

February 2018

SIDE SHOTS

Professional Land Surveyors of Colorado

Volume 49, Issue 1



STEVE PARRISH
Headline Speaker



PAM FROMHERTZ



GARY GABLE



EARL HENDERSON



HEATHER LASSNER



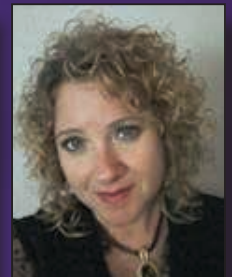
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SIDE SHOTS

FEBRUARY JOURNAL 2018

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*Side Shots is the official publication of the Professional Land Surveyors of Colorado, Inc.
and is published quarterly for the betterment of the surveying profession.*

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**Deadlines for editorials, articles, pictures and advertising are January 1, April 1,
July 1 and October 1. All material received after the current deadline will appear
in the next issue of Side Shots.**

*We would like to invite anyone who is interested to advertise in Side Shots.
Do you have something you want to sell, trade or buy? Why not use Side Shots for your
next ad? We can also reproduce business cards for advertising. Ad space reservation must be arranged
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Dear Fellow Members of PLSC:

Happy New Year to all our members! I sincerely hope you all had a great Holiday season and were able to spend some quality time with your loved ones.

The start of a new year brings with it the annual Rocky Mountain Surveying Summit being held on March 7-9, 2018 at the Arvada Center. This issue of Side Shots will go into more detail of the RMSS program—please review and sign up to attend!

As I mentioned in my last Presidents letter, the PLSC has been very busy performing outreach and education tasks that have resulted in multiple requests from high school and middle school counselors for land surveyors to attend career days in their schools. This is exactly what we had hoped would be the case. I plan on setting up a committee to coordinate these efforts and identify potential surveyors who would be willing to respond to requests within the state. The goal would be to have at least a couple of people in each chapter willing to attend career days for students. The PLSC is currently putting together hand outs and power point presentations geared toward middle and high school students.

Tom Sylvester continues to develop and instruct students in the two-year program at Colorado Mesa University/Western Colorado Community College. I would highly encourage anyone who knows of interested students to contact the college and enroll. The PLSC has invested a significant amount of money for the development of the program and we all desire it to become a success and to do so, the program will need students to be enrolled. It is my understanding that Tom is creating on line classes for the Spring 2018 semester.

The PLS and SIT refresher course will be in full swing with the publication of this issue of Side Shots. The classes started January 10 and will end March 28, 2018 so there is still time for anyone interested to sign up for individual class sessions.

In October and November, Pam Fromhertz and PLSC members have been identifying and interviewing potential personnel or agencies to fill the role of Colorado Geospatial Advisor to assist Pam and the state surveying and GIS communities in the future. We hope to have the position filled by mid-2018. If you are interested or know someone who may be interested in the position, please contact Pam or the PLSC website. Please enjoy the various articles included in this edition of Side Shots, and I hope all members have a safe Winter/Spring. I hope to see a lot of you at the RMSS.



Sincerely,
Todd Beers, PLS-PLSC President

FROM THE EDITOR



The 8th annual Rocky Mountain Surveyor's Summit is coming up, March 7th through March 9th, at the Arvada Center. This is an excellent opportunity to attend conferences hosted by local and national speakers, see the latest offerings from vendors of surveying and GIS equipment

and software, and network/socialize with your fellow surveyors. Please check out the three page description in this issue, and go online to www.plsc.net for more information, including registration details. I hope to see some of you there.

By the time you get this issue, the 2018 PLSC Refresher Courses being held at the Jefferson County Courthouse will be underway, but if you, or someone you know, is in need of exam preparation, you can register for any remaining classes through the webpage. Details appear in this issue.

Professor Gaby Neunzert has provided us with an excellent article, "Terrestrial Distances and Bearings." And Pamela Fromhertz wrote a very comprehensive

story about the National Geodetic Society's geoid slope validation survey activities conducted in southern Colorado last summer. The NGS is working toward the goal of using GNSS and a good geoid model within a device to obtain a reliable and accurate orthometric height. Both are must-read articles.

Earl Henderson wrote about Board Rule 6.8, the basis of bearings, in his Rule of the Month column. And Dean Glorso contributed another of his poems. There is also a very complete report of the Western Federation of Professional Surveyor's October, 2017 meeting by PLSC President Todd Beers, including the state reports. And we conclude, as always, with the Chapter News from the six regional chapters across Colorado. We are so fortunate to have such good writers in our state.

I received a note that Jan Sterling, the Chief Land Surveyor for the City of Aurora, is retiring after 42 years of service. Jan has been active in the PLSC for many years, and a leader in bringing TrigStar student competitions to our schools. Congratulations Jan!

JB Guyton
Editor

A masterful documentation and historical perspective of each initial surveying point for federal public lands in the United States. Published in 9x12 format, Initial Points of the Rectangular Survey System features a 4-color section with more than 130 photos depicting monuments and landmarks.

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Mr. White's first book, *A History of the Rectangular Survey System*, published by the BLM in 1983, is considered the definitive work on the U.S. Public Land Survey System. Arguably the most distinguished authority on the history of nineteenth and twentieth century public lands surveying, White began his career with the General Land Office in 1946. Both as BLM and a private surveyor, he applied his zeal to a wide range of activities. White's expertise represents a bridge between the wisdom and experience of the American heritage of land settlement and the contemporary uses of surveying technology.

Published by the Colorado Professional Land Surveyors Educational Foundation, Inc., a non-profit foundation, Initial Points of the Rectangular Survey System is undertaken in the spirit of, and dedication to, Mr. White's remarkable contributions to his field. Net proceeds from its sale will be returned to the Professional Land Surveyors of Colorado Inc. Scholarship Fund.

Rocky Mountain Surveyors Summit

March 7-9, 2018 ~ Arvada Center

PLSC is pleased to announce **Steve Parrish, PLS** as our Headline Speaker



Steve Parrish began surveying with the U.S. Forest Service in 1963, Utah PLS in 1973 and worked as a land surveyor with the USFS through 1984. Began working for the U.S. Bureau of Land Management in 1985 and eventually served as the BLM Nevada Cadastral Chief. Steve left the government in 1995 to further his surveying experience in the private sector. He is now licensed in 10 states, a Nevada water rights surveyor and the was the county surveyor for Inyo, Modoc and Mono Counties in California. Steve is a contributor to "The Surveying Handbook" edited by Brinker and Minnick, has presented workshops in 27 States, Canada and Australia and was an instructor for the BLM/FS Advanced Cadastral Survey Courses during its initial 12 years.

With 53+ years of land surveying knowledge and experience Steve offers land surveying workshops, consulting, and expert witness testimony. He worked for Tri State Surveying (NV) for 13 years, is an adjunct professor for Great Basin College (NV) since 2004, became a Certified Federal Surveyor (CFedS) in 2007 and Bachelor of Applied Science degree in 2009. Presently serves as the CFedS Panel Chairperson/Training Coordinator and is the Alpine and Mono County Surveyor (CA). Active in state and national surveying organizations and enjoys travel with family, photography and fishing. national surveying organizations and enjoys travel with family, photography and fishing.



Here are just some of the reasons you should attend the 2018 Rocky Mountain Surveyors Summit

- National and Local Speakers all in one place
- The latest products and services in the industry, with experts onsite to answer all of your questions
- Networking time with your colleagues and PLSC leadership



UP TO 24 HOURS of continuing education
and
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MASTER TRACK:

- *Walking in the Footsteps (of Previous Surveyors)* — Steve Parrish (March 7)
During this workshop, a variety of challenging situations will be presented for discussion amongst the attendees. Conflicting evidence, description ambiguities, multiple monuments, research methods, and conflict resolution are a few of the topics to be discussed.
- *Corner Site Investigation (CSI)* — Steve Parrish (March 8)
Pros & Cons; Partial & Completion Survey – Section 25: 1865-1912; Churchill & Lyon County Boundary Post – 1900; Section 18 “Surveys”: 1868-2003; Unrecorded Plat of 1931; The Wandering Corner & Transposed Notes; The “five acre” Deed; 1913-14 Forest Service Notes & the One-Mile Shift; Wild Sections in the Independence Mountains;
RESPONSIBILITIES OF THE SURVEYOR—Boundaries & Landmarks, A.C. Mulford, D. Van Nostrand Co., 1912, Carben Surveying Reprints, January, 1977, pp 87-89
- *Double Monumentation-Physical and Inferred* — Steve Parrish (March 8)
“My monument is better than yours.” We seldom actually verbalize this thought, but it is frequently inferred in varying ways. The task of determining which (if any) of two or more existing monuments will be accepted as the single corner point is a major task associated with most urban boundary surveys.
- **Resurveying an Entire GLO Township (CFedS Credit Course)** — Steve Parrish (March 9)
Only a small group of professional land surveyors get the opportunity to engage in the effort of dependently resurveying an entire General Land Office Township (GLO). Much can be learned from the larger view.

PROFESSIONAL TRACK:

- *A Historical Perspective of a Bona Fide Right* — Michael Boeckman (March 7)
This presentation will retrace the concept of ‘bona fide rights’ as it is developed and defined in the publication ‘The History of the Public Land Survey System’. The main time frame of examination will be from the creation of the PLSS to the Act of March 3rd, 1909, (The General Resurvey Law).
- *Plans Review: Minimum Standards & What Should be Included* — Cory Sharp and Heather Lassner (March 7)
Join the discussion and learn the minimum standards for plan submissions.
- *Symposium on UAVs* — Panel Discussion (March 7)
PLSC is bringing together experts in the UAV industry to answer your questions on how this tool can help your company— from a one person firm to national organizations.
- *Railroad Safety and Trespass Issues* — Charlie Tucker and Gary Gable (March 8)
You asked for presentations on railroad issues and right of way, and we listened!
- *Railroad Right of Way* — Charlie Tucker and Gary Gable (March 8)
- *Surveyor as an Officer of the Court* — Dave Pehr (March 9)
Back by popular demand, Dave Pehr is one of our great state resource for legal issues.
- *Retracement and the Cooley Doctrine* — Lee Stadele (March 9)
The talk will focus on the retracement method of Land Surveying. The audience will be engaged to debate the method used in the examples shown.
- *Point Cloud Processing* — Jim Reinbold (March 9)
Field to finish is a sophisticated program that allows users to control how data collected in the field is created and displayed in CAD.

