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# LINES & POINTS

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On The Cover

VIEW OF BEARTOOTH RAVINE  
PHOTO BY  
CODY WITT, PLS

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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).

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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
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Special Rates apply for PLSW Chapters and cover placements.

For more information please contact Jack Studley.

# PRESIDENT'S MESSAGE



I hope this finds you all ramping up for summer. Good weather and fieldwork to complete is a daydream we all have in common. Roads are opened up and birds have started to migrate back to our creek bottoms and open country, so as I sit here watching the snowflakes drift past my window; I write to you with excitement and optimism for the upcoming spring and summer.

WES was a success with interesting and informative instruction. Presentations were made by Vince Cavanaugh, Trevor Robason, Dr.

Herbert Stoughton, Karen Rogers and Brian Shaw. Many thanks to Jack Studley for his efforts in organization and the presenters who volunteered their time and expertise.

Please check with your Chapter representatives regarding upcoming topics of discussion. Those topics include the Young Surveyors Network membership and their inclusion of that entity as a voting entity at the Board level in the PLSW. The upcoming changes to The Wyoming State Plane projections as we have all heard about are becoming a reality and will need to be dealt with and our ongoing efforts to reach out to youth here in Wyoming.

Summer is coming upon us soon with hectic schedules and demanding clients. I hope you all enjoy the opportunities of warm sunny days, fly fishing, camping (corner search) and exploring (bench mark recovery) that Wyoming has to offer.

Best Wishes to all,  
 Doug Boyd, PLS  
 President,  
 Professional Land Surveyors of Wyoming.

## LINES AND POINTS ARTICLE ROTATION SUBMISSION SCHEDULE BY CHAPTER

Responsible Chapter	First Call Date	Last Call Date	Publication Date
Northeast Chapter	<a href="#">THANK YOU! (SEE "BEARTOOTH RAVINE BRIDGE" IN THIS ISSUE)</a>		
Northwest Chapter	June 1	June 15	July 1, 2024
West Chapter	September 1	September 15	October 1, 2024
Central Chapter	December 1	December 15, 2024	January 1, 2025
South Central Chapter	March 1	March 15	April 1, 2025
Southeast Chapter	June 1	June 15	July 1, 2025
Southwest Chapter	September 1	September 15	October 1, 2025

As the Board of Directors discussed, any four page article (with pictures) may be from within the particular chapter membership (survey stories, or technical experiences) or after acquiring permission to use an article from another professional society publication or which provides information of interest to the PLSW members. The Board also approved assigning the responsibility for the article development and submission to each chapter's vice president. If a Chapter does not provide an article that same Chapter shall be obligated to provide an article for the next publish date.

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## ANNOUNCEMENTS

The NSRS enabling legislation which is identified as SF-17 as signed by Governor Gordon is available on the PLSW Website under the Lines and Points heading on the PLSW Website. The color is greenish and is the marked-up copy approved by the legislature and signed by Governor Gordon. Once the final version of SF-17 is published officially by the LSO, that document will betake the place of this document.

The Cumulative index has been prepared by Herbert W. Stoughton, PEPLS for Lines and Points and is complete as an index of all the Lines and Points issues and very professional. However, the actual assembly of all the available Lines and Points issues is incomplete and is planned to be available by the end of the coming summer to be included in the PLSW Website under the Lines and Points heading.



## HINTS TO AUTHORS

Dear Readers:

The editors of Lines & Points wish to convey our gratitude to the numerous authors who have contributed photographs, technical and professional articles, and other information to be incorporated into the quarterly journal. In recent years, the assembly and redaction of the submitted materials has taken on considerable technical application of the various English language compilers, office suites, and "publishing suites". This means that the communication and transfer of information and materials arrive at the editors' desktops in a multitude of formats and styles, which sometimes are not compatible with the PLSW personal computers.

