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LINES & POINTS

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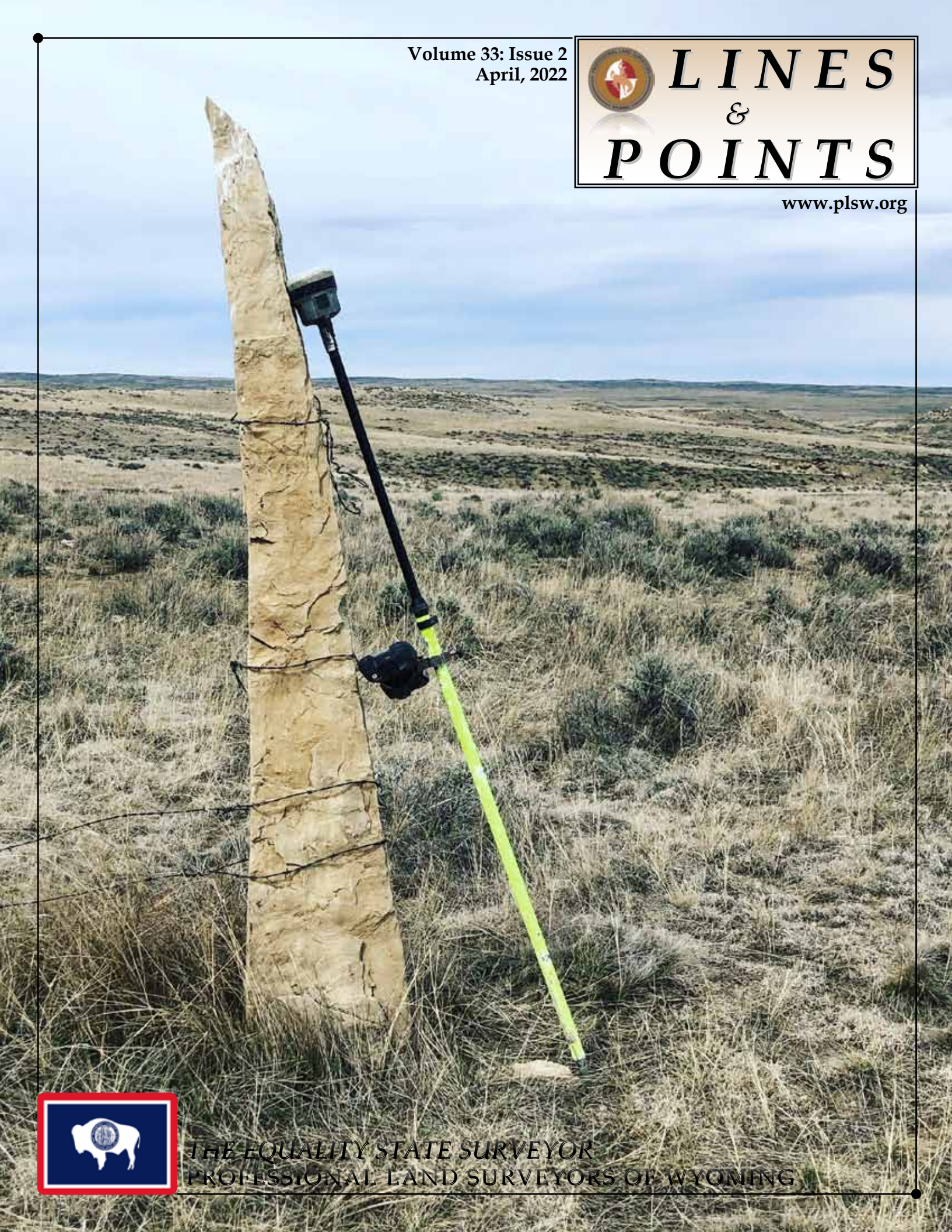

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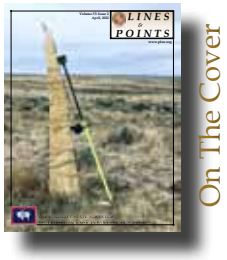

On The Cover

NE Chaper Photo No 6

photos 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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Quarter Page	$310	$80
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Special Rates apply for PLSW Chapters and cover placements.

For more information please contact Jack Studley.

PRESIDENT'S MESSAGE

How time flies! Winter seems to be releasing its grip and we're staring spring straight in the face. As we get back into our busy season, make sure to take care of your people, especially coming off a busier-than-normal winter like many of us have experienced. With the staff shortages in our profession, burn-out is a real concern and we must keep an eye on our employees. And, lest you think, "I'm just a party chief; I don't have a leadership role," I would urge you to not think of leadership as a rank, but as a choice. Anyone in an organization can be a leader. As Simon Sinek says, "it's choosing to look out for the person on your left and look out for the person on your right." If you're a crew chief, let your field tech. know that you appreciate them. If you're a staff surveyor, let your crew chief know that you see the effort they put in. If you're the president of your company, make sure to show thanks to your employees; a few small words can go a long way when someone is feeling the pressure of the daily grind.

