awareness of the two professions and fostering interest and excitement among students—all to support a more robust and diverse workforce pipeline in the future.

Barker said that the research identified opportunities for NCEES, including the development of specific resources and initiatives that will help the organization better meet the needs of these audiences in the advancement of professional licensure. A secondary focus of the research was to better understand awareness and perceptions of NCEES and the services the organization provides.

Focus groups and electronic surveys

The research was conducted using a two-phased approach. First, three separate focus groups were held with third-grade elementary school teachers, high school guidance counselors, and current college students from across the country. The second phase of the project included nationwide distribution of separate and unique electronic surveys to college engineering and surveying educators, current engineering and surveying college students, high school guidance counselors, and current practicing engineers and surveyors. Overall, more than 2,500 responses were collected through the electronic surveys.

NCEES
advancing licensure for engineers and surveyors

Finding highlights

McKinley Advisors reported the following findings from the focus groups and electronic surveys.

- With a primary focus on reading, math, and science at the elementary and high school levels, looking for opportunities to integrate engineering and surveying into the current reading, math, and science curriculum will enable greater exposure to students, as teachers currently do not have the time needed for distinct engineering and surveying classes.
- Engineers commonly decide on their career studies in high school, while surveyors are more likely to choose their career in or after college.
- Being able to have a positive impact on society is a growing reason that engineering and surveying college students and young professionals are choosing engineering or surveying as a field of study or career as compared to those who have been practicing for 10–15 years or more.
- Engineering faculty are primarily turning to state licensing boards for licensure information, while surveying faculty commonly turn to professional conferences or seminars as well as other surveying professionals.
- A majority of practicing engineer and surveyor respondents are aware of NCEES, satisfied with the NCEES services they had used, and would recommend using NCEES services to a colleague.

"The research findings are already providing valuable insight as we develop future outreach and marketing initiatives as well as the specific messages that will resonate best with our various NCEES audiences," Barker said.

This article appears courtesy of the NCEES Licensure Exchange. It is available as originally published at: https://ncees.org/wp-content/uploads/5_October-2021-LEx.pdf

AUTODESK
Platinum Partner

Seamless Connectivity. **End to End.**

From the office to the jobsite and back, you need to be connected.
Our Topcon Solutions Stores are the only Autodesk Platinum Partner that can TRULY connect an office and field team. So, what are you waiting for? Bring your engineers, your surveyors, and the team on-site all together, today. And do it with the help of your local Topcon Solution Store.

TOPCON SOLUTIONS Store

Topcon Solutions Store. Put technology to work for you.

See how we can help you find your solutions:
topconsolutions.com

For th
has en
a cust
series
Land
sugge
assist

Impr

-
-
-

Impr

-
-

Addit
copie
Our g

Are You in a Prime Location

by Perry Trunick

Henry Nass loves numbers, especially prime numbers. He's also an advocate for teaching math skills, and he keeps finding creative ways of calling attention to the numbers around us in hopes of kindling more interest in the study of mathematics.

Nass may have found an intersection that appeals to land surveyors. He contacted POB to talk about his observation that a number of latitudes and longitudes are prime numbers and that the intersection of some of these primes fall within the landmass of the continental United States.

Have Your Pi and Eat It

First, a little background. Nass says efforts by the American Mathematical Society to establish Pi Day for schools to promote mathematics have fallen a bit flat. The idea of using the date March 14, which corresponds to the mathematical constant Pi (3.14), have basically become an excuse to have a pizza party. While the intentions are good, he'd like to see the effort expanded, and he thinks an appreciation of prime numbers is one of the ways to go.

There's an interesting link for land surveyors. Nass discusses the Sieve of Eratosthenes, named for the Greek astronomer and geographer who, in the third century BCE, measured the circumference of the earth. Eratosthenes developed a tool which generates prime numbers — basically a grid system which allows the exclusion of non-prime numbers, leaving only prime numbers in place.

A number of years ago, when the year 2000 and the dawn of the 21st century were getting a lot of attention, Nass observed that the first prime number year of the 21st century would be 2003 (followed by 2011 and, of course, eventually 2017). He took that a few steps further and identified some dates within 2003, which were also represented by prime numbers, and he proposed to his city councilman that the City of New York adopt a resolution commemorating these prime number dates.

Living On the Grid

Nass didn't say what started him looking at a map of the United States and visualizing the "prime locations" represented at the intersection of a prime-number latitude and a prime-number longitude. Perhaps someone mentioned the Prime Meridian in Greenwich, or he was contemplating Eratosthenes' early geospatial endeavors, but either way, he made the leap.