We, the editors, are setting forth some simple rules for submitting materials which, hopefully will simplify your efforts and make the transition to the published version simpler and less time consuming.

1. If you have any questions or comments, please contact S. Dennis Dawson, Publications Comm. Chm., (dennieandbarb@gmail.com) or Michael A. Flaim, Editor-in-Chief (mike.flaim@bresnan.net).

2. If an article contains any illustrations, photographs, graphs, or other graphics, please transmit them as separate individual files. You may also include the illustrations within your manuscript, but the image integrity/quality is degraded seriously when attempting to extract them from the manuscript to create a published digital image. The Editor-in-Chief states that a much better digital resolution is obtained from the separate, individual illustrations submitted.

3. All submissions (electronic and snail mail) should be sent to S. Dennis Dawson (4005 Snyder Avenue; Cheyenne 82001). It is recommended a second copy be sent to Michael A Flaim (1212 Southwest Drive; Cheyenne 82007). It is further recommended a third copy be sent to Dr. Herbert W. Stoughton (2829 Carey Avenue: Cheyenne 2001. Dr. Stoughton has spent over two decades as a technical review editor of two national surveying journals, and will provide editorial/redactory review for grammatical presentation and punctuation format. The criteria for acceptable conformity to grammatical usage and punctuation shall be governed by the U.S. Government Printing Office Style Manual (any edition is acceptable).

4. It is strongly recommended that all submissions be transmitted six weeks prior to the publication deadline. The publication deadlines are: 1 January; 1 April; 1 July; and 1 October, annually.

5. Lines & Points is the official publication for the Professional Land Surveyors of Wyoming. Therefore, hence forth there will be incorporated in the publication all formal announcements pertaining to official business of the organization and other announcements. This includes announcements for the Annual Meeting; state-wide membership meetings; seminars; and the Fall Technical Session. These announcements are to be submitted to the PLSW Secretary/Treasurer John J. Studley (PLSW; Attn.: Mr. Jack Studley; P.O. Box No. 8; Cheyenne 82003) (jklz0318@gmail.com), at least four weeks prior to the publication deadline in which the announcement will appear. The PLSW Secretary/Treasurer will circulate the announcements to the Publication Comm. Chm.; the Editor-in-Chief; and the PLSW Board of Directors.

6. Advertisers and prospective advertisers should communicate directly with PLSW Secretary/Treasurer Studley about any advertisements and modifications.



## Richard "Dick" Inberg

Apr 23, 1936 - Feb 12, 2024

Memorial services are pending for Dick Inberg, 87, who passed away on Monday, February 12, 2024 at Help for Health Hospice Home in Riverton, Wyoming.

Richard "Dick" Inberg was born on April 23, 1936, son of Elmer J. and Lola B. (Emley) Inberg in Chicago, Illinois.

He received his primary and secondary education in Eagle River, Wisconsin. He attended and graduated from Michigan Tech in Houghton, MI in 1959 with a Bachelor's Degree in Civil Engineering with an emphasis on mining and surveying. He spent his college summers prospecting for gold in the Arctic.

Dick moved to Fremont County in 1959 to work in the uranium mines. He met Judith Rush at the El Torro Bar in Hudson and they were married on August 13, 1960 at St. Michael's Mission Church in Ethete, Wyoming. Dick and Judy had 4 children.

In 1959, Dick spent a few years working in the Uranium industry before starting the first of many businesses; Inberg Surveying, which then became Inberg-Miller Engineers and finally Apex Surveying. He loved to work and ran Apex Surveying until retirement in 2014. He was proud of his ability to work in remote places all over the West and especially liked working for mining companies staking mineral claims.

Dick loved anything in the out of doors. As a young man, he loved fishing, hunting, trapping and racing boats on the lakes and rivers of Northern Wisconsin. He played semi-pro hockey and was proud to have

played with members of the 1960 Olympic Gold medal team. Eventually he discovered horses and mules and began using stock to access his favorite hunting and fishing areas.