Rocky Mountain Surveyors Summit

March 7-9, 2018 ~ Arvada Center

TECHNICAL TRACK:

- *The Basis of NGS' New Geopotential Datum (and why we're expecting 3 feet of change in Colorado!)* — Derek van Westrum and Pam Fromhertz (March 7)
The new datums are coming, and changes are significant: 3 feet horizontally and vertically. NGS just completed an extensive field survey, the Geoid Slope Validation Survey of 2017 (GSVS17), in southern Colorado. This data will validate the use of gravity in achieving centimeter accuracy for the new vertical datum.
- *DORA Board Activities* — Earl Henderson & Joyce Young (March 7)
One of the most popular sessions, learn more about current DORA Board Activities and how they will affect the profession.
- *OPUS Projects* — Bill Stone and Pam Fromhertz (March 8 and 9)
OPUS-Projects is an enhanced version of the popular National Geodetic Survey/NOAA utility, the Online Positioning User Service (OPUS). OPUS-Projects is a free, web-based GPS multi-baseline processing and least-squares network adjustment package, providing simple visualization, management, and processing tools for survey projects including multiple survey marks and occupations. This is a hands-on presentation.
- *Floodplain* — Brian Varrella and Steve Griffin (March 9)
Learn more about floodplain mapping and surveying.

For a full list of speakers and topics, go to www.plsc.net.

Chapter Summit will be held at 6:00 P.M. on Wednesday, March 7th, 2018.

Cost (same as 2017):			
	1-Day	2-Days	3-Days
PLSC MEMBER:	\$200	\$375	\$550
NON-MEMBER:	\$300	\$475	\$650
STUDENT:	\$ 75	\$125	\$200
EXHIBITORS (PLSC Sustaining Members Only)			\$400

PLSC Voting Member Dues are only \$150/year and include NSPS membership.

There are many sponsorship opportunities available, in addition to exhibiting. Contact us for more information (plsc@plsc.net) or go to www.plsc.net for complete Summit information and to sign up online.

Save money when you register by February 15, 2018. Catered breakfasts & lunches will be provided on all days. Online registration is available at the PLSC web site (www.plsc.net).

SILENT AUCTION/EXHIBITS:

We will be holding a silent auction during the conference. If your equipment room is cluttered up by equipment you are no longer using, please consider donating an item or two to the PLSC silent auction.

In keeping with our traditional practice, our Sustaining Members have been invited to display their latest products and services. Exhibits will be in the Arvada Center entrance hall adjacent to the classrooms. Please visit their displays and show our appreciation for their continued support.

HOTEL:

The Doubletree Hotel at 8773 Yates Dr., Westminster, CO, will once again be our host hotel. There will be a shuttle bus to and from the conference hotel each day. Pick up and drop off times will be announced prior to and at the conference. For reservations, call 303-427-4000 and mention PLSC for discounted rates.

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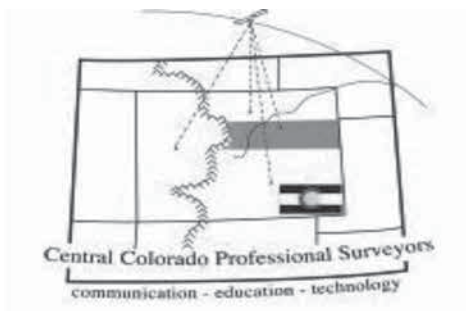
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2018 Colorado Land Surveying Refresher Course

The Professional Land Surveyors of Colorado are offering a comprehensive Land Surveying Refresher Course beginning January 10, 2018. This course offers a review and self-study plan for those taking the National Council of Examiners for Engineering and Surveying (NCEES) **Fundamentals of Surveying (FS)** and **Principles and Practice of Surveying (PS)** examinations. The course is designed to aid candidates in developing and expanding exam-taking proficiencies. The Wednesday evening classes will be 3 hours in length, starting promptly at 6:00 PM.

Fundamentals of Surveying

<u>Session</u>	<u>Date</u>	<u>Topic</u>	<u>Instructors</u>
1	Wed., Jan. 10	Overview of NCEES FS and PS Examination Use of calculators and formulas	Alan Blair
2	Wed., Jan. 17	Survey Computations I	Lynn Patten
3	Wed., Jan. 24	Survey Computations II	Dr. Jan Van Sickle
4	Wed., Jan. 31	GIS, State Plane, Geodesy, Photogrammetry	Dr. Jan Van Sickle
5	Wed., Feb. 7	Legal Terms and Definitions	John B. Guyton
	Wed., Feb. 14	No Class	

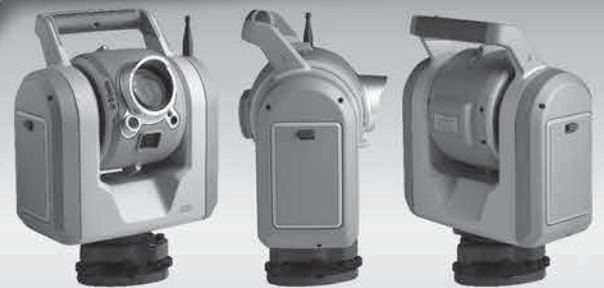
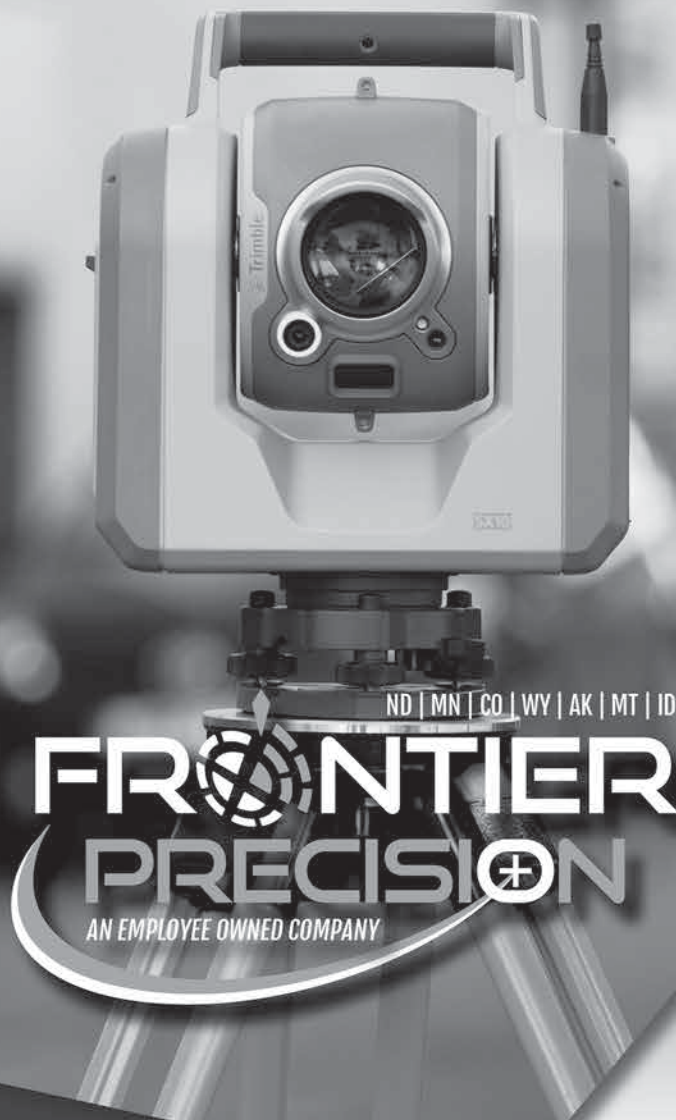
Principles and Practice of Surveying and Colorado Specific

6	Wed., Feb. 21	Public Land Survey System	Randy Bloom
7	Wed., Feb. 28	Colorado Survey Law I	Roger Nelson
	Wed., Mar. 7	Rocky Mountain Surveyors Summit, Arvada Center	
8	Wed., Mar. 14	Colorado Survey Law II	Roger Nelson
9	Wed., Mar. 21	Boundary Law/Ethics/Prin. and Practice Topics	Alan Blair
10	Wed. Mar. 28	Mock PS and FS Examinations	Lynn Patten

Registration, Fee, Location

The fee for the entire course is \$425 or \$75 per individual class. Registration is open beginning November 1, 2017. See <http://www.plsc.net/> for registration information. Classes will be held in one of the conference rooms at the Jefferson County Courts and Administration Building (Taj Mahal), 100 Jefferson County Parkway, Golden, CO. Use the parking lot and main door on the east side of the building. Signage will lead you to the classroom. For questions, contact Becky Roland, Executive Director, PLSC, 303-551-3266, broland@plsc.net. Visit the NCEES site at <http://ncees.org/exams/> to learn more about the FS and PS examinations.