When Nass called POB, he had in mind student field trips to locate the exact spots where these primes intersect. It sounded like a good opportunity to develop some

awareness of land surveying and an excuse to get involved with schools, so POB decided to help Nass spread the word.

One advantage of the prime location exercise is that it is not tied to a single, specific day, so events can be scheduled at any time. Since 2017 is a "prime year," it provides an opportunity to begin the conversation, but it's not even dependent on getting done in a prime year.

There are quite a number of learning opportunities that can branch out from there that involve the land surveying profession. They can be scaled to fit the level of teaching and the subject — mathematics, geography, history, etc. And, let's face it, the profession is struggling for ways to gain some visibility with young people with the right interests and skills in math and other subjects to get them to look at land surveying as a career.

One of the first steps is an outreach effort. Armed with some ideas of how professional land surveyors can contribute to the learning process and specific topics, get to know some teachers. At the same time, get them up to speed on land surveying and geospatial professions and help them understand how they can bring some of the real-world experience and application of the theories they teach into the classroom. Here are a few thoughts. These can be suggested as part of a lesson plan for math or science teachers, and the teachers can take it from there.

Ideally, anyone located near enough to one of the points represented by the intersection of two primes can turn it into a field trip. The opportunity for a land surveyor to go into the field with a class and demonstrate the tools and techniques to find and mark the point should be obvious. Where there is no such point near enough, the tools and methods can still be demonstrated while the location of the point becomes a map exercise.

Here's how the prime location idea Nass has can support a lesson plan. It should be easy to see where the math teacher starts and the land surveyor joins in:

Identify what is a prime number.

List prime numbers between 20 and 50 (corresponding to latitudes). Then extend that list to 140 to cover longitudes.

Pinpoint on a map the rectangle extending from 20 to 50 N latitudes and 60 to 140 W longitudes (corresponding to the location of the continental United States).

Identify the latitudes within the rectangle that are primes.

Identify the longitudes within the rectangle that are primes.

Find the intersections of two primes on the map and identify the location and nearest city.

Discussions leading up to the exercise can include the development of modern mapping using the lat/long coordinate system. This is a good opportunity to introduce the practice of surveying and highlight the Point of Beginning, and various principal meridians that followed and their importance in land management and surveying. From there, it's just a matter of demonstrating how to get to that sub-centimeter measurement that starts a boundary survey. Discussions can go in any number of directions, depending on what the class is studying. If the teacher(s) gain a good understanding of what you do and how you do it, they should be able to lead the way in developing a lesson plan that puts math and science into practical terms using a land surveyor's experience to make it real. Some cool equipment and technology certainly helps.

(continued on page 22)

2019 Corporate Members

Phoenix Engineering & Surveying, LLC .....Independence, MO
Riggs & Associates, Inc. .....West Plains, MO
McClure Engineering Company .....N. Kansas City, MO
Buescher Frankenberg Associates, Inc.....Washington, MO
Anderson Engineering, Inc.....Springfield, MO
George Butler Associates, Inc..... Lenexa, KS
Migar Enterprises, Inc. .....Grandview, MO
Bax Engineering Co., Inc. .....St. Charles, MO
Cole & Associates, Inc.....St. Charles, MO
Bartlett & West, Inc..... Jefferson City, MO
Govero Land Services, Inc. ..... Imperial, MO
Burdine & Associates, Inc..... Arnold, MO
Zahner & Associates, Inc. ..... Perryville, MO
Allstate Consultants, LLC..... Columbia, MO
Anderson Survey Company.....Lee's Summit, MO
Koehler Engineering &
Land Surveying, Inc.....Cape Girardeau, MO
Amsinger Surveying, Inc. .....Marshfield, MO
Musler Engineering Co. .....St. Charles, MO
Central MO Professional Services.....Inc, Jefferson City, MO
Robert S. Shotts, Inc. .....Lebanon, MO
Grimes Consulting Inc. .....St. Louis, MO
Marler Surveying Co., Inc. .....St. Louis, MO
Doering Engineering, Inc. .....St. Louis, MO
Shaffer & Hines, Inc.....Nixa, MO
Affinis Corp.....Overland Park, KS
ABNA Engineering, Inc.....St. Louis, MO
Bowen Engineering & Surveying, Inc. .....Cape Girardeau, MO
St. Charles Engineering & Surveying, Inc.....St. Charles, MO
Midland Surveying, Inc. ..... Maryville, MO
Taliaferro & Browne, Inc. ..... Kansas City, MO
Cochran .....Union, MO
Pickett, Ray & Silver, Inc. .....St. Peters, MO
Whitehead Consultants Inc.....Clinton, MO
Schlagel & Associates, PA ..... Lenexa, KS
Cardinal Surveying & Mapping, Inc..... Cottleville, MO
Surdex Corporation ..... Chesterfield, MO
Bader Land Surveying, Inc.....Ste. Genevieve, MO
West Wildwood Surveying, LLC .....St. Louis, MO
Integrity Engineering, Inc. .....Rolla, MO
Poepping, Stone, Bach & Associates, Inc..... Hannibal, MO
Cochran .....Fenton, MO
Minnick Surveying, LLC .....St. Louis, MO
Olsson, Inc. .....Overland Park, KS
The Sterling Company.....St. Louis, MO
Volkert, Inc..... Collinsville, IL
Engineering Solutions .....Lee's Summit, MO
Thouvenot, Wade & Moerchen, Inc.....Swansea, IL
Cochran ..... Wentzville, MO
Powell CWM, Inc. .....Independence, MO
Brungardt Honomichl & Co., P.A. .....Overland Park, KS
Cook, Flatt & Strobel Engineers ..... Topeka, KS
Westwood Professional Services.....Overland Park, KS

