

Volume 29: Issue 4
October, 2018



LINES & POINTS

www.plsw.org

STATE
PARK
SQ. MILE
S.W. COR.



THE EQUALITY STATE SURVEYOR
PROFESSIONAL LAND SURVEYORS OF WYOMING

Hixon Mfg. & Supply Co.

Introducing the world's fastest and easiest-to-use GNSS RTK rover, the Leica GS18 T. Now you can measure any point faster and easier without the need to hold the pole vertical. This latest innovation combines GNSS and inertial measurement unit (IMU) being the first true tilt compensation solution that is immune to magnetic disturbances and is calibration-free. Save up to 20 percent over conventional surveying practices, measure where others can't, faster than ever before and forget the bubble.

Leica GS18 T
World's Fastest
GNSS RTK Rover



Call 800.762.5252 today for additional information and to schedule a demo

JUST SOME OF OUR MANY VENDORS:



built to
transform



Leica Rugby CLA/CLH
First Upgradable Lasers

Call for details



FORT COLLINS
1001 SMITHFIELD DR
FORT COLLINS, CO 80524
970.482.0111 800.762.5252

www.hixonmfg.com



DENVER

8775 E ORCHARD RD, #807
GREENWOOD VILLAGE, CO 80111
303.694.0012 800.475.3422





President • Geno Ferrero, PLS

President Elect • Lyle Casciato, PLS

Secretary/Treasurer • John "Jack" Studley, PLS



• Cotton Jones, PLS
Area Director



• Mark Corbridge, PLS
Wyoming Delegate

PUBLICATIONS COMMITTEE

Committee Chair • Steven "Dennis" Dawson, PLS
dennieandbarb@gmail.com

Editor in Chief • Michael Flaim, PELS
mike.flaim@bresnan.net

Treasurer & Advertising • John "Jack" Studley, PLS
jklz0318@gmail.com

Circulation • Joel Ebner, PLS
jebner@blm.gov

Copy Editor • Herbert W. Stoughton, PhD, PELS, CP
hws.geod.engr@gmail.com

Website • Sonja "Suzie" Sparks, PLS
sasparks7@gmail.com

Emeritus Member • Pete Hutchison, PELS
petehpels@gmail.com

Emeritus Member • Larry Perry, PLS
arpentator@yahoo.com



On The Cover

"ONE SQUARE MILE" CORNER 3
MONUMENT
BY RICK HUDSON

CONTENTS

Page 3 • **PRESIDENT'S MESSAGE**

Page 5 • **ANNOUNCEMENTS**

Page 7 • **LAND SURVEYORS ARE PAYING
THE PRICE OF PROGRESS**
By: Stephen L. Carter

Page 17 • **ONE MILE SQUARE
REVISITATION**
By: R.L. "Rick" Hudson, L.S.

Page 18 • **NSPS RESPONSE TO "LAND
SURVEYORS ARE PAYING THE
PRICE OF PROGRESS" ARTICLE**
By: Gary Kent & Curt Sumner

Page 20 • **MAINTAINING DEFORMATION
STATIONS IS A 4-SEASON JOB**
By: Mike Gottfried, UNAVCO, Inc.

2018 PLSW SUSTAINING MEMBERS

- Jenn Heinrich - Frontier Precision Inc.
- John Baffert - Surv-KAP, LLC
- Chris Farnsworth - RDO Integrated Controls
- Kelly Goff - Underground Consulting Solutions
- Susan Hall - Trimble
- Tim Klaben - Berntsen International Inc.
- Troy Langston - Monsen Engineering

Advertising Information

Digital-ready, full-color advertising with payment should be mailed to Lines & Points, P.O. Box 8, Cheyenne, WY 82003.

Advertising rates are as follows:	Year	Issue
Full Page	\$810	\$210
Half Page	\$540	\$140
Quarter Page	\$310	\$80
Business Card	\$40	\$10
Employment	Free	Free

Special Rates apply for PLSW Chapters and cover placements.

For more information please contact Jack Studley.

PLSW (Professional Land Surveyors of Wyoming; PO Box 8, Cheyenne, WY 82003) is a statewide organization of Land Surveyors registered to practice in the Equality State of Wyoming. PLSW is dedicated to improving the technical, legal, and business aspects of surveying in the State of Wyoming. PLSW is affiliated with the National Society of Professional Surveyors (NSPS) and the Western Federation of Professional Land Surveyors (WestFed).

Lines and Points is published by the Professional Land Surveyors of Wyoming. Lines and Points is not copyrighted and permission is hereby granted to reprint articles with appropriate credit. The Professional Land Surveyors of Wyoming assume no responsibility for statements made or opinions expressed in this publication. The articles and opinions as put forth in this journal are not necessarily those of PLSW or the Editorial staff of this journal.

PRESIDENT'S MESSAGE

Value - the material or monetary worth of something; the worth of something compared to the price paid or asked for it. In which light do you see our profession? How does the general public value you? What about the value contractors place upon surveyors?

Due to the relatively small percentage of most projects' budgets allocated for surveying; we are one of the best values in the professional service industry. We are persons who have mastered a high level of expertise who follow a professional code of conduct and have a professional standard of practice that guide us in the work we do. When

I think of the value of surveying I think of the years of experience and expertise that we bring to a project, not the cost of our services.

The value placed upon surveying by the general public depends on how they have utilized our services. Those people who are required to reset property corners on their lot in order to construct a fence may view surveyors as an exorbitant cost to their project; after all they knew where the corners were anyway. Others may see us as invaluable, and I hope all of us have had the pleasure of working on these kinds of jobs; these jobs are usually where

we are protecting the public. In a profession that can often get bogged down with months of unending mathematics, it is fulfilling to work on a job that brings out the humanitarian side of our profession. As much as I love trigonometry, solving spiral curves will never compare with the look of relief on a client's face when you have provided them with service above and beyond the total cost at the bottom of the invoice.

Contractors are where I am often met with a unique perspective that combines both definitions above, thence becoming the most challenging and frustrating valuation placed upon surveying. There isn't a need to discuss clients that view us as the professionals we are, whether it is as professional measurers or boundary specialists. I would like to discuss the definition



of the value of surveying as being only a commodity, a mass produced unspecialized product. While this viewpoint is not held by all contractors, nor is it exclusive thereof, during construction projects is where I frequently encounter this viewpoint.

Being able to measure accurately is not exclusive to surveying. I respect the skills of any trade and have often encountered individuals that could run traditional equipment better than many survey crews. These people have had years of experience and have developed an expertise in measurement that brings value. The contractors that value surveyors as only measurers are where difficulties start. These difficulties are all about the price of surveying services. Surveyors are often encountered with requests to work for less than your quote. They might even have another person lined up that can do it for less than half of your cost. Can this person measure? Let's assume they can, but what are they getting for half price? Or more importantly, what are they losing? Professionalism, that is what they are losing, and there is a price associated with it.