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Terrestrial Distances And Bearings

By Gaby Neunzert

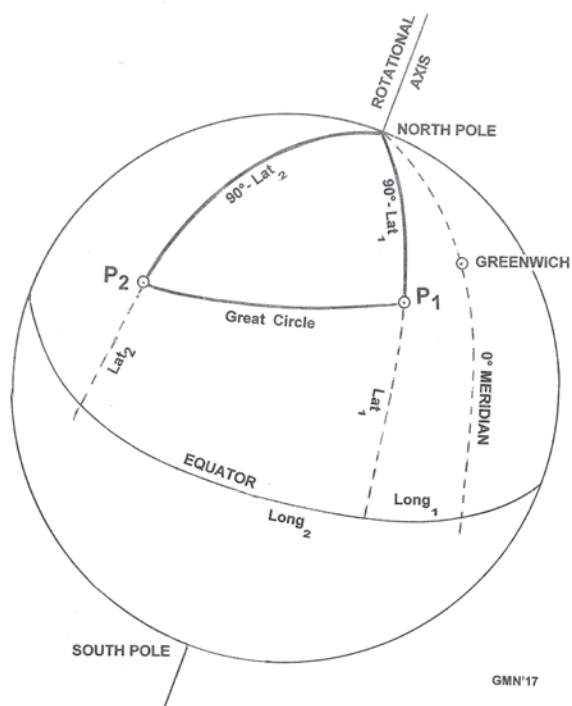
Little does a modern traveler realize that the destination of an airplane cruising across the Atlantic above a cloud deck, depends on the pioneering mathematics of ancient Indian astronomers. Since there are many nuances and rather than tracing the evolution of how terrestrial distances and headings are calculated, this presentation will rely on the basic spherical triangle geometry, which is also underlaying astronomical surveying observations. Thanks to the electronic hand calculators and spreadsheets, it is possible to modernize and simplify the calculations to a double application of the spherical cosine law only. A numerical solution is included to illustrate the concepts.

Before proceeding, there are several items which must be addressed:

- a) The size and shape of the earth. Mathematically a spherical earth is easiest to define, with spherical geometry dating back to about 500 AD and with Indian and Arabic roots. There are however many ellipsoidal models which require a modern computer, and each model has its own radii (major and minor axis). The "nautical mile" was agreed upon by international agreement in 1982 and defined at 1,852 m, to the nearest metre. Historically a nautical mile is defined as "one minute of arc on the great circle of the earth" and it continues to be used for air and marine navigation. A great circle route is the shortest distance between 2 points on a sphere and it changes direction (bearing) throughout its length. The material presented here is intended to be a navigation aid and not a navigation fix, as is possible with GPS. Even with a fast flying jet, a plane can be guided (navigated) to within a fraction of a mile with the method shown and then human skill, GPS or Radar can help the pilot to make the final landing at the destination.
- b) Location of surface. None of the mathematical models take the undulations of the ground into consideration. The 1852 m nautical mile value is nominally located at sea level and at 40,000 ft elevation, the upper limit of airplane travel, the value increases to about 1856 m.
- c) GPS considerations. Before proceeding, it may be necessary to dispel the notion that GPS can be used directly to navigate. It is true, however, that GPS can be used to fix the endpoints which in turn will allow the calculation of both distance and bearing. An intermediary output of the GPS solution is the calculation of the receiver's position

in the Instantaneous Terrestrial Reference System (ITRS), which in turn together with a reference ellipsoid is used to determine a calculated Latitude and Longitude; or expressed in more mathematical terms: lat & long are a function of the ellipsoid used. Thus, considering the previous statement, data based on the same ellipsoid are internally compatible; data based on a different ellipsoid are incompatible. In actual practice the user needs to check that both endpoints are based on the same ellipsoid.

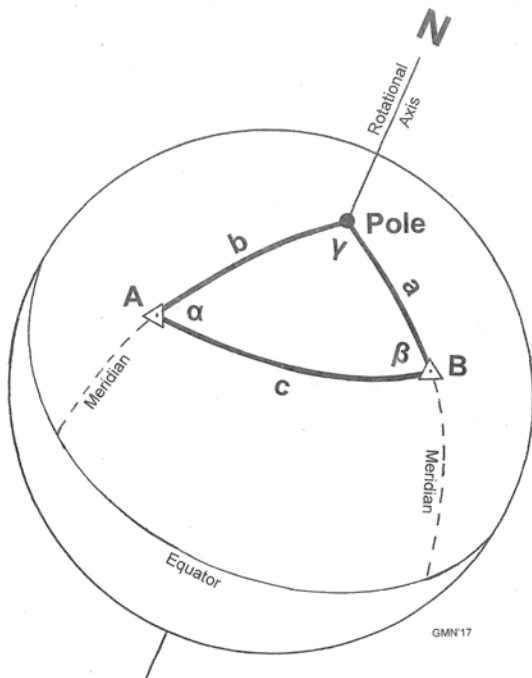
- d) Source of Lat & Long data. Occupying both the starting and endpoint of a travel route with a GPS receiver and then calculating the distance between them, is not very realistic. On a global scale, using the "Google Earth" display to the nearest second of arc (1 sec. \approx 100 ft), will probably satisfy most users. Paper maps, depending on the scale, will yield similar data. In bygone days, each airport gate had the lat and long displayed on the building wall, in front of the airplane; now a GPS fix or a computer file undoubtedly will provide the information. Again, a computer file most probably has the coordinates of the destination runway or gate.



TERRESTRIAL NAVIGATION TRIANGLE

While in flight or traveling at sea, a GPS fix is the most obvious method to verify a position and hence a distance to destination. For trans-ocean travel, a conventional noon solar sighting with a sextant, might still be a backup for electronic navigation.

- e) Illustration: A brief explanation of the “navigation triangle” and the “nomenclature illustration” may be in order. First to notice should be the “navigation triangle”, formed by the meridian through the starting point (A) and ending point (B), and intersecting at the geographic pole. The line connecting the points is a great circle route, i.e. the shortest route. Latitude is reckoned from the equator for a maximum of 90°, either north or south; longitude is measured for a maximum of 180°, either east or west from Greenwich. Conventionally, the apexes of the triangles are labeled with capital letters, the sides opposite with lower case letters and the angles are denoted with Greek letters. As long as these rules are followed, the user can select any labeling order, see the illustration. Thus, with respect to side c, the spherical cosine law is:
- $$\cos c = \cos a \cos b + \sin a \sin b \cos \gamma.$$



SPHERICAL TRIANGLE NOMENCLATURE

- f) Some spherical trig comments. For emphasis only, it is considered appropriate to duplicate some spherical trig rules.
- As in plane trig, the rule of 3 applies, i.e. a triangle solution requires 3 known variables.
 - The units of length for the sides are angular values, i.e. degrees, minutes and seconds of arc.
 - The theoretical maximum for the interior angles of a spherical triangle is 540°. The difference between 180° and 540° is called spherical excess.
- A. By using the illustration as a guide, the entry data, “a”, “b” and “γ” can be calculated.
- the sides “a” and “b” are the colatitude,
Note: for Lat. N, the colat = 90° - Lat
for Lat. S, the colat = 90° + Lat
 - the angle “γ” is the absolute difference in longitude.
- B. Modifying the cosine law to the sketch, for side “c”, yields the answer in decimal degrees (DD):
- $$\cos c = \cos a \cos b + \sin a \sin b \cos \gamma.$$
- C. Remembering that 1 minute of arc is equivalent to 1 nautical mile, requires:
- $$\text{DD (deg)} \times 60 \text{ min/deg} = \text{min. of arc} = \text{nautical miles.}$$
- D. With the answer in nautical miles (nmi) and 1 nautical mile = 1852 m, the distance can now be converted into any desired length units. CAUTION: as already mentioned the answer is probably within a radius of 100 ft or worse.
- E. Now to the direction ! To minimize complexity, it is selected to use the cosine law again. Looking at the illustration, the takeoff direction is angle β; thus, solving the cosine law for that angle:
- $$\cos \beta = \frac{\cos b - \cos a \cos c}{\sin a \sin c}$$
- Note: The azimuth of the takeoff will have to be controlled by the user. The first step is to observe whether the destination is east or west of the starting point.
- Destination east of takeoff:
- angle α acute (i.e. 0° to 90°), the starting azimuth is angle β
 - angle α is obtuse (i.e. 90° to 180°), the starting azimuth is angle β
- Destination west of takeoff:
- angle α acute (i.e. 0° to 90°), the starting azimuth is 360° - β
 - angle α obtuse (i.e. 90° to 180°), the starting azimuth is 360° - β

A historical legacy: Certainly, in the early days of airmail deliveries, a magnetic compass became an indispensable navigation tool when flying across the sparsely populated western US. Most probably but few modern airline passengers realize, that the 60 ft high numbers painted at the end of a runway represent a magnetic azimuth. Specifically, the numbers give the magnetic headings, to the nearest 10 degrees increments, in the direction of the approach. For example: runway "33" would be at a heading of 330° and this would be labeled (330°-180°= 150°) runway "15" at the opposite end. There is no reference in the literature that the magnetic heading will differ by the declination from the true heading determined by GPS. It also should be noted, that the declination varies across the entire US, nominally from about 15° in the west to about 15° in the east and that its value changes continually, possibly necessitating over time, a repainting of the runway numbers.

Ship captains and airline pilots reckon the velocity of their craft in knots = nautical miles/hour.

A numerical example:

Like with any numerical solution, a good sketch as shown above, will be most helpful.

With the latitude and longitude of the starting and ending point on hand, it is now time to turn on the electronic hand calculator.