I have the image of the grizzled old surveyor in my mind saying, "when I was younger, I just did the job I was hired to do without the need for constant acknowledgement and appreciation." This may be an unfair exaggeration, but many of us probably have a thought like that lurking within to some extent. Times change and so too should we. Providing leadership and appreciation to our co-workers and employees has the distinct benefit of them giving loyalty and hard work in return. Truly, something as simple as "good find on that monument" can make someone stand up a bit straighter, or maybe a gift-card to a local restaurant is in order after completion a particularly grueling project.

In PLSW Board news, we met shortly after the WESS convention and debriefed the survey attendance and speaker. We continue to believe the PLSW-WESS partnership is valuable and want to make sure we provide our members a good value in the conference. By my count, we had 20-25 people in live attendance at the survey sessions (I have not gotten the numbers for virtual attendees). The Board was willing to cover the costs of the speaker this year without charging any additional fees to attendees of the survey sessions, and I believe the Board would consider that move again in the future, but we want to make sure you all find value in that. Please reach out to your local chapter's director, or any of us board members, and let us know what you think. Should we continue to have a paid speaker at both the Fall Tech. Session and the WESS convention? Or did you prefer the previous method at WESS in which we had mostly vendors and governmental agencies do one-hour sessions on different topics? If you have not attended WESS in a while, or never have, is there anything we could do to provide a worthwhile experience that would convince you to attend in 2023?

Finally, I had the opportunity to attend the technical advisory committee meeting of the Surveying and Geomatics Engineering Technology program at Idaho State University in Pocatello in February and then meet with some of the staff of both the Geomatics and Civil Engineering Technology programs in person and get a tour of their facility in March. Robert Liimakka, Geomatics program coordinator, is doing a wonderful job of creating a 4-year surveying curriculum that can be delivered either in person or virtually. As I understand, the virtual option has a single rate per credit hour, whether the student lives in Idaho, Wyoming, or Florida. Their enrollment is strong and its great for us to know that, while UW has provided so many surveyors in the state a great education, there are options for our future surveyors in neighboring states as well.

Good luck out there and stay safe!

Matt Gotham, PLS
President - Prefessional Land Surveyors of Wyoming

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Surveyor Position Opening
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Computer skills are required. The applicant must have extensive experience with AutoCAD. Experience with Trimble Business Center and Trimble GPS equipment is preferred. The applicant may provide assistance with UAS (drone) operations, and may have the opportunity to obtain FAA Part 107 certification. An LSIT certificate is preferred, but not required.

Job Requirements:
Minimum Age: 18
Hiring Requirements: Drug Testing/Screening, Motor Vehicle Record Check Education Level: 2 Years of College or a Technical or Vocational School
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How to Apply:
Accepting online applications or resumes at Wyomingatwork.com, or you may apply in person, email, fax, or mail. Applications and/or resumes will be accepted through April 15, 2022, or until filled.

Contact:
Cevin Imus, President
Phone: (307) 682-1661; Fax: (307) 682-1660; Email: cimus@lsi-inc.us

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 Mike Flaim (1212 Southwest Drive; Cheyenne 82007).

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.

Lines and Points Article Rotation Submission Schedule By Chapter

Responsible Chapter	First Call Date	Last Call Date	Publication Date
Northeast Chapter	THANK YOU!! (see "*Mentorship and Surveying*" in this Issue)		
Northwest Chapter	June 1	June 15	July 1, 2022
West Chapter	September 1	September 15	October 1, 2022
Central Chapter	December 1	December 15, 2022	January 1, 2023
South Central Chapter	March 1	March 15	April 1, 2023
Southeast Chapter	June 1	June 15	July 1, 2023
Upper Platte Chapter	September 1	September 15	October 1, 2023
Southwest Chapter	December 1	December 15, 2023	January 1, 2024