So how as a profession do we communicate our value? As surveyors I think our ethics guide us

to proactively demonstrate our professionalism through more than just price. Our value is communicated through the perception of surveying by individuals and industries, which is dictated by the collective actions of the profession as a whole. If we continue to represent ourselves as professionals and not service providers, our value increases. If we continually uphold our professional standards of practice, no matter the cost, our value increases. If we continue to value our services monetarily to reflect our professionalism, our value increases.

So what is the price of professionalism? It depends on when you want to pay for it. I believe as surveyors, the earlier we are associated with a project the better the value for everyone involved. After all, anyone can measure 10.5 inches, it just depends when you want to do so. If this was the foundation of my house, I would have wanted to pay a surveyor to measure those 10.5 inches before the foundation was poured and the framing began, not after.

Geno Ferrero, PLS

President, Professional Land Surveyors of Wyoming



■ Digital Aerial Photography ■ LIDAR ■ Mobile Mapping
■ Topographic Mapping ■ Orthorectified Imagery



40 West Oakland Avenue, Salt Lake City, UT 84115 · **PHONE:** 801-487-3273 · **FAX:** 801-487-3313

ANNOUNCEMENTS

P.L.S.W. TECHNICAL SESSIONNovember 1ST & 2ND, 2018 • RAMKOTA HOTEL • CASPER, WYOMING**GENERAL INFORMATION****PRE-REGISTRATION:**

FEE: \$100 PLSW Members
 \$50 PLSW Affiliate Members
 \$175 Non-Members

A \$20 late registration fee will be added to all registrations received after October 26, 2018.

AGENDA

November 1ST 7:00 a.m. - 8:00 a.m. Registration
 8:00 a.m. - 12:00 p.m. Seminar
 12:00 p.m. - 1:00 p.m. Luncheon
 1:00 p.m. - 5:00 p.m. Seminar
 5:00 p.m. - 9:00 p.m. Social Hour
 November 2ND 7:00 a.m. - 7:45 a.m. Breakfast Buffet
 8:00 a.m. - 12:00 p.m. Seminar

Disputes Between Adjoining Landowners

The ins and outs of boundary disputes between adjoiningers and the role the professional surveyor should play in those disputes. Surveyors often find there is more than one opinion as to the location of boundary lines between adjoiningers. Disagreements and their legally prescribed resolutions are discussed, including adverse possession, quiet title actions, estoppel, boundary line commissions, and agreements.

Ownership versus Possession

Ownership of land consists of a bundle of rights that include use and possession. However, mere use or possession of land under certain circumstances may ripen into rights that can cast doubt on the true ownership. When do claims for the right to use or possess land create a claim of title, and when do they only create a right to continued use? We will investigate the various legal claims to land, the evidence supporting these claims, and the surveyor's responsibility to report field or record evidence of such claims.

LOCATION AND LODGING

A block of rooms has been reserved at the **Ramkota Hotel, 800 N. Poplar**, Casper, Wyoming until October 21st. Please note Wyoming State Volleyball is also during this time, so reserve your rooms early!

Rate: \$82 per night. Telephone: 307-266-6000.

PROFESSIONAL DEVELOPMENT HOURS

12 Professional Development Hours will be awarded for the entire seminar.

FOR MORE INFORMATION, CONTACT:

Paul Svenson 307-266-2524
 Bill Fehringer 307-995-2620

Highways, Byways, and Private Roads

Location or relocation, free or restricted access, centerline or sideline: all of these aspects of roads affect the work of both boundary and construction surveyors. After a brief history of roads and road building in the US, we will investigate the creation of public and private terrestrial passage, the entities that control them, the rights of abutting owners, and the extinguishing of those same corridors for transportation.

Wendy Lathrop, PLS, CFM

Wendy Lathrop, president and owner of Cadastral Consulting, is licensed as a Professional Land Surveyor in New Jersey, Pennsylvania, Delaware, and Maryland, and as a Professional Planner in New Jersey. She holds a Master's degree in Environmental Policy, and has been involved in surveying since 1974 in projects ranging from construction to boundary to environmental land use disputes. Wendy is also a Certified Floodplain Manager through the Association of State Flood Plain Managers (ASFPM). A former adjunct instructor at Mercer County College in New Jersey, Wendy has also taught as part of the team for the licensing exam review course at Drexel University in Pennsylvania. She has been teaching seminars for surveyors since 1986 and has been writing articles for surveyors since 1983. Wendy is a contributing editor for "The American Surveyor" magazine, and has four articles included in the American Bar Association's text, Land Surveys: A Guide for Lawyers and Other Professionals.

Lines and Points Article Rotation Submission Schedule By Chapter

Responsible Chapter	First Call Date	Last Call Date	Publication Date
Laramie Valley Chapter	December 1	December 15, 2018	January 1, 2019
Upper Platte Chapter	March 1	March 15,	April 1, 2019
Southwest Chapter	June 1	June 15	July 1, 2019
Northeast Chapter	September 1	September 15	October 1, 2019
Northwest Chapter	December 1	December 15, 2019	January 1, 2020
West Chapter	March 1	March 15	April 1, 2020
Central Chapter	June 1	June 15	July 1, 2020
South Central Chapter	September 1	September 15	October 1, 2020

Reports of GPS Problems Submitted by the Public are Now Available on Coast Guard Navigation Center Website

To provide better service and situational awareness to the public, the U.S. Coast Guard Navigation Center (NAVCEN) is now publishing reports of GPS problems on its website. Any notes about problem resolution, if available, will also be listed. The website will be updated as new reports are received and processed. All reports made in 2018 are now available. Reports for prior years will be made available in the future.

Reports of GPS problems submitted to NAVCEN through the GPS Problem Reporting webpage will be posted to the GPS Problem Report Status webpage after review by NAVCEN staff. Reports will be anonymized to protect the submitter's personal information and any equipment manufacturer data. After user and interagency partner input has been collected, any findings will be added to the report along with the suspected cause and resolution, if available.

The webpage will include the following information for each report:

- **Date / Time of Disruption:** Date and time of the report as provided by the reporting source.
- **Date Submitted:** Date the report was submitted to NAVCEN.
- **Location:** The general location of the reported problem based on input from the reporting source. Latitude and longitude may be used for maritime reports.
- **Type:** Installation type as provided by the reporting source. Choices include: Agriculture,

automobile, aviation, communications, first responder, marine, law enforcement, research, surveying, timing, transportation, and other (with a fillable field).

- **Description:** Description of the problem. This information from the reporting source is edited for clarity and to remove personal and equipment manufacturer identifying details. The description also provides GPS satellite constellation analysis information as provided by the GPS Operations Center, a determination if authorized GPS testing might have been a factor, and information on correlating reports from other users and interagency partners.

- **Cause:** The most likely cause of the report based on interagency input.