He loved Fremont County because he could hunt, fish, ride his mules and spend time exploring. Dick was a passionate advocate for wild lands, wild places and wild creatures and was never afraid to offer his opinion to government agencies or policy makers. He was generous with his outdoor knowledge and spent many patient hours untangling his children's fishing lines and making sure they caught the first fish.

Dick was not a religious man but felt a soul could be fueled by spending time in wild places in the company of family, dogs and mules.

Mr. Inberg belonged to many conservation and civic organizations. He was a founding member of the Continental Divide Trail Association, founding member and officer in the Wind River Backcountry Horseman, and Board Chair and Board member of Wyoming Wilderness Association. He was a member of The Lions Club and held several statewide and local offices. He was a fixture of the pancake supper and relished the role of pancake flipper.

Survivors include his daughters, Lee Ann Inberg-Schuff and her husband, Theo Schuff of Wilson, Wyoming and Mary Ellen Nelson and her husband, Tom Nelson of Highlands Ranch, Colorado; grandchildren, Andrew Nelson, Matthew Nelson, Kylee Nelson and Kipling Schuff; brother, John Inberg and his wife, Diana of Lasalle, Colorado; sister, Nancy Farrell and her husband, John of Guelph, Ontario.

Mr. Inberg was preceded in death by his parents; wife, Judith Rush Inberg and their sons, Kirk D. Inberg and Eric R. Inberg.

The family request no flowers. Instead they ask that you please donate to your favorite hunting or fishing organization in memory of Dick Inberg.

On-line condolences may be made at [TheDavisFuneralHome.com](http://TheDavisFuneralHome.com)

In Memoriam

# Frank Guliuzza, Jr.

28 May 1934 - 6 December 2023

Many of the PLSW membership never met Frank Guliuzza, because he was not a land surveyor! But anyone who was associated with the Geodetic Survey Squadron at F.E. Warren A.F.B. (the Squadron's headquarters) knew Frank. Frank was a geodetic field surveyor's surveyor! The undersigned heard about Frank in August 1980, but did not meet him for several months, because he was afield assigned to temporary duty in a survey project.

Frank was born in Marion, Ohio, to Frank and Georgia P. (Hoch) Guliuzza. In his youth Frank faced numerous challenges, and terminated his formal education in the 8th grade. That event did not inhibit Frank's desire to learn. Throughout his career, he enrolled in education and training courses offered during his military and civilian career. When he reached military age, Frank enrolled in the Navy, and served on the heavy cruiser USS Rochester during the Korean War. Later he transferred to the US Army (in the early 1960's). Finally, he transferred to the US Air Force, and entered the enlisted geodetic surveyor career field.

On 14 April 1956, Frank and Mary E. Simpson married. The couple raised three children - son Frank (deceased), son Randy (June), and daughter Robin Parkins (Chuck). Mary Guliuzza passed away in 2018 after 62 years of marriage. At the time of Frank's passing, there were five grandchildren and nine great grandchildren.

Frank retired from the Air Force in 1977 with the rank of Master Sergeant. He then went to


work as a surveyor for the Wyoming Department of Transportation. After a short period of time, Frank rejoined the Geodetic Survey Squadron/Defense Mapping Agency at Warren A.F.B. As a civilian Frank worked as a technical advisor for conducting field surveys supporting the Department of Defense's weapon systems and programs. Shortly after returning to the Squadron, Frank specifically was assigned to organize and implement a survey education/training program for the recently hired enlisted military and civilian personnel. For the duration of his tenure, one of Frank's important assignments was to train the newly hired field surveyors into the intricate tasks of executing field surveys; computing the results; and writing the technical reports for these surveys for various weapon systems. Nearly all the younger surveyors starting at the Squadron in the 1980's came under Frank's tutelage. Frank's laid-back style of teaching; his enormous wealth of surveying expertise; and his jovial demeanor were essential attributes for his success in the classroom and in the field.