Takeoff: Golden, CO, Lat: 39°44'49" N 105° 12'39" W
 Destination: Los Angeles, CA,
 Lat: 34°03'00" N, 118°15'00" W

Intermediate steps:

Side (a) = 90°- Lat_{Go} = 90° - 39°44'49" = 50°15' 11"

Side (b) = 90°- Lat_{LA} = 90° - 34°03'00" = 55°57'00"

Angle (γ) = |Lon_{LA} - Lon_{Go}| = |118°15'00"_{LA} - 105° 12'39"_{Go}| = 13°02' 21"

Calculate:

distance (c): $\cos c = \cos a \cos b + \sin a \sin b \cos \gamma$
 $= \cos(50^\circ 15' 11'') \cos(55^\circ 57' 00'') + \sin(50^\circ 15' 11'') \sin(55^\circ 57' 00'') \cos(13^\circ 02' 21'')$

$c = 11^\circ 51' 54'' = 11^\circ 51' 54'' * 60^m/^{\circ} = 712m =$
712 naut. mi Answer

Calculate starting azimuth (β) = $\cos \beta = \frac{\cos b - \cos a \cos c}{\sin a \sin c}$

$\beta = \frac{\cos(55^\circ 57' 00'') - \cos(50^\circ 15' 51'') \cos(11^\circ 51' 54'')}{\sin(50^\circ 15' 51'') \sin(11^\circ 51' 54'')} = 114^\circ 36' 20''$

Azimuth (obtuse & west) = 360°- 114°36'20" = 245°23'40"
 use 245°24' Answer

For the record only: The closing azimuth at the destination (LA) is angle α = 122°27'56" (calc.)

There are 2 comments associated with this number:

1 – the 122°+ value represents the starting azimuth in LA for the return trip back to Golden.

2 – For up to 1 mile in length, the forward and reverse bearing of a "straight" line is the same. For a great circle route, the bearing changes continuously and the forward azimuth is not the same as the back azimuth.



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

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2850 Youngfield Street
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CO-956
9650

December 21, 2017

Mr. John B. Guyton, Editor
Side Shots
3825 Iris Ave.
Boulder, Colorado 80301

Dear Mr. Guyton:


This letter informs you of official BLM cadastral surveys in Colorado that have been accepted and officially filed from December 9, 2016, through November 29, 2017, and are now available in the Public Room, Bureau of Land Management, Colorado State Office, 2850 Youngfield Street, Lakewood, Colorado 80215. The surveys will also be available at <http://www.glorerecords.blm.gov>.

The accepted surveys are listed below by township, range, meridian, group number, type, approval date and number of plats.

<u>Township</u>	<u>Range</u>	<u>Meridian</u>	<u>Group No.</u>	<u>Type</u>	<u>Approved</u>	<u>Plats</u>
T. 36 N.	R. 1 W.	NMPM	1592	Plat & Notes	12/09/16	1
T. 8 S.	R. 75 W.	Sixth	1646	Plat Only	01/03/17	2
T. 14 S.	R. 67 W.	Sixth	1625	Plat & Notes	02/03/17	1
T. 43 N.	R. 4 W.	NMPM	1659	Plat Only	02/07/17	2
T. 13 S.	R. 68 W.	Sixth	1600	Plat & Notes	02/14/17	1
T. 33 N.	R. 7 W.	NMPM	1453	Plat & Notes	03/14/17	1
T. 50 N.	R. 8 W.	NMPM	1247	Plat & Notes	03/20/17	1
T. 10 S.	R. 77 W.	Sixth	1656	Plat Only	03/29/17	2
T. 50 N.	R. 14 W.	NMPM	1657	Plat & Notes	04/24/17	1
T. 9 S.	R. 76 W.	Sixth	1667	Plat Only	04/26/17	2
T. 43 N.	R. 15 W.	NMPM	1407	Plat & Notes	06/08/17	1
T. 3 N.	R. 71 W.	Sixth	1662	Plat Only	06/15/17	2
T. 43 N.	R. 16 W.	NMPM	1407	Plat & Notes	07/13/17	1
T. 36 N.	R. 15 W.	NMPM	1658	Plat & Notes	07/25/17	1
T. 36 N.	R. 15 W. (S. 23)	NMPM	1658	Plat & Notes	08/11/17	1
T. 4 S.	R. 86 W.	Sixth	1685	Suppl. Plat	09/19/17	1
T. 45 N.	R. 2 E.	NMPM	1675	Plat Only	10/06/17	1
T. 6 N.	R. 71 W.	Sixth	1668	Plat Only	10/16/17	3
T. 6 N.	R. 72 W.	Sixth	1668	Plat Only	10/16/17	1
T. 13 S.	R. 90 W.	Sixth	1688	Suppl. Plat	11/29/17	1

As other surveys are completed, I will advise you of their acceptance. You may circulate this letter among the membership of the Professional Land Surveyors of Colorado.

Sincerely yours,


Randy Bloom
Chief Cadastral Surveyor for Colorado

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NGS Geoid Slope Validation Survey 2017 Conducted in Southern Colorado Summer of 2017

By Pamela Fromhertz, Rocky Mountain Regional Advisor, NGS/NOAA

Summary

Technological advances have revolutionized the acquisition of accurate measurements in the geospatial world. As a result, the National Geodetic Survey (NGS) is now able to better define datums and reference systems using new technology – such as the Global Navigation Satellite Systems (GNSS) and high accuracy gravity measurements. Gravity, primarily airborne gravity, will be the basis of the new geopotential (replacing 'vertical') datum planned for 2022. In order to evaluate the approach of using gravity, NGS conducted three comprehensive field surveys, referred to as Geoid Slope Validation Surveys (GSVS). The last of these surveys was conducted in southern Colorado along U.S. Highway 160 (US 160). Four types of field surveys were conducted: 1st order leveling, GPS, gravity and Deflection of the Vertical. This article describes the field surveys in detail.

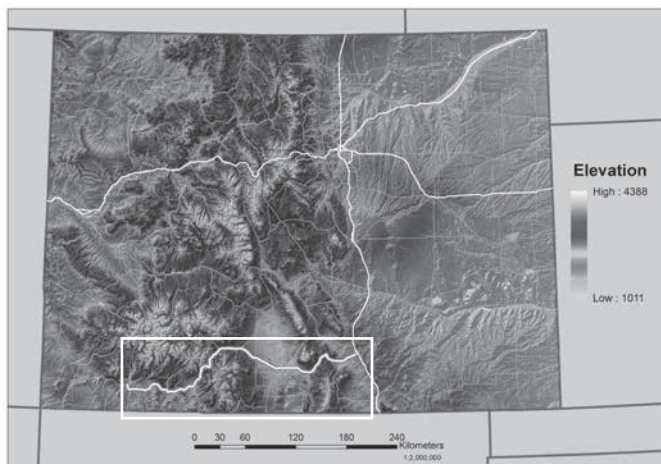


Figure 1: The location of GSVS17, courtesy B. Shaw

Why

Most folks in today's world want to use GNSS to collect and even map their data. GNSS provides an ellipsoid height. However, for most mapping and elevation products an orthometric height is used. The difference between these two heights in Colorado is approximately 60 feet. Recall this simple formula:

$$\text{orthometric height} = \text{ellipsoid height} - \text{geoid height}$$

which provides a relationship between an orthometric and ellipsoid height along with a geoid height. Historically, we used precise leveling (walking from point A to B across the entire country) to obtain the orthometric height, which has been used as the basis for elevations. In a sense, the orthometric height reflects which way water flows. Now with the advent of GNSS, NGS wants to provide a really good geoid model that would be available within the technological device or software, such as, a GNSS unit, drone, or mapping software; the user collects their data, an accurate geoid model is applied internally and the user obtains a reliable and accurate orthometric height. NGS' goal is to produce a gravimetric geoid accurate to about 1 cm, wherever possible. If applied to a 1 cm accurate GNSS-derived ellipsoid height the results would yield a 2 cm accurate orthometric height. Gravity for the Redefinition of the American Vertical Datum (GRAV-D), an NGS project that consists of collecting airborne gravity data over the entire US, will provide the basis for the gravimetric geoid model.

To verify that a 1 cm gravimetric geoid model is possible, NGS has conducted three Geoid Slope Validation Surveys: Texas in 2011 (220 miles), Iowa in 2014 (204 miles), and Colorado in 2017 (223 miles). The Texas survey was chosen for the low elevation and simple gravity. The Iowa survey was selected for the higher elevation and more complex gravity (where the survey crossed the Midcontinent Rift). Both of these areas had relatively flat terrain. The Colorado survey, targeted as the most difficult — rugged terrain, high elevation and complex gravity — was conducted

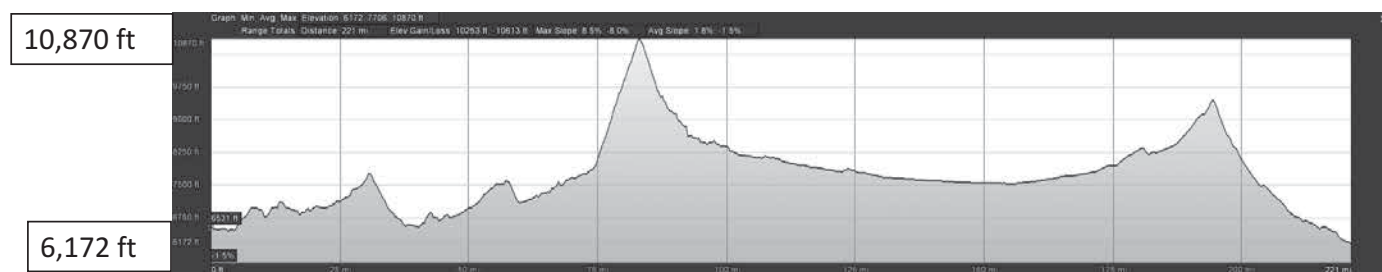


Figure 2: The elevation of the GSVS17 survey line

LEVELING

1st order leveling procedures were conducted along the survey line, double-running the entire 223 miles. This includes 3000' elevation change over Wolf Creek Pass (a total of 4500' along the line). The lack of three 1st order ties on both ends of the project highlight one of the issues in classical leveling procedures. The marks or the ground surfaces simply move. As a result, the leveling will be published to 2nd order class I (NAVD88). Regardless, the accuracy of the height differences were more than sufficient for the validation of GRAV-D. Two field parties, typically a four-person crew, conducted

the leveling from May through July 2017, on average leveling five miles per crew per day. The method was the two field parties worked in similar areas, checking in daily with the leveling project chief. Two to three miles were run in one direction and two to three miles in the opposite direction daily. In the steeper terrain, uphill progress was usually slightly slower but gains were made going downhill. Some of the crew – but definitely not all – enjoyed running with the three-meter rod on their shoulder.