- **NAVCEN Closed Date:** NAVCEN collects interagency input and provides a detailed response to the reporting source for each report submitted. If there are no further questions from the reporting source, and NAVCEN has no other correlating information, NAVCEN will close the case. The results of interagency input will be included in the description field when the case is closed. This date may not correspond to the event end date.

Civil GPS users are encouraged to submit reports of GPS problems to the Coast Guard Navigation Center, civil aviation users are encouraged to report GPS anomalies to the Federal Aviation Administration, and military users should contact the GPS Operations Center.

Rick Hamilton

CGSIC Executive Secretariat
GPS Information Analysis Team Lead
U.S. Coast Guard Navigation Center
703-313-5930

~ GRENVILLE DODGE AND PARTY AT THE GANGPLANK ~



A signed and numbered reprint of Dave Paulley's original oil painting of UP Rail Road's survey party finding a route over the Laramie Mountains after being forced there by an Indian war party.

FOR SALE BY THE PLSW SE CHAPTER

\$50.00 per print plus shipping

Contact: Dennis Dawson

307-421-9932

DennieandBarb@aol.com

Land Surveyors Are Paying the Price of Progress

Once the sole purview of licensed professionals, drawing lines on a map is getting the startup treatment — and regulators aren't happy about it.

By Stephen L. Carter



Stephen L. Carter is a Bloomberg Opinion columnist. He is a professor of law at Yale University and was a clerk to U.S. Supreme Court Justice Thurgood Marshall. His novels include "The Emperor of Ocean Park," and his nonfiction includes "Civility."

Change is coming. Photographer: Mark Wilson/Getty Images

If you decide to buy a house, part of the process likely involves a guy with a theodolite on a tripod heading out to the lot and mapping what the law calls the metes and bounds, just to be sure that what will soon be your fence isn't encroaching on the neighbor's property — or vice versa. If you're borrowing money, the bank will require the survey. If you're paying cash, you'll probably want the survey for your own peace of mind.

This is pretty much how things have been going for decades, and if state regulators have their way, it's how things will stay. That, at least, is the message of a peculiar case from Mississippi, where a startup called Vizaline LLC has gotten itself in trouble with state regulators.¹

What wrong has the company done? Suppose a bank is considering whether to make a loan on a

particular property, but the value of the property is too small to justify the expense of a land survey. Enter Vizaline. For a fee that averages one-tenth the price of hiring a professional surveyor, the startup will use publicly available information to show the metes and bounds by means of a figure (a "polygon," the company says) superimposed on a satellite map. (See a typical report below.) That's it; Vizaline draws lines on a map, usually at the behest of community banks and other small institutions.

The Mississippi Board of Licensure for Professional Engineers and Surveyors says this is the same as land surveying, and in October of last year it sued the company for surveying without a license. Among other forms of relief, the board wants Vizaline to return all the money it's received for its services. Earlier this month,

Vizaline countersued, claiming a violation of its rights under the First Amendment. The board's action, says the complaint, "will silence Vizaline's constitutionally protected speech."

Well, I'll leave it to others to ventilate the free speech issues. Let's note, instead, the ludicrousness of the board's position. Suppose that you work at a small bank and you're moderately tech-savvy. Somebody from the loan department pops in and asks you if there's a way to use the deed to draw the property lines on a Google map of the area. You say sure, you burn a little midnight oil, and the next morning you hand over your report. It's hard to believe that you'd have broken state law.

The only difference is that Vizaline says to the bank, "If you'd rather not develop the expertise in-house, we



Viza-plat Property Report

Current Date: 2016-12-06 08:41:45

Bank Name: [REDACTED]

Order Number: 3590

Owner Name: [REDACTED]

Submitters Name: [REDACTED]

Parcel Address: [REDACTED]

Parcel ID: unknown

Loan Number: [REDACTED]

Price: [REDACTED]

Dear Customer,

Attached please find the Viza-Plat property report for [REDACTED]
[REDACTED] Parcel Number: unknown.

It has been a pleasure serving you and we look forward to serving you with additional reports in the future. If you have any questions please feel free to email us at scott@vizaline.com or brent@vizaline.com and please be sure to reference your order number.

Thank you for your time and consideration.

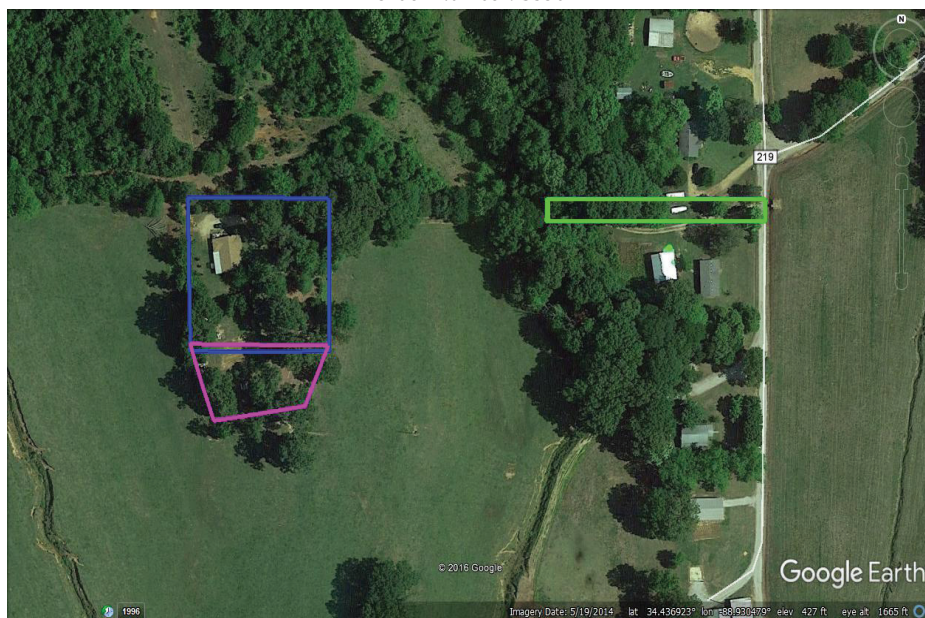
Sincerely,

The Viza-Plat Team.



Viza-plat Property Report

Submitters Name: [REDACTED] Owner Name: [REDACTED]
Parcel Address: [REDACTED] Parcel ID: unknown
Order Number: 3590



Notes: Please see notes on page 3

YES () The polygon of this case does close properly and is platted as we believe it should be.
NO (X) The polygon does not close properly or there is another identified issue.

In either case the lender should carefully review the case for other potential issues and call us with any questions.

The visual shift that appears between the parcels and the imagery is a normal shift caused by the conversion of State Plane (parcel data) to Geodetic NAD 83 (imagery data). This shift does not effect the results of this report.

Vizalines product Viza-plat is a polygon(s) of a particular property of interest, constructed from a property description and placed on imagery for visualization and general reference purposes only. It is not a Legal Survey, nor is it intended to be or replace a Legal Survey.