The most important things in Frank's life were his family, his job, and golf - in that order! After retirement, Mary and Frank eventually moved to Sun Lakes, Arizona, where Frank could play golf all year round. After Mary's passing in 2018, Frank returned to Cheyenne for a visit and host a memorial service. His comment to this writer was, "I lost my best golf partner." Mary and Frank were more than wife and husband, but an equal partnership through life. Mary and Frank will be buried with a military service at the Cheyenne National Cemetery on 1 July 2024. The details will be published later.

author:

Herbert W. Stoughton, Ph.D., P.E., P.L.S., C.P.

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# BEARTOOTH RAVINE BRIDGE

(MAY, 2020 - SEPTEMBER, 2022)

By: Cody Witt, PLS





In early 2020, as everyone was going crazy with Covid, masks and the general decline of humanity; our normal project work had slowed down enough for us to look around and find an opening for a bid for to survey a federal highway project. The project was for a bridge that is outside of Cooke City, MT, on the scenic Beartooth Highway. The initial staking request seemed simple enough. They needed a survey for some offsets for concrete bridge supports, as well as, blue tops for two sections of road redesign on either side. With the project being snowed in for a few months out of the year, this would be a spread out over three summers due to weather constraints. We put in a bid for the contractor and got an email back later saying that we had been selected. Like all disasters, in the beginning, the project sounded simple enough and it was in a beautiful spot. Sounds great, right? Three years later we realized we had gone and officially "stepped in it," and signed ourselves up for what can only be described as an opportunity for personal and professional growth.

If you have never driven the Beartooth Highway it is definitely worth the drive. It has miles of switchbacks through the mountains with great views and wildlife all over. For me this turned into a five and a half hour drive in the dark from Gillette to Cody, WY, then up the Chief Joseph Highway to get to the site by 8 a.m.

In May 2020, we had a big kick off meeting in Cody, with Federal Highway Administration (FHA) representatives, state highway representatives, Forest Service representatives, and the construction contractor who we were sub-contracted under. We talked for a couple hours about the scope of the project, hopes and dreams, and general optimistic expectations for each other. After the meeting we drove up to the actual project site to begin recovering the control monuments. We dug the previously established control out of three feet of snow and observed them with GPS to create the control network for the site. The project was originally surveyed and designed in 2002, and was mothballed until they found \$25 million in the "Build Back Better" infrastructure bill. The wonderful, yet unfortunate for surveyors, thing about mountains is they tend to move. We found out quickly that the control coordinates we had been provided did not fit the monuments very

well at all. The project had stringent horizontal and vertical tolerance requirements and we were nowhere near those provided standards. We sent the contractor and the FHA a notice about the issue and they pretty much said roll with it since we do not have time to redesign. This should have been a pretty good indicator of what was to come.

I staked the limits to start stripping back the trees, existing asphalt, and the area to smooth within the rock field where the new bridge and straightened portion of road would be. We used GPS and, as the snow finally melted away, I traversed through the control points with the Trimble S7 robotic total station. Prior to this most of my projects had not required the accuracy of a total station so I was a little rusty but figured it would be a great refresher. Man, was I right. The discrepancies we saw with our GPS in less-than ideal terrain became pretty apparent when we started traversing and leveling through the control monuments. At first, I was blaming myself and wondering if I had messed up the traverse. I closed the traverse loop within reason but the control coordinates we were given didn't seem to match at all. We actually sent a letter to the Federal Highway Administration detailing our findings. The answer we got back was push on since they didn't have time to for a redesign.

After the asphalt was stripped back, they started clearing trees and building small work areas for the pads that the bases and columns would be built on. Building a good foundation for your bridge is important, right? The whole steep hillside consisted of four foot boulders and required quite a bit of shaping and crushed road base to be hauled in. The contractor had a work camp with a crusher, concrete plant and grizzly bears four miles down the mountain.