Award Nominat

to be awarded at
Annual Confer
October 201
Tan-Tar-A Re

Person Nominated: _____

Name of Award: _____

On a separate page highlight the reason(s) for y

Mail or fax completed form to the Mail Society of Professio
65102 or Fax: 573-635-7823, no later than August 15, 201
Awards Committee

Award

Surveyor of the Year Award has been given since 198
has given freely of his/her time and efforts to the organizatio
profession.

* Must be a Member of MSPS
* Should enjoy an outstanding reputation for his/her know

Robert E. Myers Service Award has been given since
who, over an extended period of time (ten years minimum) h
surveying profession and in particular to the Society.

Past Recipient

Surveyor of the Year Award - Joe Clayton, Richard Elgin, St
Chris Wickern, Mark Nolte, Ralph Riggs, John Teale, Shane
Lashley, Richard Cox, Jim Mathis, Jim Anderson, Robert S. S
John A. Holleck, John Stevens, Richard Barr, Erwin Gard, C
Anderson, Mike Flowers, Bob Pirrie, and Jerry Day.

Robert E. Myers Service Award - Darrell Pratte, Robert Ubl
Hayes, Rich Howard, Stan Emerick, Don Martin, Robert My
Robert S. Shotts, Stan French, Gaylon Smitth, Dan Lashley,
Flowers, Erwin Gard, Rich Norvell, David Krehbiel, Richard
Norman Brown, and Harold Schulte.

MSPS Board 2018

PRESIDENT
GERALD BADER
Bader Land Surveying Inc.
16255 Sugar Bottom Road
Ste. Genevieve, MO 63670
573-483-2777 • Fax: 573-483-2777
Email: baderls@brick.net

PRESIDENT-ELECT
CHRIS WICKERN
Engineering Surveys & Services
1775 W. Main St.
Sedalia, MO 65301
660-826-8615 • Fax: 660-826-6158
Email: chris_wickern@yahoo.com

VICE PRESIDENT
SUSANNE DANIEL
Daniel & Assoc., Surveying and Mapping
1758 Red Bridge Road
Ozark, MO 65721
417-581-5744 • Cell: 417-380-3785
Email: Susanne_daniel@msn.com

SECRETARY-TREASURER
EARL E. GRAHAM
Grimes Consulting, Inc.
12300 Old Tesson Ferry Rd., Ste. 300D
St. Louis, MO 63128
314-849-6100 • Fax: 314-849-6010
Email: earlg@grimesconsulting.com

IMM. PAST PRESIDENT
JOE CLAYTON
Anderson Engineering Inc.
3625 Johnson Dr.
Joplin, MO 64801
417-629-8120 • Fax: 417-782-7398
Email: josephclaytonpls@gmail.com

DIRECTORS

STAN EMERICK
(Term expires 2018)
Farnsworth Group Inc.
14051 Calcutta Drive
Chesterfield, MO 63017
314-962-7900 • Fax: 314-434-1782
Email: semerick@f-w.com

DIRECTORS (continued)

BRAD McCLOUD
(Term expires 2018)
Missouri Dept. Of Conservation
230 Commerce Drive, Ste. 109
Jefferson City, MO 65109
573-470-6343
Email: bradley.mccloud@mdc.mo.gov