Developed by Vizaline, LLC, www.vizaline.com

have it already." That's how a division of labor is supposed to work. What we see here is another example of how state licensure requirements can actually make people worse off. By all accounts, Vizaline's clients are happy with the services the startup provides. The only people who are unhappy seem to be the regulators. And — unsurprisingly — the regulator in this question, the aforementioned Mississippi Board of Licensure for Professional Engineers and Surveyors, is made up largely of professional engineers and surveyors.

The pattern is a familiar one. Regulators have tried to stop Uber, Airbnb and a host of lesser-known startups, even when those who use them sing their praises. Over time, the market tends to win. To take a single example, Key West was long famous — well, infamous — for barring ride-sharing services, in a transparent effort to prop up a frankly dreadful local taxi industry. Last year,

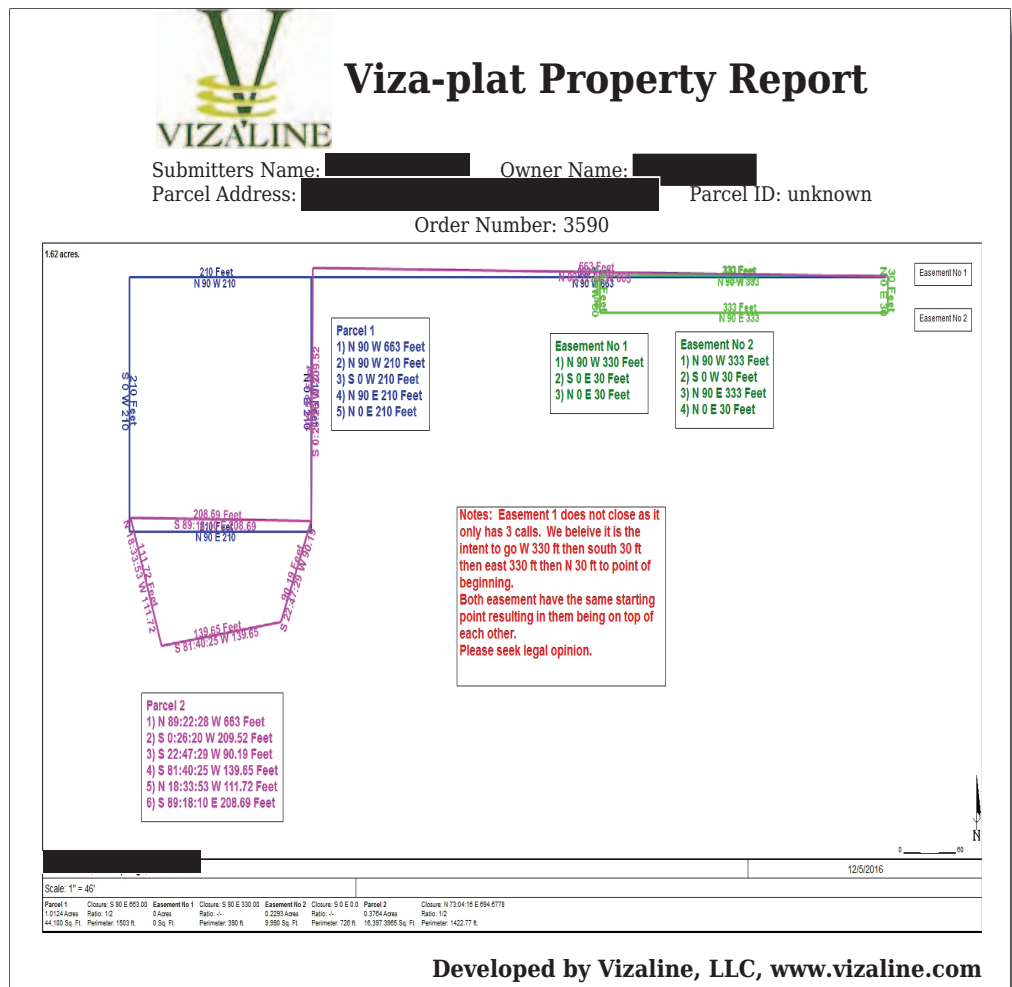
because of a new Florida law preempting local bans, both Uber and Lyft were suddenly available.

I'm not suggesting that all regulators have been entirely captured by their client industries; I'm not suggesting that no tech startups need close supervision. But the Vizaline case seems a pretty clear example of overreach. The clients are sophisticated, and they're not complaining. Only competitors want the company shut down.

The courts may be edging toward reining in such regulatory highhandedness. Consider *Southeastern Reprographics v. Bureau of Professional and Occupational Affairs*, a 2016 case from Pennsylvania. A rural electricity cooperative with assets scattered over 100 square miles hired a contractor to locate all of its assets, including "transmission poles, distribution poles, security and street light poles, pad-mounted equipment, regulators and meters." The contractor went out into the field, used GPS to find and tag the assets, and prepared a map for the client.

This was too much for state regulators, who charged the contractor with performing an "engineering land survey" without a license. But when the issue was litigated, the contractor won. To be sure, the case was decided as a matter of tight statutory construction. Still, the court plainly saw the problem in the proper terms. To demonstrate the absurdity of the board's claim, the court pointed out that the use of GPS to locate and map the cooperative's assets was no more a land survey than the use of a GPS device by a taxi driver to find them.

Exactly. The tools are here and they're going to be used. I do have sympathy for engineers and surveyors who will lose income and perhaps careers, just as I have sympathy for taxi drivers, travel agents and factory workers. But the tech



wave isn't really stoppable.²

In the particular case of land surveying, I suspect that progress will be fairly rapid — and painful. I don't know whether Vizaline will win its case, but I can confidently predict that the market for surveyors will eventually be disrupted. The major disruption will come when the big banks move. When those who finance big projects and big houses decide that a report that relies on GPS mapping is sufficient to mark the metes and bounds of a property, the rising tide of demand will swamp local regulatory resistance.

Progress often isn't fun, but that's how it works.

¹ Hat tip: *Ars Technica*.

² Including for those of us who write for a living.

This column does not necessarily reflect the opinion of the editorial board or Bloomberg LP and its owners.

To contact the author of this story:

Stephen L. Carter at scarter01@bloomberg.net

To contact the editor responsible for this story:

Brooke Sample at bsample1@bloomberg.net

PLSW FIELD BOOKS AVAILABLE

Embossed with the PLSW logo on the cover

Only \$10.00 each

Available in Orange or Yellow



PLSW, SE Chapter % Larry T. Perry L.S.
 1127 Terry Ranch Road
 CHEYENNE, WYOMING 82007

ATTENTION! **SAFETY MANUAL FOR SURVEYORS**



NOW AVAILABLE FROM THE SW CHAPTER
 OF PROFESSIONAL LAND SURVEYORS OF
 WYOMING

COMPREHENSIVE, AFFORDABLE, ADAPTABLE!
Special Offer - Only \$50 + \$2 SHIPPING!