The two columns that would support the bridge were 70 feet tall and would require 125 yards of concrete and an impressive pile of rebar. To keep the columns from moving, the bases had eight piers each bored to a depth of 15-25 feet into bedrock. Then the large concrete bases would be built on top of the piers and the vertical column formed and poured in stages. As far as surveying goes, I would set nails and offsets for each set of forms. The contractor would build the forms and I would come back and recheck. We would then adjust pour, as needed, and repeat; building ever



so slowly upwards. I soon learned that reading a carpenter's level is not taught on the first day of concrete school. I learned the degree of precision I provided from my data was not needed for these "mud magicians." Close enough and field fit became the motto and they lived and died by it.

The main challenge for me on this project was the terrain. The road sides are very steep. One side is a rock wall and dense trees and the other side is a rock field that drops off severely. Having a vantage point from the control to a large portion of the work area was very limited and setting new control outside the work area, where it would not be destroyed, became almost impossible. There always seems to be that one little spot you can't see

from the gun on most projects, but on this project it was a constant frustration. In order to be able to see and stake the column bases in the bottom but also see along the bridge for the girder and road surface layout I ended up needing new control right on top of both abutment walls. Which was the worst place to expect new control to survive when they would need to excavate out six feet of fill to build the abutments, wing walls and girder supports. I set lots of extra control and they still seemed to destroy it about as fast as I could set it, and had to resection points back in on either end of the bridge from my extra points. I kept daily notes and was able to maintain good residuals throughout the project. After the first summer we



had successfully poured both support columns for the bridge. Construction had also begun on a mile of new road with Geotech retention wall and the blast crews had started blasting back 25 feet of a bad corner to allow better visibility and wider campers clearance.

Year two started with digging our control out of three feet of snow, again, to try and verify nothing had moved. The first order of business for the summer was to get the "dance floor" and the tops of the columns framed and poured. The abutment bases had been poured but we needed to finish the wing walls and backfill, so we could finalize and set the steel girders. I should note that during this entire project the road was open during daylight

hours. We had flaggers leading single file lines of tourists and gawkers driving between Cooke City and down the pass to Red Lodge, MT. The longest delay that I'm aware of was 45 minutes. The blasting crew would set charges in the evening and work all night to clear the spoil to make sure the road was open and passable by 7 a.m. the next morning.

The column tops were framed on what is called the "dance floor." It is the work platform used to set the rebar cage and concrete forms. The whole thing was adjustable on two and a half inch bolts that were anchored into the concrete column. After everything was assembled, I got the call to come check the height and position and we adjusted it to the designed base height and recheck the

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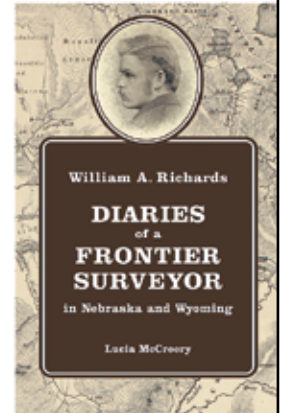
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forms. The girders for the bridge land on steel wear plates that are bolted to the column tops. Seasonal expansion is expected in girders so the plates allow the bridge to stretch lengthwise and slide. The plates needed to be within 5mm of the design so lots of care was taken to make sure they ended up in the correct location.

The abutment walls were finally completed and the end of summer brought that nerve-racking deadline and the arrival of the girders to be craned into place. Each girder was 130 foot long and custom welded with the superelevated reverse curve prebuilt into them. It was very impressive to see 5 foot tall, 1 inch thick steel beam curved and bent into that big of a shape. I also would like to commend the truck drivers that drove them down the switchbacks to even get to the project site. The sigh of relief I felt when they

hit the plates and bolted up was incredible. It was finally starting to look like a bridge.