Leveling along Wolf Creek Pass. Above left and bottom right: S. Breidenbach (Leveling Survey Chief), R. Strouse, M. Ahern. Above right: R. Strouse, courtesy P. Fromhertz.



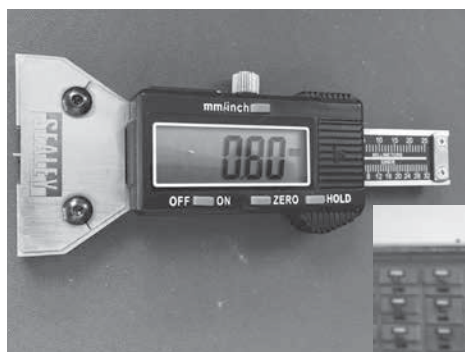


Calibration of the GPS equipment for GSVS11, courtesy C. Geoghegan

GLOBAL POSITIONING SYSTEM

Global Positioning System (GPS) was collected on 223 bench marks with two sets of observations — a minimum of a 24- and a 16-hour set. Even though NGS is developing tools for GNSS, only GPS was collected on this survey. The two crews each set up on five bench marks daily for a total of 10 new setups per day. Prior to heading to the field, all GPS equipment was calibrated at the NGS training center located in Corbin, VA. Each fixed height tripod was measured to the nearest tenth of a mm.

Several extra measurements and observations were made on this survey to account for different parameters. The dimple of each mark was measured using a digital depth gauge, which also became known as a 'dimple-ometer.' The difference between the top of the disk, which is used for height in leveling, and the base of the dimple, which is used with the tripod for GPS measurements, was accounted for by this precise tool, measuring to a hundredth of a mm. A 360-degree camera was used to collect information on all the obstructions. This information was then plotted and could be used in the review of the GPS processing.



The Digital Depth Gauge, measuring 0.80 mm. Photos courtesy C. Geoghegan.

The 'dimple-ometer' on a disk.



White boards were used at each site to record site setup information.

A locking security cable was run through an equipment box (containing the GPS receiver and battery), an eye on the tripod and either an eyebolt set in the concrete of each station or a nearby object, such as a guardrail, to ensure security of the equipment.

Below, Charlie Geoghegan, the GPS project chief, explains the field procedures:

"The GPS team was split into two 2-person crews, each collecting the requisite data on the official marks from opposite ends of the line and working independently toward the middle. Once deployed, each receiver collected two data sets per mark on consecutive days of the year. Regardless of the time or day of deployment, the receivers were programmed to begin data collection at zero hours UTC. For each mark, this resulted in a 24-hour data set for the first day and a 16+-hour data set for the second day (when it was manually stopped by the crew for redeployment on a mark further down the line)."



B. Stone setting up the GPS, courtesy B. Shaw.

In addition, four temporary Continuously Operating Reference Stations (CORS) were located in Ignacio, Wolf Creek, Monte Vista and Westcliffe, to serve as backup to the existing NGS CORS and to augment the eventual project processing strategy. The GPS data will be processed through OPUS Projects. GPS observations were completed in 45 days.

GRAVITY

An absolute gravimeter, a Micro-g LaCoste A10, was used on all the marks in Colorado to determine the acceleration of gravity (this is in contrast to the GSVS11 and GSVS14 surveys, in which a relative meter was used to determine relative gravity on most bench marks). In addition, the Micro-g LaCoste FG5, a much more precise absolute gravimeter, measured a 24-hour data set indoors at three intermediate points along the US 160 line. The sites were located at CDOT's maintenance yards in Durango, Wolf Creek Ski Area and Walsenburg. The 24-hour observations serve as confidence checks to the gravity data collected at each bench mark. Finally, a Scintrex CG6 relative gravity meter was used to determine the vertical gradient of gravity above each bench mark. The project manager, Derek van Westrum, Ph.D., explains this.

"The Micro-g LaCoste A10 absolute gravity meter determines the acceleration due to Earth's local gravity at each bench mark. This provides the full field gravity value (out to 9 digits). For example, at the DURANGO CA station, the value is 9.79266192 m/s^2 . The A10 measures this by tracking the fall of a mirror in a vacuum with an atomic clock and a laser. The laser measures distance, and is "calibrated" by being tied to an atomic transition (like the clock). Because the length and time standards are tied to atoms, the measurement is absolute and autonomous (there is no need to call some base station "zero", for example). However, that gravity value is actually determined at about 72 cm above the bench mark (more or less the height of the A10). Gravity gets noticeably stronger closer to the bench mark (you are getting closer to the center of the earth). This change in gravity as a function of height is called the "vertical gravity gradient". We use a small, portable relative gravity meter (Scintrex CG6) to measure this gradient by going up a tripod with known height intervals (approximately set at 72", 36" and 4"). Once the gradient function is known, we calculate the gravity value on the bench mark. In the case of the DURANGO CA station it is 0.00000201 m/s^2 larger, or 9.79622391 m/s^2 ."



A10 gravimeter and J. Kanney



CG6 relative gravimeter



FG5 gravimeter with D. van Westrum explaining how it works.
Photos courtesy, P. Fromhertz

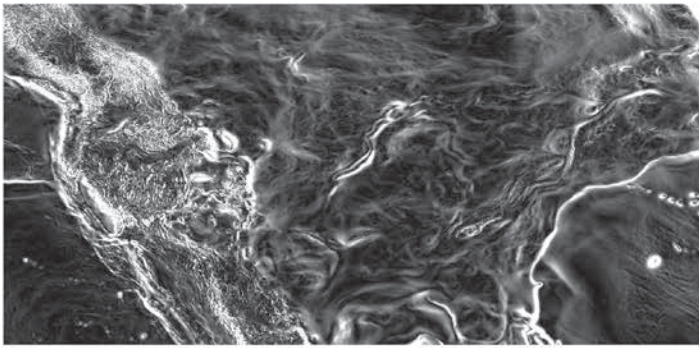


Figure 4: Magnitude of the Deflection of the Vertical

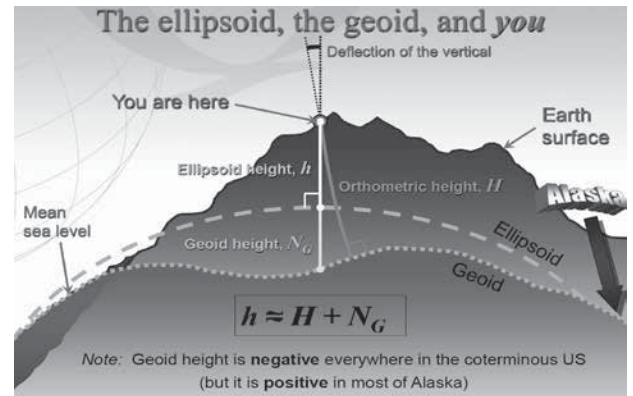


Figure 5: Schematic of the Deflection of the Vertical

DEFLECTION OF VERTICAL

The Deflection of the Vertical (DoV) is the angle between the true zenith (plumb line) and the line perpendicular to the surface of the reference ellipsoid. Two ETH-Zurich CODIAC zenith camera systems measured the DoV at night by looking at the actual locations of celestial objects compared to the predicted locations. The difference is the DoV, which is a direct measure of the geoid slope (after one corrects for the intervening topography). Another way to look at it is the DoV is the spatial derivative of the gravity field. Measurements were taken on all 223 bench marks with two cameras and two 2-person crews working through approximately 45 nights of observations; the DoV work was successfully completed in October.

THE RESULTS

In all three GSVS, the differential geoid undulations (heights) between points, referred to as the geoid slope are compared to NGS's gravimetric geoid models produced from the GRAV-D data. Two methods for deriving geoid slopes were utilized: (1) minimally constrained geodetic leveling combined with the absolute gravity measurements and GPS, and (2) the astro-geodetic DoV. The GSVS conducted in Texas and Iowa confirm the NGS approach in using a gravimetric geoid model as the basis for the new geopotential datum yielding a 2 cm accurate orthometric height. Data from GSVS17 will be processed and reviewed over the coming year.

The biggest surprises the crews encountered were rattlesnakes and decomposing roadkill near the marks. Moreover, I am sure the weather was interesting – hot days, hail, snow, and cold nights – but that's Colorado. As the Rocky Mountain Regional Advisor (and previous Colorado State Geodetic Advisor), I am glad that the survey was conducted in Colorado. I cannot wait to see the results, which will be invaluable to determining the future of surveying in mountainous terrain. If results demonstrate a 1 cm geoid can be derived primarily from gravity, will it further revolutionize the way surveying is conducted? Will the results clearly indicate one way or the other the need for bench marks locally in the future?



D. Martin, DoV Survey Chief, recording data, courtesy D. Winester

References

NGS Ten-Year Strategic Plan, 2013-2023, Positioning America for the Future
 NGS White Paper, Improving the National Spatial Reference System, 2010, 2015 Geospatial Summit document
 NOAA Technical Report NOS NGS 62, Blueprint for 2022, Part 1: Geometric Coordinates
 NOAA Technical Report NOS NGS TBD, Blueprint for 2022, Part 2: Geopotential Coordinates

Acknowledgements

GSVS17 field efforts were successful due to the many participants, especially the project and field survey leads — awesome job everyone. Special thanks to Todd Johnson and Dennis Pirtle, CDOT Survey Coordinators and their Region 5 and Region 2 staff and maintenance crews. I appreciate the editorial reviews of this article by B. Stone and D. Van Westrum, which greatly enhanced this article.