RON HEIMBAUGH
(Term expires 2019)
Department of Ag-Land Survey Program
1251 A Gail Drive, PO Box 937
Rolla, MO 65402
573-368-2323 • Fax: 573-368-2379
Email: ron.heimbaugh@mda.mo.gov

RAY RIGGS
(Term expires 2019)
Riggs & Associates
102 W. Trish Knight St., PO Box 71
West Plains, MO 65775
417-256-8125 • Fax: 417-256-6971
Email: rayr@riggslandsurveying.com

DIRECTORS (continued)

JERROD L. HOGAN
(Term expires 2020)
Anderson Engineering
811 E. Third St.
Joplin, MO 64801
417-782-7399
Fax: 417-782-7398
Email: jhogan@andersonengineeringinc.com

MATTHEW THOMAS
(Term expires 2020)
Boone County Surveyor
801 E. Walnut, Room 315
Columbia, MO 65201
573-886-4480
Email: mthomas@boonecountymo.org

TWM Presents "Sureving" to Home School Students

by Don Martin, PLS

In a twist of the movie phrase "If you build it, he will come," a member of the Thouvenot, Wade & Moerchen, Inc. (TWM) surveys group, PLS Josh Stein experienced a similar revelation while participating in an 8th grade career fair. There on behalf of TWM, Josh was making informal pitches to the young participants about the fascinating profession of surveying. As a parent/student duo marveled at the career opportunity to be found in the realm of surveying, the parent realized that this interesting field was one she was not aware of. Witnessing the connection her daughter was making to the surveyor's presentation, this parent imagined (correctly) that she was not the only parent that was unaware of the world of surveying. So she returned the surveyor's pitch with one of her own…a sort of "share it, and more of us will come."

You see, the parent/student duo were part of southwest Illinois network of home-schooled students and their parents. When Josh Stein did such an effective job of introducing and describing the trade he and others from TWM practice so well, that parent knew that if a showcase for surveying was provided many home-school boys and girls, with parents in tow, would attend. An event was born!

On September 5, 2019 at the Sure Shot archery facility in Mascoutah, Illinois, approximately 60 young people made their way to a series of career and activity "stations" throughout the afternoon. Each station, hosted by members of the TWM staff of surveyors and engineers, offered hands on exposure to the technologies and tools of these design professions. While 60 students may sound like a lot (it is!), the actual level of interest was around 300 students! That's right, three-hundred! For the sakes of time and size the home-schooling parents themselves suggested limited event attendence.

Derek Twente of TWM introduces student to 3D scanning.

The TWM team had organized themselves throughout the facility in a manner conducive to the young people embarking on a walk through the building in groups making stops at each station. As the boys and girls gathered at the stations, a TWM representative would make an informal presentation about a unique element of survey or engineering and then offered examples to children. The examples included more than a practitioner's demonstrations. The young students

themselves were invited to plot, calculate, measure and operate. Not teaching or lecturing in any formal senses, these were encounters between engineers, surveyors and the students in which careers were shared with those looking to plan for their future work.

Jennifer Cochran of TWM noted that most of the students participating had never heard of surveying as a career. Translating this insight into action, TWM filled a need to inform young people and their parents about surveying. As she said, "we seek opportunities to do so." And she assures future events will be planned.

Attending career fairs and student outreach events is a regular part of the TWM surveyors' community life. They also enjoying speaking before service groups and professional societies. They welcome chances to stand among others in their communities in extending helping hands. In the process, they may introduce some lucky young people to their own futures in rewarding careers in surveying!

Home-school students learning to operation robotic total station.

The TWM presentation 'Reality Capture Takes Flight'.

"The U.S. Public Land Survey System for Missouri"

FOURTH EDITION

By Dr. Richard Elgin, PLS, PE

Hardback Edition - Printed in Color

NOW AVAILABLE

MSPS Members
$120.00

Non Members
$160.00

(Includes Shipping)

Sponsored by MSPS, the book ***The U.S. Public Land Survey System for Missouri*** is now available. This book is a complete synthesis of Missouri's unique version of the USPLSS. Its chapters are: **1.** Early History of the U.S. Public Land Survey System, the French and Spanish in Missouri and Missouri's Boundaries. **2.** Original Surveys on the U.S. Public Land Survey System for Missouri. **3.** Resurveys on the U.S. Public Land Survey System. **4.** Missouri Court Decisions Concerning Resurveys on the U.S. Public Land Survey System. **5.** Reestablishment of Lost Corners for Missouri. **6.** Example Protraction and Resurvey Problems. **7.** Some Missouri GLO Plats. The book has 419 pages, 24 figures, 20 example protraction problems, 28 example proportioning problems, 90 example GLO plats, 4 appendices and a glossary. Written by Dr. Dick Elgin who is uniquely qualified to write this book. Dick is a surveying researcher, practitioner, educator and author. Semi-retired, he's spent the last two years writing this much-needed manual about our state's USPLSS.