CD CONTAINS ENTIRE 206 PAGE MANUAL IN BOTH
 "WORD" AND ADOBE ".pdf" FORMATS THAT CAN BE
 EDITED AND ADAPTED FOR YOUR PARTICULAR USE

Contact Secretary/Treasurer: Olian T. Shockley
 Olian_Shockley@msn.com or phone 307-875-0146



STAKE YOUR TERRITORY

SURV-KAP®

QUALITY SURVEY MARKERS, CAPS, MONUMENTS
 AND ACCESSORIES SINCE 1972

SURV-KAP.COM | 800-445-5320

**ORDER ONLINE
 TODAY!**

ONE MILE SQUARE REVISITATION

R.L. "Rick" Hudson, L. S.

PRIOR TO THE "OFFICIAL" SURVEY

Following the treaty and ceding of that portion of the Shoshone Indian Reservation to be known as the Ten Mile Square early in 1897, the Thermopolis Town Site Company retained the services of A.T. Seymour to survey Thermopolis, in then Fremont County. Two yet to be completed procedures would render the survey invalid and the sale of lots premature.

As Dorothy Milek states in her book Hot Springs: A Wyoming County History: *"Residents originally thought an official survey was the first step. It wasn't. Incorporation was. On January 21, 1899, an election was held with 89 out of 299 residents for incorporation and four against . . . It was 1901 before the patent was issued."*

Secondly, the land later known as the Ten Mile Square, and the within One Mile Square / State Reserve, had not yet been surveyed by the General Land Office. Thus there were no Public Land Survey System corners adjoining the proposed town site, the nearest corner being about two and one-half miles to the east.

The east boundary of the Shoshone Indian Reservation had been surveyed by Frank S. Wood, Deputy Surveyor, per Contract No. 230 dated December 15, 1886, extending south from the confluence of Owl Creek and the Big Horn River. The public land lying north and east of the reservation was surveyed by Howard B. Carpenter, D.S., per Contract No. 241 dated April 1, 1891. Although lands to the south and east of the reservation had been surveyed by Edward F. Stahle, D.S., in 1897, land within the Ten Mile Square and the One Mile Square would not be surveyed by him until Contract No. 276 dated June 23, 1899.

THE GENERAL LAND OFFICE CONTRACT SURVEYS

General Land Office Original Surveys, in the territory and later the state of Wyoming, until 1910, were performed by surveyors under individual contracts with the federal government's Surveyor General. Qualified surveyors entered into agreements to provide





personnel, instrumentation and equipment, materials, and logistical support to complete the field work; followed by the transcription of descriptive field notes and drafting of plats (maps) depicting the surveyed public lands. Only upon inspection and approval, by the Surveyor General, was the survey "Approved" and payment authorized to the surveyor. The length of time, from issuance of the contract until payment, was often more than one year which necessitated what we now call "a good credit rating". Surveyors seeking such contracts were required to post bonds to insure completion of the work; such bonds usually secured by land and improvements, valued at least double the contract amount. The contract amounts were based on type and mileage of survey lines, and upon terrain. The first contract was dated June 13, 1870; the last, number 343, was dated June 30, 1910.

CONTRACT NUMBER 276

According to Herbert W. Stoughton, PhD, in his 2001 compilation *State of Wyoming General Land Office Contracts* Deputy Surveyor Stahle (pronounced 'stay lee) held 22 GLO contracts from 1880 until 1910. Contract 276 included township exteriors, subdivisions and meanders and, specifically, the "Boundaries of the One Mile Square". The contract is dated June 23, 1899, between Edward F. Stahle, U. S. Deputy Surveyor, and Alpheus P. Hanson, U. S. Surveyor-General for Wyoming. The field notes and plat were approved at Cheyenne on April 28, 1900.

A copy of the contract and bond, provided by Dr. Stoughton, lists the contract amount as \$4092 and the bond amount as \$8200, secured by improved and unimproved lands in Laramie County and improved lots in the City of Cheyenne. While the contract also includes surveying of other lands in the southwestern portion of the state it specifically states Deputy Surveyor Stahle "*. . . will well, truly, and faithfully survey, mark, and establish The boundary lines of the tract one mile square ceded by the United States to the State of Wyoming; The N. and W. bdys of Fract T.42N., R.94W.; the north & W. bdys of Fract T.42N. R.95W.; The N. bdy of Fract T.42N., R.96W.; the W. bdys of Fract Tps.43N. Rs. 94 and 95 W.; The*

Combine and Conquer. RDO does that.



eBee
senseFly

RDO Integrated Controls features Hybrid Positioning Systems that perform faster in the field than stand-alone robotic systems, with more versatility than RTK-only solutions. A true upgrade, our Hybrid Positioning technology combines GNSS positioning and optical robotic measurements, on one rover pole.

- Faster field work than stand-alone robotic/GNSS solutions
- Combination of fully robotic system with lightweight GNSS receiver
- Hybrid Lock for rapid prism acquisition in dense areas
- Hybrid Switch with single screen tap to bounce between optical and GNSS measurements
- Hybrid Resection to start production at locations that are safe and convenience
- Compatible with all Topcon robotic total station systems



Topcon Falcon 8



Drone Loaner Program:

Check out our used loaner fleet of UAVs at a discounted rate.



877-90 RDOIC
www.rdoic.com





subdivision and meander lines in Fract Tps 42 and 43 N., Rs 94, 95 and 96W. Liability on the above surveys limited to \$177500. . . . The rates, per mile, were set at five dollars for section lines and seven dollars for township lines, increased to seven and eleven respectively over mountainous or timbered lands, or through dense undergrowth.

SPECIAL INSTRUCTIONS

Accompanying the contract and bond are the Special Instructions, consisting of twenty typewritten pages, detailing procedures, requirements, field notes and specific instructions regarding where the survey is to originate and how it is to proceed. These instructions are referenced in the field notes; in this particular case the instructions state *"You will commence at a point one-fourth mile due east from a point on the East water line, due East on the N. and S. center of the main or principal hot spring, and run thence north on true line one-half mile where you will establish corner no. 1, which is the N. E. corner of the tract"* As will be explained later, this was easier said than done.

FROM THE "OLD EAST BOUNDARY OF THE SHOSHONE INDIAN RESERVATION"

Prior to the survey of the One Mile Square,

Deputy Surveyor Stahle, and his five-man crew, surveyed the "North boundary of T.42N., R.94W" beginning at 7 a.m. on July 21; West, from the reservation boundary (on the northwest flank of what is now Black Butte) to the township corner, a distance of approximately two miles. The aforementioned Special Instructions state *"You will begin at the closing cor. of fract. Tps. 42 and 43 N., Rgs.94 W., on the old east boundary of the Shoshone Indian Reservation, which you will change to double C.C. by marking C.C. on W., with pit and mound, and run thence west on a true line"*

At the township corner they set " a sandstone 30 x 16 x 3 ins. 22 ins. in the ground . . . " thence continued on with the "West boundary of T.42N., R.94W." Returning to the township corner he performed tests to confirm the proper adjustment of his "Young and Son's Solar compass with telescopic attachment", using the Sun at 5:30 p.m., and Polaris at 11:20 p.m., indeed a very long Friday. Retiring to their camp for the evening, the crew would continue surveying the next morning.