Rule of the Month—Basis of Bearings, Board Rule 6.8

By Earl Henderson, PLS

Board Rule 6.8 clarifies C.R.S. 38-51-106(1)(e) which requires that all Land Survey Plats contain a statement of how bearings, *if used*, were determined (emphasis added). I think we can all agree that the vast majority of us are currently using bearings to define directions on our Land Survey Plats, but in fact I have recently seen some plats using angles and not bearings. I personally find it cumbersome to use anything other than bearings, but if that's your preference then have at it. But if you're in the same camp as most of us you likely use bearings and you likely already know that a Basis of Bearings (BOB) statement is required. However, it's surprising how often the BOB is incorrectly stated. I'll get to that later (BR 6.8.3).

There are several parts to Board Rule 6.8. My personal favorite is BR 6.8.1 Purpose. It should go without saying, but obviously somewhere in the past it was deemed necessary to state in rule that the purpose of the BOB statement is for "...other surveyors..." not for yourself. But the last sentence of BR 6.8.1 is the best part. No matter what is said in statute or rule, if the BOB statement doesn't facilitate a retracement of the survey, it just ain't good enough.

BR 6.8.2 Composition is also an interesting aspect of this rule. Although there's a good deal of information and requirements in this paragraph I'd like to bring your attention to three things in particular. The first is that the BOB "...shall state...the bearing between *two fully described monuments at each end of a single line.*" (emphasis added) There need to be monuments at each end of the BOB line so that the "other surveyors" can establish your BOB. Without those monuments "other surveyors" cannot start where you started. Second, those monuments need to be "fully described" so that again the "other surveyors" can be certain that they're using the correct monuments and following in your footsteps. And third, the LSP "...shall show the... relationship between the basis of bearings and the survey." Although all these aspects should be obvious from both common sense and reading the rule, it's apparently not, from what I see. After all, what use is a BOB if you can't set up on two monuments in the field, know that you're on the correct monuments, and then survey to the subject property?

BR 6.8.3, & 6.8.3.1-6.8.3.4 describe the acceptable methods for stating the BOB on the LSP depending on what method you've chosen to use for that particular survey. I'm not going to go into the details as they're pretty self explanatory and non-controversial. But I will say this, it is baffling how often a BOB statement is stated incorrectly when there are specific and numerous written examples right there in the Board Rules. Why would you state your BOB without quoting the appropriate example directly from this rule? There's no statute or rule that states you have to quote the example. But if you choose to use some other phraseology, then you're opening yourself to the possibility that your phrase will be interpreted as not complying with the rule.

BR 6.8.3.5 shows a couple of examples of unacceptable BOB statements but by no means, and you can take my word for this, are these the only unacceptable ways to make a BOB statement. But once again I need to make the point that it's baffling just how often a BOB statement appears to be quoting one of these examples of unacceptable statements.

The bottom line for all the rules pertaining to the BOB statement is that as a professional, it is your responsibility to show "other surveyors" how to follow in your footsteps. And if no one can follow your footsteps, how can you expect "other surveyors" to be able to agree with your decisions and conclusions? When crafting a BOB statement remember that it's always acceptable to include more than the minimum amount of information if you think the situation warrants it. And also remember that what you should be trying to accomplish with a BOB statement is to help "other surveyors" follow in your footsteps, as I hope we are all trying to do with each decision we make. We tend, as a group, to romanticize following in the footsteps of ancient surveyors, but we should be just as conscious of following in the footsteps of our current fellow professionals and describing to "other surveyors", who may be looking at us as ancient, how we got to where we were going. Of course that presupposes that we're not already so ancient that we've already forgotten where we were going, for what, and...(!@#& – I knew I should have written that down).

Be safe out there.

THE MATADOR

By Dean Glorso, PLS



"The Matador" — Circa 1975

JAMES TRAINOR STOWELL, Colorado PLS 11392

Dean Glorso is the author of "*In Search of the Laughing Place: A Book of Poems & Paintings*," available in paperback and Kindle on Amazon.com

I have pondered words in *The Elegy for Jock*
And feel the familiar chill of *Guenther's* loss
But it was James "my trainer" who bid for a similar fate
The hand of death his own

As we continue down the path of life
And reflect on the minds we enjoyed
It's easy to resurrect the smiles they gave
But often difficult to cap the sadness

Each time I take a measurement of land
The Matador's words of guidance echo my mind
The simplest lessons learned
From a master of my craft

While working at the edge of the Andaman
He gave a call, to ask "my" advice
10,000 miles I could not reach
Alas, only a "click" of the black device

As we remember the Elegies for Matadors passed
May we hold fast a brotherhood of glue?
Life is sweet, laughter cures and caps
The saddest times, may they be few

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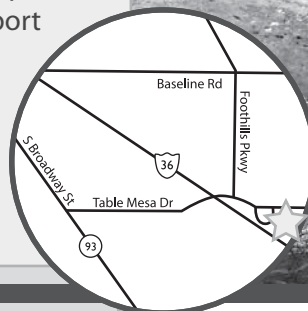
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WFPS Board Meeting Summary

October 21, 2017 Luxor Hotel, Las Vegas, Nevada

By Todd Beers, PLS

Below are the notes/minutes summary from the meeting:

INSTALLATION OF OFFICERS

Past Chair Ray Mathe installed the newly elected Officers.

Matt Gingerich, Chair
Michael Nadeau, Chair-Elect
Ben Petersen, Secretary/Treasurer

NSPS

Nevada NSPS Director Paul Burn reported on the activities of NSPS. NSPS held their fall meetings in conjunction with Texas Society of Professional Surveyors in Frisco, TX.

NSPS has had success with the FLAIR Act and the Davis Bacon Act. Paul reported that NSPS has shown interest in shifting the CFedS administration to a different organization, possibly WestFed.

NSPS needs to hire additional staff in order to meet the demands of increased membership. In order to do so, an increase in dues will be necessary. No action was taken at the fall meetings, more discussion will take place in the spring with the possibility of an increase taking affect for the 2019 dues cycle.

NSPS Western Directors Council and WestFed

There was discussion regarding the differences between the NSPS Western Directors Council and the Western Federation of Professional Surveyors. There are clear differences between the two groups with the largest difference being that WestFed is comprised of the 13 western state associations. One of WestFed's missions is to provide support to the member state association which is done in a variety of ways. Paul indicated that the NSPS Western Directors Council understands the difference and supports WestFed as a group. A memorandum of understanding (MOU) was executed between WestFed and NSPS several years ago that indicated both groups support for one another.

- WFPS will contact NSPS Western Director's Council indicating their understanding of the different roles and support.
- WFPS Delegates download WestFed Powerpoint and provide information to your state association leadership. Attend your state Board meetings and provide a thorough report of the meeting so that the

Board has the benefit of the information you receive during meetings.

- WFPS Delegates, when a WestFed meeting is being held in your state, invite your association leaders to attend.

NCEES

NCEES is working on a public lands exam module. This could potentially be used by states as their state-specific exam with the addition of their own state law exam.

Individual State Reports:

ALASKA

Membership: 211

Conference: WFPS is currently working with ASPLS to co-sponsor their 2019 Conference. WFPS is looking for WFPS Delegate that are interested in presenting a program during the conference.

ASPLS is still discussing the BLM DPPS program.

ARIZONA

- Membership: 417

- APLS 2017 Conference was held in Tucson. The conference featured 3 concurrent tracks of education as well as social events. Good feedback was received from the conference attendees and a net profit of over \$15,000 was achieved.
- APLS will partner with NALS, UCLS, and WestFed for the 2018 Conference which will be held February 21-24, 2018 in Las Vegas, NV. Information can be found on the conference website PLSeducation.org
- Reported that it is difficult to get attendance at monthly chapter meetings. Some time was spent discussing ways in which other states have had success in increasing chapter meeting attendance. Ideas included:
 - ✓ Program: Be sure to have a program that will be of interest to the membership. Low attendance can be a result of using vendors to provide programs which creates a perception that meetings are a sales pitch.
 - ✓ Location: Poll your members to determine the best location to meet. Discuss the possibility of rotating locations if you serve a large geographic area.
 - ✓ Time: Poll your members to determine the best time of day to meet. If you are holding only dinner meetings, try holding a lunch meeting.
 - ✓ Raffle: Consider a monthly progressive raffle.

CALIFORNIA

- Membership: 1734
- Conference: March 23-27, 2018 in Sacramento, CA.
- CLSA is holding monthly webinars that are provided free to CLSA members.

COLORADO

- Membership: 529
- Conference: March 7-9, 2018 at the Arvada Center
- PLSC is focusing efforts on obtaining mandatory continuing education. PLSC is in need of letters of support for continuing education. Specifically, any statistics indicating that continuing education in your state has helped to decrease instances of disciplinary actions.
- PLSC participated in National Guidance Counselor Conference held in Denver and will also host a booth at the Colorado state guidance counselor conference. PLSC is constructing a virtual sandbox as an interactive display for career events. The sandbox allows participants to manipulate the sand and see real time update of that topography.
- PLSC has pledged \$250,000 for an endowment to maintain a surveying degree program in Colorado.

HAWAII

- Membership: 86
- Conference: February 15-16, 2018 in Honolulu, HI
- HLSA Board of Directors is working on legislation to address de-registration of registered lands in Hawaii. HLSA is working with stakeholders involved in mapping, recording and indexing of registered and de-registered lands to discuss possible solutions.