ORDER FORM

Name: _____

Firm: _____

Address: _____

City, State: _____ Zip: _____

Phone: _____ Fax: _____

Email: _____

PAYMENT OPTIONS

❒ Visa ❒ MasterCard ❒ Discover ❒ American Express

Card #: _____ Exp. Date: _____ CVV Code: _____

Total Amount: $_____

❒ Check Enclosed or ❒ Invoice my Firm

Please send your order form to **MSPS, 722 E. Capitol Avenue, Jefferson City, MO 65102.**
Fax: 573-635-7823 ~ Email: msps@missourisurveyor.org
For questions call 573-635-9446.

COURSE FEE SCHEDULE (Please check appropriate boxes)	MSPS Member	Non-MSPS Member
❑ Wednesday and either Thursday or Friday	$600	$600
❑ Thursday and Friday	$750	$800
❑ All Three Days	$900	$1,000
❑ Wednesday Only	$250	$250
❑ Thursday Only	$500	$500
❑ Friday Only	$450	$450

Missouri Society of Professional Surveyors

Surveyor's Review Course

August 23-25, 2017
Best Western Capital Inn
1937 Christy Drive
Jefferson City, MO 65101

LOCATION AND LODGING

A block of rooms has been reserved at the Best Western Capital Inn in Jefferson City, Missouri, at a rate of 96.29 +applicable taxes excluding blackout dates for single king or double queen occupancy which includes a Full Hot Breakfast each morning. **Deadline for reservation is August 15, 2017.** Make your reservation by calling 573-635-4175 and refer to "MSPS rate" when reserving your room.

CANCELLATION POLICY

MSPS reserve 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 will be given after August 15, 2017.**

Review Course Registration

Name _____ PLS # _____

Firm _____

Address _____

City, State _____ Zip _____

Phone _____ Email _____

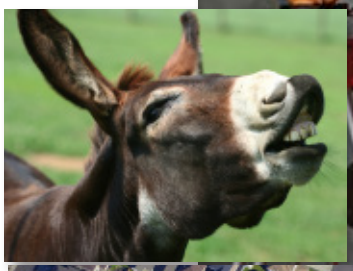
PAYMENT OPTIONS

❒ Visa/MasterCard/Discover/American Express ❒ Check Enclosed ❒ Invoice my Firm

Card # _____ Exp. Date _____

Total Amount: $_____

To Register, detach and mail payment to: MSPS , PO Box 1342, Jefferson City, MO 65102
Phone: 573-635-9446 ~ Fax: 573-635-7823 ~ Email: msps@missourisurveyor.org
Registration Deadline: August 15, 2017



2015-2016 Board Members

PRESIDENT
JIM MATHIS III
Mathis & Associates
114 Broadway
Poplar Bluff, MO 63901
573-785-4202
Fax: 573-785-8121
Email: mathis@tcmax.net

PRESIDENT-ELECT
JOSEPH CLAYTON
Anderson Engineering, Inc.
3625 Johnson Dr.
Joplin, MO 64801
417-629-8120
Fax: 417-782-7398
Email: josephclaytonpls@gmail.com

VICE PRESIDENT
GERALD BADER
Bader Land Surveying Inc.
16255 Sugar Bottom Road
Ste. Genevieve, MO 63670
573-483-2777
Fax: 573-483-2777
Email: baderls@brick.net

SECRETARY-TREASURER
CHRIS WICKERN
Engineering Surveys & Services Inc.
1775 W. Main St.
Sedalia, MO 65301
660-826-8615
Fax: 660-826-6158
Email: chris_wickern@yahoo.com

IMM. PAST PRESIDENT
ADAM TEALE
Midland Surveying, Inc.
501 North Market
Maryville, MO 64468
660-582-8633
Fax: 660-582-7173
Email: ateale@midlandsurvey.com

DIRECTORS
SUSANNE DANIEL
(Term expires 2016)
Daniel & Assoc., Surveying and Mapping
1758 Red Bridge Road
Ozark, MO 65721
417-581-5744
Cell: 417-380-3785
Email: Susanne_daniel@msn.com

MICHAEL GRAY
(Term expires 2016)
Gray & Associates, LLC
2548 N State Hwy F
Ash Grove, Mo. 65604
Cell: 417-569-6164
Email: mikegray@hughes.net