The focus of year three was the bridge deck and paving. A survey of tenth points to compare the girders design with actual elevation was needed to start laying out the deck. I got to walk all four girders and collect these points while tied off seventy feet in the air. Shots on the edges and center of each girder were taken roughly every two meters for the full length of the bridge. The deck contained an immense amount of epoxied rebar. Concrete curbs with drain holes were framed up and the guide rails for the Bidwell concrete paver machine were laid. The whole deck had support screws that could be adjusted up or down. The deck was poured in three large sections (Abut1 to Column1, Column1 to Column2, and Column2





to Abut2). It is important to realize that adding tons and tons of concrete to the forms will settle the girders lower and change our previously surveyed tenth points. The weight of the rebar, forms and concrete and the distance from the solid support of the two end abutments or the two main columns changes how much sag is calculated. I shot the tenth points and then we add the vertical deflections, to account for the sag. We created a sheet for the crew with the station and elevation for them to set the deck to. Engineers can be helpful, who knew. Before they started the pours we resurveyed the deck height and they adjusted it to fit the design sheet. I was pretty impressed they were within a few centimeters on the whole deck so only minor tweaks were needed. With the final checks done the concrete trucks started rolling again from the work camp.

With the deck poured and both concrete approaches poured. The next task was red tops and blue tops for the contractor to finish the subgrade and prepare for paving. The bridge spans Beartooth Ravine and has views of a waterfall and quite the outlook so the design called for

an interpretive site pullout for everyone to park and take their Facebook photos. A small ten spot parking lot and divider was designed along with the road reroute. This included some curb and gutter, sidewalks and access ramps and an island. More nails and offset hubs were set for the crew to pour the curbs and start paving. The last day on site included marking out the paint lines for the road and pullout, shaking hands and hauling butt home before they could call me back.

This project was a not what I was expecting at all but I think that it turned out nice. I got a chance to get stretched as a surveyor and through some discomfort I learned a ton. I never want to build a bridge again in my life, but if pushed into a corner, I've at least proven to myself that I can. I don't miss the 18-hour days driving over, surveying and then driving back. But I got to see some amazing country, work on the biggest project of my career and learned a ton. Have you ever wanted to be a whipping post for the government and construction contractors? If you answered yes then building bridges might just be for you.

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# Thoughts on Professional Practice and Education

## Article 6: Licensing With and Without A Degree

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

This is the sixth article I have prepared in the series offering thoughts on professional practice and education. In this article, I wish to review survey licensing requirements. I have noted that a graduate of a surveying course of study will likely seek multiple state survey licenses. More practitioners seek multiple state licensing than when I started my surveying practice. It is common for four-year surveying graduates to be licensed in two or more states. I know of one individual licensed in more than a dozen states. As I look back on fifty years of surveying practice, over that time, I have held licenses to practice surveying in six states.

While the reader is probably aware of their state licensing requirements, a review of licensing requirements nationwide is appropriate. Requirements for licensure among states vary.

More than 25% of states require some formal education in order to be licensed. Not all of these

states require a surveying or geomatics degree. The most stringent academic requirement found for licensure exist in states that require a surveying or geomatics degree from an ABET accredited program.<sup>1</sup> Some states relax this standard slightly by not mandating an ABET accredited surveying or geomatics degree. Relaxing academic restrictions even more, some states accept any four-year degree with a certain number of surveying credits. Next in academic laxity is a state allowing any four-year degree without specific surveying credits. Some states will permit a two-year surveying or geomatics degree with a certain number of surveying courses. Finally, a number of states continue to allow licensing by experience only. Two-years of experience is a minimum requirement coupled with education. The norm for experience among states appears to be four-years of experience coupled with education. More experience is required when there is less formal education.

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It stands to reason that a person wishing to pursue licensure as a surveyor with the widest possible opportunity for employment and licensure in the United States should meet the most stringent state requirement for licensure. The person casting a wide net for employment or licensing should obtain an ABET accredited four-year surveying or geomatics degree. There are several universities in the United States and foreign countries with excellent programs that are ABET accredited. Some offer accredited surveying degrees entirely through distance education. Individuals can achieve an ABET accredited degree without leaving their state.