THE ONE MILE SQUARE ORIGINAL SURVEY

Saturday, July 22, 1899, began with confirmation of instrument adjustment at 7 a.m. and

determination of the magnetic declination at 17°34' East. Having completed the necessary preliminary activities Mr. Stahle and his crew were finally ready to begin the actual survey of the One Mile Square. The following excerpted description of the survey is set forth in the approved field notes: *"Persuant to instructions, I proceed to the Big Horn Hot Spring and from the East side of the N. & S. center of the main Spring I run East 20.00 chains to a point. Thence I run North and at 40.00 (chains) Set a red sandstone 20 x 14 x 7 ins. 15 ins. in the ground for N.E. cor. or Cor. No. 1 of the One Mile Square, marked P.L. on N.E., S.L. 1 on S.W. faces, dug pits 36 x 36 x 12 ins. S. & W. of stone 8 ft. dist, and raised a mound of earth 5 ft. base 2½ ft. high S.W. of cor."* They next surveyed the north boundary noting (at 10.00 chains) *"Extreme North edge of Devil's Soup Bowl 70 lks. south. This is a circular depression 4.00 chs. in diam. and 75 ft. deep in centre containing a black fluid about 1.00 ch. in diam. at the bottom."* At 26.06 chains they set a limestone at the right bank of the Big Horn River and noted " . . . a sulphur spring, flowing about a cubic foot of water brs. S. ½° W. about 4.00 chs. dist." followed by triangulation across the river thusly: *"Having set flag on opposite bank on line I measure a base North 3.00 chs. to a point, from which flag brs. S. 50°6' W."* with a diagram and computations resulting in a distance of 3.59 chains to a special meander corner on the left bank of the river. At 80.00 chains they set a sandstone for Cor. No. 2, then ran South along the west boundary where, at 64.00 chains, the *"N.E. cor. "Pilot" printing office brs. S. 70° W. 1.02 chs. dist."* followed by setting a sandstone for Cor. No. 3 at 80.00 chains and noting *"The Town of Thermopolis lies West & South of this cor."* The south boundary also involved triangulation across the river from 22.28 chains to 29.78 chains on the way to Cor. No. 4; thence crossing spurs (ridges), gulches (draws), and wagon roads before ending the east boundary at *"Cor. No. 1, place of beginning."*

Because the One Mile Square straddled the range line, it then became necessary to return to the township corner and run the range line through it. At 18.26 chains a closing corner was monumented with a sandstone: *"Thence across 1 mile Square on blank line"* to the unmonumented section





corner at 80.00 chains, intersecting the north boundary at 18.25 chains feet and, at 18.28 chains, the *“Right bank Big Horn River at a point 5 lks. N.W. of Special Meand. Cor. on N. Bdy of 1 mile Square heretofore described. Set a sandstone 12 x 8 x 8 ins. 2 ins. in the ground on bed rock on ledge 20 ft. above river ... I surrounded stone with mound of stone & raised a mound of stone 2 ft. base 1½ ft. high N. of cor. pits impracticable. Ascend gradually over rocky ground.”* Continuing North, this range line again crossed two channels of the Big Horn River, an island (unsurveyed until November 1909), a steep escarpment, and terminated at the right bank of Owl Creek, the thread of which then became the north boundary of the aforementioned “Ten Mile Square” which was subsequently surveyed by U. S. D. S. Stahle under Contract No. 277.

RETRACEMENT SURVEYS AND CORNER PERPETUATION

As mentioned earlier, the townsite had been prematurely surveyed in 1897. Ed Stahle noted during his original survey of the One Mile Square in July 1899 that “The Town of Thermopolis lies West & South of this cor. *“referring to the southwest or corner number 3 of the state land. Dorothy Milek has informed us “It was 1901 before the patent was issued.”*

The “official” survey of the Town of Thermopolis was executed by local surveyor D. V. “Dan” Bayne during the late summer of 1901 with Town Corner I (of X / ten) also being Corner No. 3 of the One Mile Square. The southern portion of the west boundary and a short portion of the south boundary of the One Mile Square then became coincident with the resurveyed townsite.

Subsequent plats of additions to the townsite, the as-constructed right-of-way maps of the Chicago, Burlington and Quincy Railroad, and other maps on file with the County Clerk’s Office depict the boundaries of the One Mile Square, some designating it as the Big Horn Hot Springs State Reserve or the State Reservation, without specific mention of the actual corner monumentation. Corner Nos. 1 and 4 are depicted by symbol on USGS quadrangle “Thermopolis” dated 1960. Corner No. 3 is depicted by symbol and used as the point of beginning on an addition plat based on work during the period 1957 – 1960.

Custom Survey Markers & Monuments • Signs & Witness Posts • Flagging & Targets • Nails & Washers

SURVEY MARKING

Custom Survey Markers & Monuments • Signs & Witness Posts • Flagging & Targets • Nails & Washers



Berntsen®

Marking the Infrastructure of the World™

877-686-8561 | www.berntsen.com

The first known document (of public record) describing a retracement of the entire boundary is the Certified Land Corner Recordation by Inberg Surveying Company, Inc., of Riverton, bearing the certification of Bruce L. Hughes, L.S. 557, filed on 3 April 1978, reception no. 294864, at the office of the Hot Springs County Clerk and Ex-Officio Register of Deeds. The township corner and all four corners of the One Mile Square, labeled "State Park" are described and the connecting bearings and distances, with angles and coordinates, are shown on the sketch.

The township corner was remonumented by me, L.S. 519, and documented by CLCR filed on 26 April 1983, reception no. 332013. This report also states recovery of Cor. No. 4, marked by the original survey sandstone and rock mound with L.S. 557 memorial alongside.

The CLCR by Martin A. Pedersen, L.S. 544, filed on 16 September 1983, reception no. 334907, depicts Cor. No. 4 as SE c HSSP and states "stone replaced with brass cap". The Survey Report booklet, by Mr. Pedersen of Robert Jack Smith & Associates, Inc., of Rawlins, is not of record locally but a copy was given to me by him upon completion of his survey and provides excellent documentation of the 1983 retracement of the One

Mile Square, subdivision of Sections 30 and 31, and the fourteen resurveyed lease tracts. The brass-capped iron post monuments were manufactured by Rob Shook's Survey Supply Service Company in Casper.