IDAHO

- There are numerous complaints to the Board of Registration that stem from disagreements between surveyors regarding boundaries. ISPLS is looking for a way to mitigate these complaints. Some time was spent discussing how state associations handle these issues, including:
 - ✓ Ethics Committees
 - ✓ Professional Practice Committees
 - ✓ Arbitration Committees
- Each state to submit their guidelines, policies, and/or handbooks, for ethics/professional practices/arbitration committees to the WFPS office via email to admin@wfps.org. Crissy will compile these into one bookmarked PDF for state associations to review as examples.

- Idaho requested the following items be added to the WestFed matrix: Does your state have a licensed land surveyor on staff with the Board of Registration?

MONTANA

- MARLS is expanding their outreach. They set up a booth at the County Records Association Conference which led to the recorders inviting MARLS to provide a presentation.
- Montana law is passive regarding county surveyors. It currently states that a county "may" have a county surveyor but it is not required.
- Requested the following be added to the WestFed matrix: Does your state have a requirement for county surveyors? Are county surveyors elected or appointed? Is your county surveyor an employee or an independent contractor?
- MARLS has donated to the NSPS disaster relief fund and has added three additional scholarships to be awarded each year bringing total to 10 scholarships a year.
- MARLS has decided to no longer employ a lobbyist and instead will use volunteers and grassroots campaigns for legislative activities.

NEVADA

- Membership: 255
- NALS 2017 Conference was held in Reno, Nevada. The conference featured 3 concurrent tracks of education, roundtable discussions and a successful panel presentation featuring a land surveyor, attorney, and title officer. Great feedback was received and a net profit of over \$24,000 was realized. In addition, the NALS Education Foundation held a bowling tournament, and a live and silent auction which raised over \$11,000 in net profits for scholarships.
- NALS will partner with APLS, UCLS, and WestFed for the 2018 Conference which will be held February 21-24, 2018 at the Luxor Hotel in Las Vegas, NV. Information can be found on the conference website PLSeducation.org
- NALS continues to support the Great Basin College surveying program which has had an increase in enrollment for the last several years.
- NALS Chapters are encouraging survey firms to hire interns to introduce them to a career in land surveying. As an incentive, the Southern Nevada Chapter is offering scholarships to interns that decide to begin taking survey classes.

NEW MEXICO

- Conference: April 27-28, 2018 at the Sandia Resort in Albuquerque, NM.
- NMPS has recently retained the services of a new lobbyist to assist with legislative efforts.
- NMPS continues to fundraise to offset the \$100,000 pledge that they have made to New Mexico University surveying program.

OREGON

- Membership: 501
- Conference: January 17-19, 2018 at the Salem Conference Center
- PLSO has dedicated a large budget to hire a customer engagement firm to help rebrand PLSO and develop a public awareness program.
- Oregon has an active Young Surveyors Network that is working on their own branding. They are in the process of developing a logo and have asked PLSO for funds. PLSO is currently reviewing the structure of the Young Surveyors Network – should it be treated as a committee of PLSO or as a separate entity to which PLSO is affiliated?

UTAH

- Membership: 400
- UCLS will partner with APLS, NALS, and WestFed for the 2018 Conference which will be held February 21-24, 2018 at the Luxor Hotel in Las Vegas, NV. Information can be found on the conference website PLSEducation.org
- The annual Surveyors Historical Society Rendezvous will be hosted in Utah in 2018.
- UCLS is in the process of incorporating as a charitable, 501(c)3 foundation. UCLS is donating an initial \$5000 in order to fund the Foundation.
- UCLS continues to support TrigStar, the Boy Scout Merit Badge program, and CST as part of their outreach efforts.

WASHINGTON

- Membership: 881
- Conference: March 7-10, 2018 at the Grand Davenport in Spokane, WA.
- LSAW will be holding a fall seminar in Tacoma featuring Gary Kent as the speaker. The spring seminar will be held in the Vancouver area.

- LSAW legislative committee is working on establishing monument preservation funding through a small fee on recorded documents. Once the draft language is approved by the Board of Trustees, LSAW will work with our lobbyist to introduce legislation.
- LSAW has formed a committee to review the possibility of reinstating the affidavit of minor correction which has been banned creating a requirement to file an amended record of survey to correct survey maps.
- Prevailing wage continues to be an issue in Washington. New rates vary by county ranging from \$11-\$60 per hour.

WYOMING

- Membership: 262
- Conference: November 2-3, 2017 in Casper, WY.
- PLSW is working on legislation to address destruction of monuments.
- The University of Wyoming currently offers a minor in Land Surveying and a Land Surveying Certificate program. However, low enrollment has put this program in jeopardy. PLSW is monitoring this situation and will work to maintain the program.
- PLSW continues to work in conjunction with the Board of Registration to promote the profession. Outreach events to elementary, middle, and high schools are being conducted. A team of 26 volunteers are taking part in classroom presentations, STEM events, and career fairs. Last year, over 30 classrooms across the state were reached and the goal is to double outreach efforts in 2018.

WILDLIFE RELIEF FUND

The fires in northern California have affected numerous people in the land surveying profession. Many states have requested ways to help. WFPS is recommending that one fund be created through the NSPS disaster relief fund to assist these victims.

Authorize the Executive Committee to negotiate and execute an MOU with NSPS to set up a western states relief fund. The Executive Committee will develop the criteria and administer the fund.

Executive Committee to review the draft MOU and work with NSPS to set up the fund. Once in place, an email will be sent to all WFPS Delegates with information on how to make a contribution.

BYLAWS

Bylaw Chair Mark Corbridge is working on drafting language that will address the WFPS quorum as well as bring the bylaws up-to-date regarding electronic meetings and voting.

Crissy Willson to work with Mark Corbridge to develop draft language.

CONFERENCE

The Western Regional Surveying Conference will be held February 21-24, 2018 at the Luxor Hotel in Las Vegas, NV.

Featured Speakers:

Don Wilson

Kris Kline

Jan VanSickle

Featured Programs:

- BLM & CFedS: Don Buhler, Dan Webb, Jerry Davis, Ron Scherler, and Steve Parrish
- Mock Trial
- Panel Discussions, Round Table Discussions
- 4 Concurrent tracks of education

Social Events:

- Bowling Tournament
- Silent & Live Auction
- Dinner at Excalibur Knights of the Round Table show

If you are a member of your state association, you are entitled to member pricing for this conference.

STEM BROCHURE

Matt Gingerich has worked with a high school graphics student to develop a brochure on how land surveying is a STEM career.

Matt indicated that the student volunteered many hours to develop the logo and the flyer and recommended WFPS pay a nominal amount to show our appreciation.

Authorized to pay the student \$50 for development of the STEM logo and flyer.

All Delegates to review the flyer and send comments to Matt Gingerich for incorporation into the final flyer.

SCHOLARSHIP

Scholarship Chair Mark Corbridge is working on revising the criteria for WFPS scholarships and creating a revised scholarship application.

The Board requested that the scholarship reflect both Mike Mickiewicz and Paul Reid's name.

Crissy Willson to work with Mark Corbridge to develop proposed scholarship criteria and application.

WEBINARS

The Executive Committee has confirmed monthly webinars beginning in January. States will be invited to promote webinars with a portion of registration from their state being split with their association.

ACTION LIST

The action list was reviewed. The list will be updated and emailed to Delegates.

Add to the matrix: Total number of resident licensees in your state.

Crissy Willson to order name badges for the following delegates: Russ Klusener, Mark Corbridge, Coy Chapman, Jerry Dodd, and Donald Weiber

Crissy Willson to add Executive Directors to the WFPS email list to receive agendas, minutes, highlight reports, and other WFPS news.

NEXT MEETING

Crissy Willson will contact the Executive Director of NMPS to discuss the possibility of holding the next WFPS meeting on April 28th in conjunction with the NMPS Conference.

Treasurer's Report January 2, 2018

Operating Funds:

Business Savings
\$116,515.65

Business Checking
\$16,355.82

Investments Fund
\$252,175.37

Total PLSC Assets
\$385,046.84

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A BILL FOR AN ACT

101 CONCERNING ESTABLISHING A CONTINUING EDUCATION REQUIREMENT
102 FOR PROFESSIONAL LAND SURVEYORS.

Bill Summary

(Note: This summary applies to this bill as introduced and does not reflect any amendments that may be subsequently adopted. If this bill passes third reading in the house of introduction, a bill summary that applies to the reengrossed version of this bill will be available at <http://leg.colorado.gov>.)

The bill requires the state board of licensure for architects, professional engineers, and professional land surveyors to adopt rules establishing a continuing education requirement to maintain the continuing competency of professional land surveyors.

Shading denotes HOUSE amendment. Double underlining denotes SENATE amendment.
Capital letters or bold & italic numbers indicate new material to be added to existing statute.
Dashes through the words indicate deletions from existing statute.

1 *Be it enacted by the General Assembly of the State of Colorado:*

2 **SECTION 1.** In Colorado Revised Statutes, **add** 12-25-215.5 as
3 follows:

4 **12-25-215.5. Continuing education - rules.** NO LATER THAN
5 DECEMBER 31, 2019, THE BOARD SHALL ADOPT RULES ESTABLISHING
6 REQUIREMENTS FOR CONTINUING EDUCATION THAT A PROFESSIONAL LAND
7 SURVEYOR MUST COMPLETE IN ORDER TO RENEW AN ACTIVE LICENSE TO
8 PRACTICE LAND SURVEYING ON OR AFTER JULY 1, 2020. TO COMPLY WITH
9 THIS SECTION, THE RULES MUST REQUIRE THE SURVEYOR TO PARTICIPATE
10 IN BOARD-APPROVED PROFESSIONAL DEVELOPMENT PROGRAMS SUFFICIENT
11 TO MAINTAIN CONTINUED COMPETENCY.