This wide diversity of pathways allowing surveying licensure reveals differing opinions nationwide and within state societies as to what should be the requirements for licensure in a state. The issue has been firmly settled in some states. It is a source of great debate in others. This article is not intended to create controversy in states that has had the controversy and has settled the requirements.

A person that does not have a degree or possesses a degree not accepted in a state of their residency or employment can always seek licensure in another state should they wish to show professional achievement. Of course, I must stress that a person working in one state holding a survey license in another state cannot necessarily provide surveying services in the state where they work. The surveyor must hold a license in the state in which services are offered or performed.

I would also caution that in many states holding a valid survey license to practice in the state is not sufficient. The person must also hold a certificate of authorization (COA) or similar business license or work for a firm that does hold a certificate of authorization in the state. I have seen many disciplinary citations issued to out-of-state firms that incorrectly believed that they could provide services in a state by simply having an employee of that firm licensed in the state. I would also caution that the out-of-state firm must often pay income taxes to the state and in some case the municipality in which they performed their services and received payment. A most frustrating time in my past was when a municipality in a state I was not

a resident demanded I pay an income tax on a small fee I received for services completed in that municipality. Had I been aware, I would have refused the services or doubled my fee to cover the frustration and time to do the extensive paperwork involved in paying a municipal income tax.

I would also like to dispel some misconceptions that surveying must be thought of as a 'lesser' profession or not a profession at all because individuals can be licensed without formal education in the professional field. I suppose some judges or legislatures feel and have ruled otherwise. Their position allows them to have an opinion that establishes the definition in that state. It is a fact of life that an opinion of a person in power means more than an opinion of some other person.

The fact is there are other professions that surveyors work alongside that permit licensure without a formal education. As I write this article, Washington, Vermont, California and Virginia allow an individual to become a member of the bar without graduation from a law school. Wyoming, New York and Maine allow individuals to be members of the bar without a juris doctorate (J.D.) degree so long as the individual has at least some law school courses.

Not all states require an engineering degree to become a professional engineer (P.E.). Some state permit engineering experience alone to qualify for licensure.

I am sure that some individuals reading this article will wonder what my opinion is regarding a requirement for formal education in order to obtain a survey licensure. I have five degrees and taught in a four-year surveying program for more than thirty years. My background would suggest I am a strong advocate for a degree requirement. Yet surprisingly, I am not in favor of mandating education in order to become licensed. My first surveying licensure was obtained based on my surveying experience alone. There is no question that I learned more about surveying by obtaining my B.S. degree. I also learned a lot more about surveying when obtaining my M.S. degree followed by my Ph.D., and, lastly, my law degree. The fact that I learned more about surveying upon attaining each degree, doesn't mean each degree should be required for licensing.

My opinion is that an individual that passes the fundamentals of surveying exam, professional surveying exam, and state specific exam has the knowledge necessary to competently practice surveying. Competent practice demands a minimum level of knowledge - not retention of all knowledge possible. A degree will instill the information in less time, with a better understanding, and with more extensive knowledge. Yet, an intelligent individual, through self-study, and extensive experience can also gain the minimum level of knowledge for competent practice. I believe the important point is whether the individual has the knowledge, not the way the knowledge was acquired. Some of the best surveyors I have ever met or followed had no formal education or a two year degree only.