FOLLOWING FOOTSTEPS

In commemoration of the original survey, and in conjunction with a storytelling presentation during the Big Horn Basin Folk Festival the first weekend in August, I revisited the point of beginning and the four corners of the One Mile Square on Saturday, July 21, 2018. Using a handheld GPS receiver (rather than a solar compass), a digital voice recorder (rather than a bound field book) and a digital camera (rather than a Kodak Brownie). I set out to figuratively follow Deputy Surveyor Stahle and his five-man crew as they performed the original survey.

I began, as did they on that Saturday morning nearly six score years ago, at the east edge of water of the Big Spring. While exercising care not to become immersed during the five-minute observation, I observe the rising gas bubbles in the clear but mineral-laden water and measure the temperature thereof at 126.1° F. Stepping back, I compare the observed position with the computed



position and conclude I am standing where they were 119 years ago, all of us looking up at the steep, rocky ridge to be traversed.

Rather than hike the 20 chains east, I drive around Monument Hill to the mid-point on the east line, which now falls in the Buffalo Pasture, near the herd's watering hole. Observing no such critters in the immediate vicinity, I proceed north 40 chains and verify Martin's Corner No. 1 monument undisturbed and in good condition. Heading west, now along the north line, I stop to peer into the Devil's Punch (formerly Soup) Bowl, as noted by Mr. Stahle, albeit devoid of the "black fluid" in the bottom.

Leaving the north line, I drive past the Big Spring, cross the Big Horn River on the Park Street Bridge, through the north part of Thermopolis, to the old airport vicinity. Hiking outside the south and then east perimeter fences, I next recover Corner No. 2 about one foot outside the eight ft. high fence; the cap now bearing a gouge, the rock collar now somewhat scattered and two ft. inside the fence. The fence did not exist when I last recovered this corner in 1994!

Backtracking into town, I occupy and photograph Corner No. 3, the brass cap in the

sidewalk at the northwest corner of Springview and Arapahoe Streets; set by R. Lee Donley in the early 1960s.

Driving easterly through Thermopolis I again cross the Big Horn River, this time via the Broadway Street Bridge, continue through East Thermopolis, and re-enter the Buffalo Pasture near Corner No. 4. A short hike up the steep slope brings me to the buck and rail fence extending east and west. Acknowledging the electric fence attached thereto, I slither under (rather than step over) the wires as I have no desire to test conductivity through the local 'veyor and the several electronic devices. Forty more feet, now atop the ridge, I see a steel post and once again recover Corner No. 4. Other than snip a few overhanging branches of sagebrush, I make no alteration to the encircling rock collar constructed by Martin around Rob's brass-capped iron post on that summer day in 1983.

With corner recovery complete by early afternoon, I pause to pay homage to each of the surveyors whose footsteps I have followed: Edward F. Stahle, D.S.; Bruce L. Hughes, L.S.; Martin A. Pedersen, L.S. Thank you gentlemen for your enduring land surveying accomplishments.



Response to Recent Article Entitled “Land Surveyors Are Paying the Price of Progress” by Stephen L. Carter, posted in Bloomberg Opinion, July 19, 2018

By: Gary Kent/Curt Sumner

The public is damaged when their boundary lines are disrupted; the cost to litigate a boundary dispute runs into the tens of thousands of dollars and routinely exceeds \$100,000. This is ultimately why the surveying profession exists, and why Professional Surveyors are licensed in all 50 states.

Without the stewardship of Professional Surveyors, and the responsibility and authority they hold to determine and describe real property boundaries, the entire system of land tenure in the United States would literally break down because boundaries would become ambiguous and conflicted.

This imminent collapse is avoided by what is necessarily a combination of the Professional Surveyor’s expertise as to boundary locations, and the title industry’s business of insuring title. The insuring of title is one thing; however, the location of those insured title lines is an entirely different issue. Thousands of times every day, title companies (not to mention lenders, buyers, sellers, and owners) rely on Professional Surveyors to locate boundaries and produce maps that are not simply precise, but that are also accurate. Precision is nice – necessary in many cases – but accuracy is imperative.

Professional Surveyors routinely see examples of features that are very precisely located, yet in entirely the wrong location (i.e., inaccurate). For example, anyone can go to a location, and record a very precise latitude and longitude with their handheld GPS receiver – perhaps to the nearest inch. Yet, if they try later to navigate back to that exact same position using their recorded latitude and longitude, they will find themselves off by at least a few feet, if not a few meters. Why? If they do not know the answer to that, then they are achieving precision, but not accuracy.

Many will remember a few years back when a U.S. Hellfire missile struck the wrong building

in the Middle East. Was that an imprecise strike? No – to the contrary – it was extremely precise; it went exactly where it was programmed to go. Unfortunately, it was programmed to hit the wrong building. It was very precise, but fatally inaccurate.

A few feet of inaccuracy is not too bad when hiking, but it is disastrous when locating a boundary corner – and fatal when firing a missile.

This is important because, contrary to popular perception, boundaries are most assuredly not a function of mathematics and geography. We all want our boundaries to be precisely located, but with extremely rare exception, boundary lines cannot be accurately – or, for that matter, legally – defined by GPS, by lines in a GIS, by latitudes and longitudes, or by coordinates.

Technology is a tool used to locate boundaries, but boundaries themselves are defined by a complex, centuries (literally) old body of common law rules as applied to evidence found both in records and on the ground. It is impossible to define a boundary line except by searching for and analyzing evidence found on the ground. Frequently, some of that evidence is a half mile or more away and buried two feet beneath the surface.

GPS, GIS, computer applications, laser scanners, and even drones are tools that Professional Surveyors use to precisely locate features on the earth. Adapting to those technologies was, and to some extent continues to be, tremendously disrupting to a profession whose available technology was fairly static for several hundred years. However, Professional Surveyors have adapted to – and adopted – those technologies as applications are developed that generate high precision while providing for significant time savings.

But when virtually anyone can make precise

measurements, the difference between precision and accuracy is more important than ever before.

To summarize, the Professional Surveyor's duties and responsibilities are to help ensure the integrity of the "American Dream" of real property ownership.

They are the only persons competent and qualified - both under the law (examination and licensure) and by experience and education - to locate property boundaries on the ground, and to map and certify those locations to owners, lenders, title companies and other parties interested in - or with an interest in - real property.

While technologies exist to create precise maps and measurements, people should not be lulled into a false sense of confidence. Precision without accuracy is a snare and a delusion.

Contrary to the statement in the referenced/linked article, "but I can confidently predict that the market for surveyors will eventually be disrupted. The major disruption will come when the big banks move. When those who finance big projects and big houses decide that a report that relies on GPS mapping is sufficient to mark the metes and bounds of a property, the rising tide of demand will swamp local regulatory resistance", when protecting property rights, it is unlikely that land owners will be accepting of the concept that "Close is good enough".