EARL E. GRAHAM
(Term expires 2017)
Grimes Consulting, Inc.
12300 Old Tesson Road, Ste. 300D
St. Louis, MO 63128
314-849-6100
Fax: 314-849-6010
Email: earlg@grimesconsulting.com

CHARLES E. QUINBY
(Term expires 2017)
EDSI
16141 Swingley Ridge Rd.
Chesterfield, MO 63011
636-537-5585
Fax: 636-537-0275
Cell: 314-223-3429
Email: cqsurvey@swbell.net
Email: cq@engdesignsource.com

STAN EMERICK
(Term expires 2018)
Farnsworth Group Inc.
14051 Calcutta Drive
Chesterfield, MO 63017
314-962-7900
Fax: 314-434-1782
Email: semerick@f-w.com

BRADLEY McCLOUD
(Term expires 2018)
Missouri Dept. Of Conservation
230 Commerce Drive, Ste. 109
Jefferson City, MO 65109
573-470-6343
Email: bradley.mccloud@mdc.mo.gov

EXECUTIVE DIRECTOR
SANDRA C. BOECKMAN
722 E. Capitol Avenue
PO Box 1342
Jefferson City, MO 65102
573-635-9446
FAX: 573-635-7823
Email: msps@missourisurveyor.org

NSPS GOVERNOR
TROY HAYES
Midland Surveying Inc.
501 N. Market
Maryville, MO 64468
660-582-8633
Fax: 660-582-7173
Email: tryhayes@midlandsurvey.com

Land Surveyors Licensed in 2011

Don Michael Brady
Texarkana TX

James Ralph Freeland
Greenville SC

Sylvester Farris Furse IV
Rolla MO

Charles B. Gardiner III
Longwood FL

Kellan Michael Gregory
Belton MO

James Ryan Mikel
Kansas City KS

Ty Jeremy Milner
Doniphan MO

Franke Sinker
Fulton MO

Michael E. Small
Augusta KS

Scott M. Spayer
St. Louis MO

John Tobin Taylor
Pacific MO

David Mark Varner
St. Louis MO

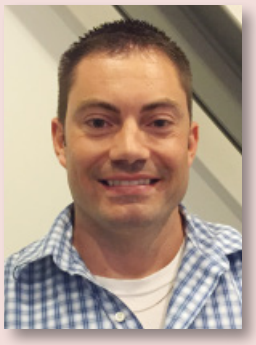
Matthew Gregg Vogelsang
Warrenton MO

Matthew Douglas Wade
Pontiac MO

David N. Young
Clarksville TN

Meet Our Members!

LS Member



Tom Reynolds
Hillsboro, Missouri

Position:
Survey Manager,
Cole & Associates

Focus of survey practice:
The full scoop of site development surveying – boundary, topo, ALTA, construction layout, as-built. Most of my work is in the city and suburban subdivisions for developers and title companies. But I am happiest when I can pick up a large parcel boundary survey requiring PLSS retracing.

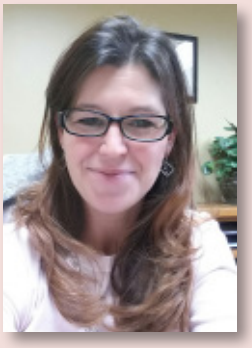
Finding a career in surveying:
I was going to community college on an A+ scholarship studying Business. While in school I had a part-time job at a restaurant, and one of our frequent patrons was a shareholder with Cole & Associates. We became acquainted, he described surveying and told me I could have a job if I wanted it. I graduated and went to work the next day; I've been surveying ever since.

Likes about surveying:
Surveying is a natural fit for me because it aligns things I enjoy studying and doing with my work. I was a history nerd, and when the other kids said they would never use what they learned in trigonometry class, I saw the practicality of trig. That's two matches to surveying. I love the outdoors and I was a walk-around-the-woods kind of kid even finding survey flagging and baling twine on trees marking property lines of the parcels near home. Another match. And then there is the sense of accomplishment… being a part of taking undeveloped land, measuring around it, marking it off, and bringing housing or businesses to that place. I get to see my work grow into making communities. I really like that! So you see, surveying is my work, but it is a reflection of the things I like.

Concerned about the profession:
Not only a surveyor, I am a manger in my field, so I know the challenge of finding people to do this work. I hope we find a way to enhance our profile such that young people will consider surveying as a career option. We need a presence in the schools and with job placement counselors to get out the word "there's good jobs in surveying!"

Meet Our Members!