12 **SECTION 2. Act subject to petition - effective date.** This act
13 takes effect at 12:01 a.m. on the day following the expiration of the
14 ninety-day period after final adjournment of the general assembly (August
15 8, 2018, if adjournment sine die is on May 9, 2018); except that, if a
16 referendum petition is filed pursuant to section 1 (3) of article V of the
17 state constitution against this act or an item, section, or part of this act
18 within such period, then the act, item, section, or part will not take effect
19 unless approved by the people at the general election to be held in
20 November 2018 and, in such case, will take effect on the date of the
21 official declaration of the vote thereon by the governor.

CCPS

Greetings everyone. Welcome to 2018! I'd like to start by saying thank you to the dedicated CCPS members I see time and time again at the general meetings. During the October meeting in Golden we had an excellent presentation by "The Two Manitou Nancys", Nancy Wilson and Nancy Fortuin, detailing their trek across Albania, Kosovo and Montenegro.

As the CCPS begins to plan our 2018 General Meeting calendar we welcome any feedback, comments and ideas for upcoming topics and speakers for the year. If there is a topic that you find interesting or noteworthy let us know! Please reach out to any of our board members to discuss.

Over the last year the CCPS as well as the PLSC and other chapters have been diligently working on planning the upcoming PLSC 2018 Rocky Mountain Surveyors Summit that will be held March 7-9, 2018 at the Arvada Center. If you haven't done so already please take a minute to enroll online. The conference lineup looks outstanding!

CCPS elections were held in December for 2018 Board of Directors. The members of the Board are: Shawn Clarke (President), Robert Boehm (Vice President), Shaun Lee (secretary), Scott Throm (Treasurer), Brian Socia, Gavin Puckett, Julia Keilman, Derek Brown, Daniel Davis, Devon Arnold and Randy Fortuin. Thank you to all who voted and welcome to the new officers and Board members!

I hope all of you had a wonderful holiday and happy new year! Cheers.

Kevin Kucharczyk, PLS
CCPS President (2017)

NC-PLSC

The Northern Chapter got off to a good start for the last quarter of 2017 with a presentation on Right of Way research in Weld County from Jackie Hernandez-Barrow. As an employee of the Public Works department, Jackie has developed a step-by-step guide for a thorough and accurate systematic approach to what can sometimes be an overwhelming task. A PDF copy of this approach is available for everyone; please contact Jackie or myself if you would like one. Lamp Rynearson was kind enough to host the October meeting.

November took us to the City of Loveland Museum where Tim Kerr presented "User Maintenance for Total Stations". This is part of our approach to direct more of the meeting topics to field procedures and practices. We felt that we were successful in that we got a few fresh faces to attend in spite of the meeting being held during Game 7 of the World Series (Note: we did end the meeting in time to catch the 2nd half of the game).

December was our annual Christmas Party at the Summit in Windsor. There was great attendance and we had some good laughs with food, beer and bowling. I can't remember if we voted to make this a tradition or not, but we will certainly revisit the idea at the next meeting.

We all look forward to a productive, professional and profitable 2018 for everyone!

Steven Parks, PLS
President NC-PLSC

NW 1/4 PLSC

Things are going well in the NW1/4 region as even most of the remote pockets in Northwestern Colorado have shown a significant recovery from the Great Recession. Although lagging behind Denver in terms of recovery of the real estate market, construction activity in both civil and residential markets have increased noticeably in 2017. And with the recovery comes the "rediscovery" of all the surveying issues that were left to rest in 2008 and 2009 as the world spiraled in the economic downturn.

Most of these issues relate to plats that were being prepared in 2006 and 2007 at the height of the boom, never recorded, the subdivision went into foreclosure and then years later a bank/receiver buys the vacant land at auction. And then five or seven years after the foreclosure, the lots are finally ready to be sold and the poor surveyor (much poorer due to the Great Recession, no doubt) is left trying to finish up a plat/subdivision that they have not looked at in a number of years. Specifically, we see easements recorded later in time, property corners that were partially set, bearings and distances left off of plats and all of the issues associated with a project being set aside as the money dried up. In some cases, the subdivisions had issues unrelated to surveying such as water rights. These particular subdivisions ended up in court and in most cases, the plaintiff (lot owners) won and the original developer/owner of the water rights was forced to deed water rights to the Homeowners Association. In other cases, the individual homeowners are using the water without any legal right and the situation lingers on.

We have a number of subdivisions that, when they came out of the foreclosures of the Great Recession in 2013 or 2014, sold for 1/3 to 1/2 of what their 2007 value was. Three years later, some of them have recovered to 60-70% of peak value, and they have sold like hot cakes as builders are constructing custom homes in the \$900,000 to \$1.4 million range. These are on lots ranging in size from 0.14 to 0.4 of an acre.

Gas, coal and oil activity is still relatively slow. Coal in particular may never recover to its levels of 10 or 15 years ago when world records were set in long wall production. The demand is simply not there for a variety of reasons. Natural gas pipeline activity has picked up as easements for future pipelines are being written and compressor stations are being built.

And so we head into the New Year with a certain amount of guarded optimism. The reemergence of the 5% down loan concerns us, but it seems to be a smaller proportion of the overall real estate/banking market. Many of the \$1 million homes are cash. And the 25,000-level stock market seems poised for a correction if history is any indicator. If you are a sole proprietor of a

CHAPTER NEWS

surveying company, become an S Corporation as you will see tax benefits! Happy New Year!

Brian T. Kelly
Vice-President, NW ¼

SC-PLS

We have two members of our board that are donating \$500 each to build us an AR sandbox for use on College/Career Days we attend annually. Thanks to Spencer Barron, owner, Barron Land, and Mark Johannes, owner Compass Surveying & Mapping, LLC. Also a big thanks to Brian Dennis who provided us with the details and design instruction.

In our November meeting we invited Dale Archer from Mountain Safety speak on fire safety in the home. Dale has many years of experience in the fire safety business and passed some of his knowledge onto us.

Our Christmas party in December at Miramont Castle in Manitou Springs was a big hit this year! We had a blast with our annual white elephant gift exchange. Thanks to Joseph Alessi, III of Alessi & Associates for putting this all together. We also presented Sean Maik with his \$1000 scholarship plaque. Sean was our 2017 Southern Chapter Academic Scholarship recipient.

Join us every third Tuesday of the month at our board meetings or member meetings, and keep an eye on our website for details at www.scpls.net. We wish you a great and prosperous new year for 2018!

Don R. Hulsey, PLS
President, Southern Chapter

SWC-PLSC

The SW Chapter of the PLSC had a good turnout at our last meeting held on November 21, 2017 at Durango Brewing Company. Input was had from all (including some of the bar clientele!) on some of the legislative items that are being discussed at the state level. These items included corner monument records, retention of recorded documents, continuing education, and drones.

Everyone generally agreed on the value of corner monument records and really appreciates the online Google based access. Some suggestions for additional items that could be on monument records included photos and LLH coordinates sufficient to locate the monuments but not to replace them if they've been destroyed. However, some of the surveyors would prefer that this type of location information be kept off the report all together. A suggestion was also made for a requirement that if the most recent monument record is more than 20 years old, a new record would be required to be prepared and filed.

The La Plata County Surveyor, Steve McCormack, has been very proactive in communicating our concerns regarding the retention of survey records with the Clerk and Records office. He has received positive response from them and a commitment to retain the records. The SW Chapter will be sending the clerk a letter supporting the retention of survey records so that she can share it with the County Commissioners.

The Chapter is most appreciative of the efforts of the PLSC and all others involved in bringing the AAS degree program to Colorado Mesa University. This is a very positive step for the survey community.

Chapter members also agree on the need for continuing education requirements and recognize the value of annual training opportunities. Throughout the upcoming year we will look for speakers and other educational opportunities for our chapter meetings.

Election of officers was held and the results are as follows: President, Parker Newby; Vice President, Todd Johnston; Secretary, Josh Casselberry; Treasurer, Dave Seiler.

Parker S. Newby, P.L.S.
President- SW Chapter PLSC

WCLS

The last meeting of 2017 for WCLS was held November 8th, 2017 at the City of Grand Junction City Hall. The meeting was well attended and there were three (3) main topics for the meeting: 1.) A replacement for Pat Green, Mesa County Surveyor (elected position). Since Pat is term limited at the end of 2018, a replacement is being sought at this time. Names were suggested and they will be contacted ASAP so that the proper steps leading up to the election can be met.

2.) New officers and directors for the upcoming 2018 election. It was discussed that younger members of WCLS be encouraged to "take over the reins" of this organization and several members have volunteered to run for the complete slate of officer positions.

3.) Possible subjects for the upcoming Spring Seminar were discussed and commented upon. Suggestions were to be emailed to WCLS in a timely manner.

The year 2018 promises to be better economically for the surveying community and the addition of a survey degree program at Mesa State College is good news for all surveyors in Colorado. It is fortunate that we have Tom Sylvester here in Grand Junction to lead that survey program. The January meeting was held at the Grand Junction Golden Corral on Wednesday January 12th with 21 members in attendance. New officers and directors were recognized as the results of the 2018 vote were announced. President: Alec Thomas, Vice President: Chris Ransier, Treasury Secretary: Alex Lheritier, Director: Brian Bowker, Director: Scott Thompson. The county surveyor position will be open this year and a successor to Pat Green is currently being sought. Topics of discussion included turnover at the county planning department, C.R.S. 43-2-302 and how title is vested upon vacation of Right of Way. Outgoing WCLS president Peter Krick was presented with a plaque and gift card in appreciation for his terms as WCLS president.

Alec Thomas, PLS
President, WCLS

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