Sundance
Unmanned Aerial Systems

UAV mapping services for oil and gas, construction planning, inspection and progress mapping

High resolution orthophotos and digital elevation maps

UAV flight and software training

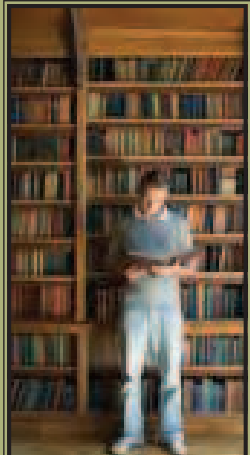
 Dave Spurlock
307-330-7777
survey@wyoming.com

FREE MONEY AVAILABLE!!!

**APPLY NOW FOR A
PLSW SCHOLARSHIP**

If you are attending college with the intent of pursuing a career in Land Surveying in Wyoming, we want to give you money!

A Scholarship Application is available on our website
<http://www.plsw.org>



Caldera Chronicles

MAINTAINING DEFORMATION STATIONS IS A 4-SEASON JOB

By: Mike Gottfried, UNAVCO, Inc.

Readers of this column will recall that the Yellowstone Volcano Observatory is actually a consortium of agencies that work together to monitor at Yellowstone. Today we will take a deeper look at the role that UNAVCO plays in that consortium, and some of the work that we do in the park.

Who is UNAVCO, you may ask? We are a federally funded nonprofit charged by the National Science Foundation with operating the National Earth Science Geodetic Facility. We help study the Earth's shape, gravity field, and

rotation, using high-precision field measurements to quantify small changes in the Earth's surface. Among other things, we built and now operate the Plate Boundary Observatory, a network of high-precision, geodetic remote monitoring stations that spans the continental United States and Alaska.

With Yellowstone National Park, UNAVCO operated 14 continuous Global Positioning System stations, a five borehole strain meter, tilt meter, and seismic stations, as well as a lake level monitoring system on Yellowstone Lake. These stations are collecting and transmitting data in near real-time,

allowing scientists around the world to study small changes (deformation) in the volcano, hydrothermal system and Lake Yellowstone.

Keeping all this remote equipment running in environments like Yellowstone can be challenging. Engineers from UNAVCO typically visit the park four or five times per year to maintain and upgrade the instruments and associated equipment. Field work ranges from repairing solar panels and enclosures damaged by snow to upgrading GPS receivers and antennas that allow them to track new satellite signals. Getting the data back can be difficult, too, as many of these stations are very far from civilization. We employ a combination of cellular, satellite, and radio networks to carry the information back for archiving and analysis.

While most of the field work is scheduled for the summer seasons, sometimes equipment fails in the winter. And since Yellowstone is closed to cars from November through April, getting to remote stations is not trivial. Some years it can involve snowmobiling 60 miles each way at temperatures as low as - 20 degrees, or cross-country skiing several miles from the road. Even finding the equipment can be a challenge as it is often buried under feet of snow.

This past February, a team from UNAVCO visited several sites in the park to repair an offline continuous GPS station and tiltmeter. The work required a 1950s-era Bombardier snow coach and some cross-country skiing to be able to replace the failed communications equipment.

The net result of all this effort is a stream of high-precision and real-time data on how the surface of the Yellowstone region is deforming - critical monitoring of data for the Yellowstone Volcano Observatory. The latest measurements indicate

that since 2015 the caldera is subsiding at a rate of a few centimeters (about an inch) per year. The Norris area, in contrast, is uplifting at about the same rate.

All the data collected by UNAVCO are available to the public, so we encourage you to check out these resources:

- GPS data from 14 stations in Yellowstone National Park can be accessed from the UNAVCO map interface (just navigate to the Yellowstone region).

- Borehole strain data from stations B205, B206, B207, B208, B944, and B950 are available from the strain meter data archive.

- Borehole seismic data from stations B205, B206, B207, and B208 are available from the seismic data archive.

- Borehole tilt data from stations B205, B206, B207, B308, B944, B945, and B950 are available from the tilt data archive.

Editor's Comment: The surveying profession not only includes the branches of land surveying; geodesy and geodetic surveying; hydrographic surveying; cadastral surveying; cartographic mapping; engineering and construction surveying; and route surveying; to name a few disciplines. This article describes the functions and activities being undertaken to study the geophysical aspects of the Earth. The GPS receivers and the communication systems employed are very similar to the survey grade equipment employed in land surveying practice. The GPS activities described in this article were originally initiated in the late 1980s by UNAVCO (Jim Stowell, then employed at UNAVCO).

SCHERBEL ON SURVEYING

A compilation of parts of the
WYOMING STATUTES
and other items of interest to
PROFESSIONAL LAND SURVEYORS

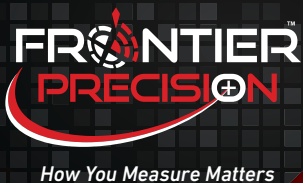
Order from SURVEYOR SCHERBEL, LTD.
Box 96, Big Piney – Marbleton, Wyoming 83113
\$60.00 postpaid
Revised and updated: July 2016

**SURVEY SUPPLY SERVICE
COMPANY**

MANUFACTURER CUSTOM
SURVEY STAKES, LATH, & BRASS CAPS
FLAGGING - PIN FLAGS - FLUORESCENT PAINT

ROB SHOOK
P.O. Box 51227
Casper, WY 82605-1227
307-234-9856

COMPLETE FIELD SUPPLIES SINCE 1969



No matter where the job takes you, Frontier Precision is by your side, through our technology and support. That continues today, with the redesigned powerful Trimble TSC7 controller — it delivers the latest version of our field software with a more powerful processor to make quick work of large projects. Because at Frontier Precision, we never forget the most important measurement is your bottom line.



Frontier Precision, celebrating 30 years!
1988-2018
AN EMPLOYEE-OWNED COMPANY

Even when you're off the grid,
you're not off ours.



Want more information? Contact:

Jason Dyshe | Geospatial Sales Representative
jasond@frontierprecision.com
720.214.3500 or 800.652.1522 [Toll Free]
720.214.3503 [Fax]

Frontier Precision | 5480 West 60th Avenue, Unit A | Arvada, CO 80003

The New TRIMBLE® TSC7
Large 7-Inch Screen
Windows 10 Operating System
Military-Grade Rugged Design



LINES AND POINTS

P.O. BOX 8

CHEYENNE, WY 82003



Please Recycle

Transportation

Permitting

Western
Research & Development, Ltd.

Land Development

Planning

Surveying — Civil Engineering — Planning

- **Land Surveying / Right-of-Way**

WRD's Survey Department is managed by Professional Land Surveyors licensed in multiple states.

- **Water Resources**

WRD has wide-ranging experience performing hydrologic and hydraulic engineering as well as water rights research.

- **Transportation / Utility Design**

From traffic engineering and signal design to water and wastewater system design, WRD's civil engineers can to it all.

- **Construction Inspection**

The WRD team has over 20 years of experience providing construction inspection services.



Tel (307) 632-5656

5908 Yellowstone Rd, Cheyenne, WY

www.wrd-ltd.com