LS Member



Michelle Brown
Lee's Summit, Missouri

Position:
Project Manager,
Lovelace & Associates

Focus of survey practice:
Working mostly for municipalities and in residential suburbs, my focus is surveys in support of engineering, construction and development. So I do a lot of boundaries for subdivisions, plot plans for builders, topo for engineering and layout for construction.

Most memorable project:
The project that first introduced me to surveying. I was in the Air Force and we went to El Salvador to convert an outdated airfield into an Army base camp. We only had two weeks to do it, and we got the whole site laid out and set up. At times we had motor-graders and bulldozers climbing up our backs, but we got it done. We even connected the locals to running water!

Likes about surveying:
In surveying there is always change. I'm never in one place too long, stuck doing the same thing with no sense of accomplishment. With surveying it seems like I'm always someplace new, confronting and solving new challenges, and seeing my work come to life in the form of properties, homes, and infrastructure. As a surveyor I arrive on site to raw ground and my measurements, marking and mapping results in streets and neighborhoods. That is very satisfying. Also, the mix of office and field is much to my liking!

Why a member of MSPS:
Being in MSPS is the way I am part of the group in this career field. The fellowship and networking it provides I continue my surveying education through the exchange of ideas and peer learning membership affords. One's own work doesn't always provide the breadth of experience needed for all we do. With the association of others in my profession I broaden my knowledge base through their experience.

Missouri Society of Professional Surveyors

Surveyor's Review Course

August 22-24, 2018

Best Western Capital Inn, Jefferson City

PROGRAM

Wednesday, August 22 ~ 1:00 - 6:00 pm

Surveying Math *(Bring your NCEES-approved calculator)*

- ❑ Calculator Use & Basic algebra
- ❑ Trigonometry and Geometry
- ❑ Traverse Calculations and Coordinate Geometry
- ❑ Surveying Math Applications

Thursday, August 23 ~ 8:00 am - 5:30 pm

Surveying Fundamentals

- ❑ Errors Analysis & State Plane Coordinates
- ❑ Route Surveys, GPS & GIS
- ❑ Exam Preparation, Legal Principles & Definitions

Friday, August 24 ~ 8:00 am - 3:30 pm

Missouri Practice

- ❑ Missouri Standards & Board Rules
- ❑ Missouri GLO System, Resurveys on Missouri's GLO system (RSMO Chapter 60)
- ❑ Other Missouri Statutes, Riparian Boundaries

This course is appropriate for those who will be taking any part of the surveying licensing exams, or for those already licensed and wish to review surveying topics and receive PDUs.

INSTRUCTORS

Dr. Joseph Paiva, PLS, is a geomatics and business development expert and a former university educator, who is now CEO and Principal of GeoLearn (www.geo-learn.com), an online education company specializing in courses for professionals and technicians in the geospatial industry.

Dr. Dick Elgin, PLS, PE, works for Archer-Elgin Surveying and Engineering, LLC (Rolla). He authored "The U.S. Public Land Survey System for Missouri."

Mike Flowers, PLS, is the former Missouri State Land Surveyor. He is a member of the Missouri Board of Architects, Professional Engineers, Professional Surveyors and Landscape Architects.

All are well known surveying professionals. Joe Paiva helped found the Review Course and for years all three have previously taught parts of it.

This course has been approved for continuing education credits from the Missouri Board for Architects, Professional Engineers, Professional Land Surveyors and Landscape Architects for the following hours:

Wednesday — 5.0 PDUs
Thursday — 8.5 PDUs
Friday — 6.5 PDUs

COURSE FEE SCHEDULE (Please check appropriate boxes)	MSPS Member	Non-MSPS Member
❑ Wednesday and either Thursday or Friday	$600	$600
❑ Thursday and Friday	$750	$800
❑ All Three Days	$900	$1,000
❑ Wednesday Only	$250	$250
❑ Thursday Only	$500	$500
❑ Friday Only	$450	$450

Missouri Society of Professional Surveyors

Surveyor's Review Course

August 22-24, 2018
Best Western Capital Inn
1937 Christy Drive
Jefferson City, MO 65101

LOCATION AND LODGING

A block of rooms has been reserved at the Best Western Capital Inn in Jefferson City, Missouri, at a rate of $101.69 plus applicable taxes excluding blackout dates for single king or double queen occupancy which includes a Full Hot Breakfast each morning. **Deadline for reservation is July 25, 2018.** Make your reservation by calling 573-635-4175 and refer to "MSPS rate" when reserving your room.