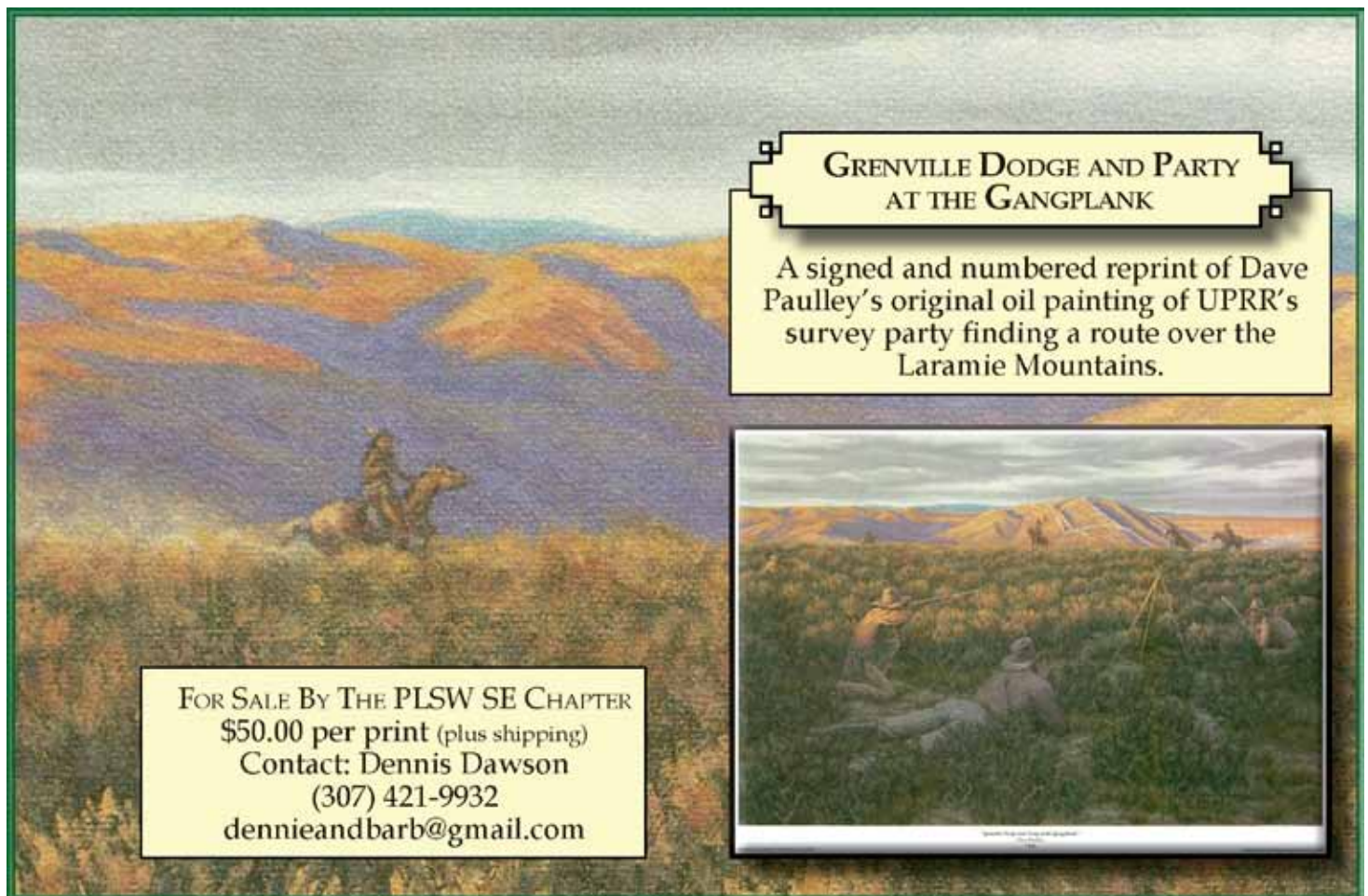
<sup>1</sup> A search portal that provides ABET accredited surveying programs can be found at <https://amspub.abet.org/aps/category-search?disciplines=69&disciplines=67>

<sup>†</sup> Other books and articles by Knud can be found at <https://umaine.edu/sot/faculty/hermansen-articles/>



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