CANCELLATION POLICY

MSPS reserve 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 will be given after August 15, 2018.**

Review Course Registration

Name _____ PLS # _____

Firm _____

Address _____

City, State _____ Zip _____

Phone _____ Email _____

PAYMENT OPTIONS

❒ Visa/MasterCard/Discover/American Express ❒ Check Enclosed ❒ Invoice my Firm

Card # _____ Exp. Date _____ CVV Code _____

Total Amount: $_____

To Register, detach and mail payment to: MSPS, PO Box 1342, Jefferson City, MO 65102
Phone: 573-635-9446 ~ Fax: 573-635-7823 ~ Email: msps@missourisurveyor.org
Registration Deadline: August 15, 2018

On the Cover: A Standing GLO Witness Tree Marked by Joseph C. Brown in 1816

by Dr. Richard Elgin, PLS, PE

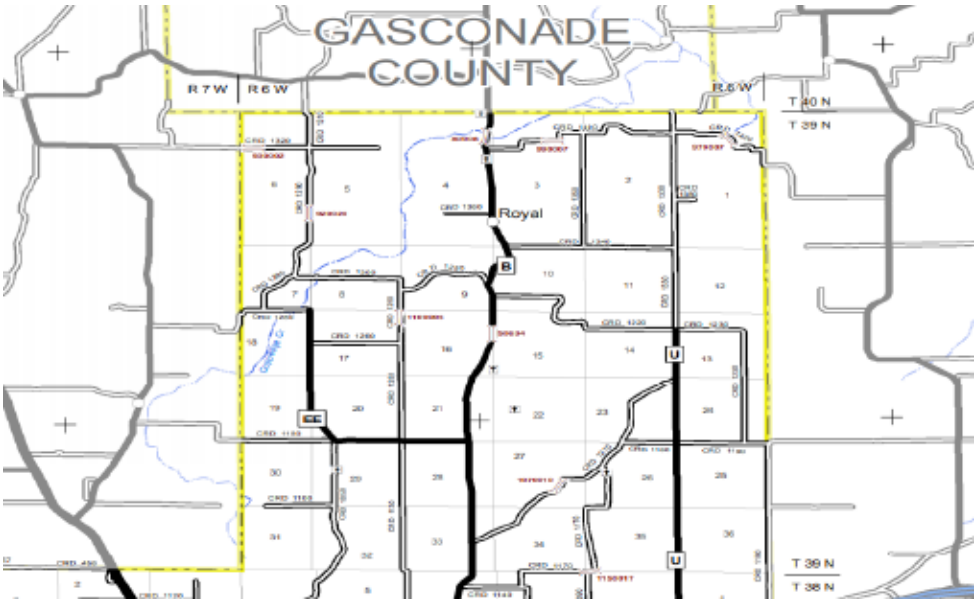
This corner was set in May, 1816 by the famous GLO Deputy Surveyor Joseph C. Brown when he surveyed the Standard Line between T39N and T40N west from the 5th Principal Meridian. (Mr. Brown had surveyed the Base Line in 1815 and would go on to survey the Osage Treaty Line (late 1816), the west and south lines of Missouri (1823) and the Santa Fe Trail (1825).)

It is the Standard Township Corner between R6W and R7W. Mr. Brown set a post and marked a 12" Post Oak, North 30 degrees West, 7 links. It became (and still is) the southwest corner of Gasconade County. Perpetuated over the years, in the **front cover** (taken 1975) photo, Phelps County Surveyor Bob Elgin is measuring the bearing to Brown's standing Post Oak, then 31 inches. He "set a standard SLSA concrete monument with brass cap." In the photo my father is using a Gurley compass on a Jacob Staff to take the bearing, the variation no doubt set in the vernier.

As shown on the **back cover** (taken 8/8/20), former Phelps County Surveyor Dick Elgin stands at the same corner. The monument looks much the same today. The Post Oak is now 35 inches.

The standing GLO witness tree and Dick Elgin, August 2020.

I'm sure you are wondering what is the lap to the Closing Township Corner to R6W and R7W. The answer is 42.70 chains east. This is a relatively large lap, due to several factors, one being that T39N (the north line of Phelps County) is one of those extremely long closing townships, being over 8 miles in length in some locations. This is due to poor measurements on the 5th PM. The GLO Post Oak's growth rate has been only a tenth of an inch (2.5 mm) per year.



The "long closing township" condition of T39N is clearly illustrated in this county road map. The northern tier of sections in T39N are noticeably taller than the remaining sections in the township. The corner with the call to the "Standing GLO Witness Tree Marked by Joseph C. Brown in 1816" is the southwest corner of Gasconade County.