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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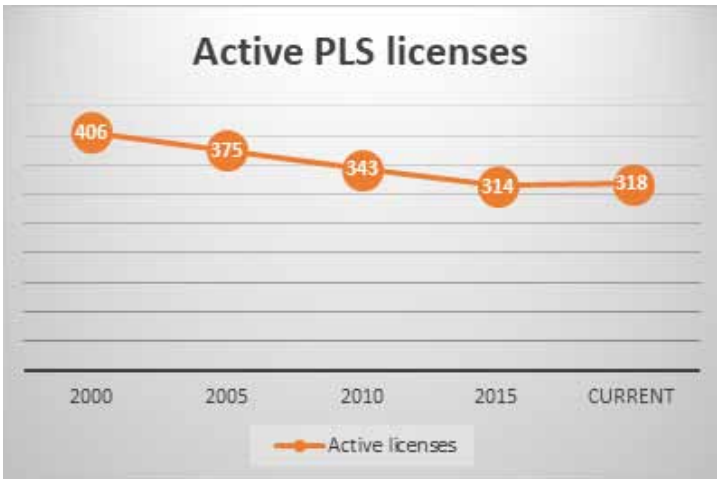
Mentorship and Surveying

by Cody Witt, PLS

I didn't know what I wanted to be when I grew up. I was working at a ski resort and didn't know what I was going to do when the resort closed down for the season. When talking with one of my team leads, she said I should put in for a job with her as a seasonal survey tech with the BLM. I knew absolutely nothing about surveying but was excited to try something new. My first survey boss was named John Bunce. John was just wrapping up a 30-year career with the Forest Service and BLM between Idaho and Montana offices. Over the course of my first summer, I got an introduction/education into the basics of the PLSS, searching for stones, marking bearing trees and trying to keep up with a 70-year-old mountain goat. I spent two summers under John as head hole digger, GPS tech and gopher and loved every minute of it. I was hooked and realized that this was something I wanted to do so I changed colleges and my major.

John retired from the BLM and I was placed under a new Cadastral chief for my next summer. Tom Trzinski was a construction surveyor and former Marine. He was switching to federal employment after getting burned out on the building high rises in Chicago on the private side. Tom was pretty much Magnum PI complete with the Hawaiian shirt, cigar and bourbon. He was a hard ass but was a great chief and I loved working with him. I gained more experience with the total station and taking notes. I was yelled at when I screwed up and encouraged when I did things right.

These two men opened the door to surveying for me and taught me a ton. They were passionate about what they did and it was infectious. I learned so much from both of them and still smile when I think of the crusty old dudes and the greenhorn they were saddled with.



Everyone's story on how they got into surveying is different. Some had fathers or family members they are carrying the torch for and others like myself were innocent bystanders who were sucked in. I hope however you found your way that you had your own crusty party chief that took the time to invest in and teach you, help you, and maybe even harass you. All these things make for a great mentor.

Mentorship can take many forms. Its not always a gray-haired wizard showing you the deep secrets of the universe. It can be the guy or gal in the cubicle across from you that simply has experience with something you don't who is willing to teach you. Mentors usually fall into one of three categories.

First, there are Examples. Examples can be people that we look to with respect and admiration and strive to personify. As surveyors we all know people that do great work and are a pleasure to follow behind. They document everything and make judgement calls based on sound practices and reasoning. The other end of the spectrum is the name and number that comes across your desk and you cringe. From past experience or reputation, we worry about the mess we might find. What information is missing or corners were cut. Both of these extremes and everything in-between serve as examples. You can learn what to do or you can learn what not to do, but the important thing is to learn.

The second type of mentors are Coaches. These are the people that we have allowed in our circle and put in a position to challenge us and push us out of our comfort zones. They are someone you actually know; not just know of. They see something in you and are interested in your growth. They will tell you to do better, be better or push you on the next step in your growth and development. These can be a boss, a coworker or friend in the industry. They know your strengths and weaknesses and together you can come up with a plan for your success.

The last type of mentors are Sponsors. These again are people that you know and believe in your goals and plans and will put your goals with their goals. They will open up doors for you and put their name on the line with yours. A good boss can fall into this category they realize that when you succeed that the company succeeds as well. They have their bottom line to consider but should want you to grow and move up within the organization.

How does mentoring relate to surveying? Our entire licensing process is based on working under a licensed surveyor so that hopefully some of that knowledge and wisdom wears off. You should learn how things are done and why things are done a certain way. It also requires multiple references. Ideally a person would work under multiple surveyors to broaden their understanding and experience. College education is a good introduction and provides the basics but the field experience and hands on training under an experienced mentor is the real education. Hopefully there is give and take where both sides learn from each other. When unique challenges during a project arise the mentor and mentee can discuss possible solutions together.

Each person's position and journey are different and come with unique challenges. As an owner you may struggle with advertising and selling your business to potential clients. You might be a good surveyor but struggle when you get promoted to survey manager and now have to manage people as well as projects. You might be a fresh tech or college grad and an eager ignoramus. You want to get busy making your mark but need some guidance and pointing in the right direction. Each of these are an opportunity for us to reach out and learn from someone who has done it, and whether they failed or succeeded, are willing to share what they learned in the process. Don't be afraid to ask for help or ask for a second set of eyes when you're struggling or when you're succeeding.

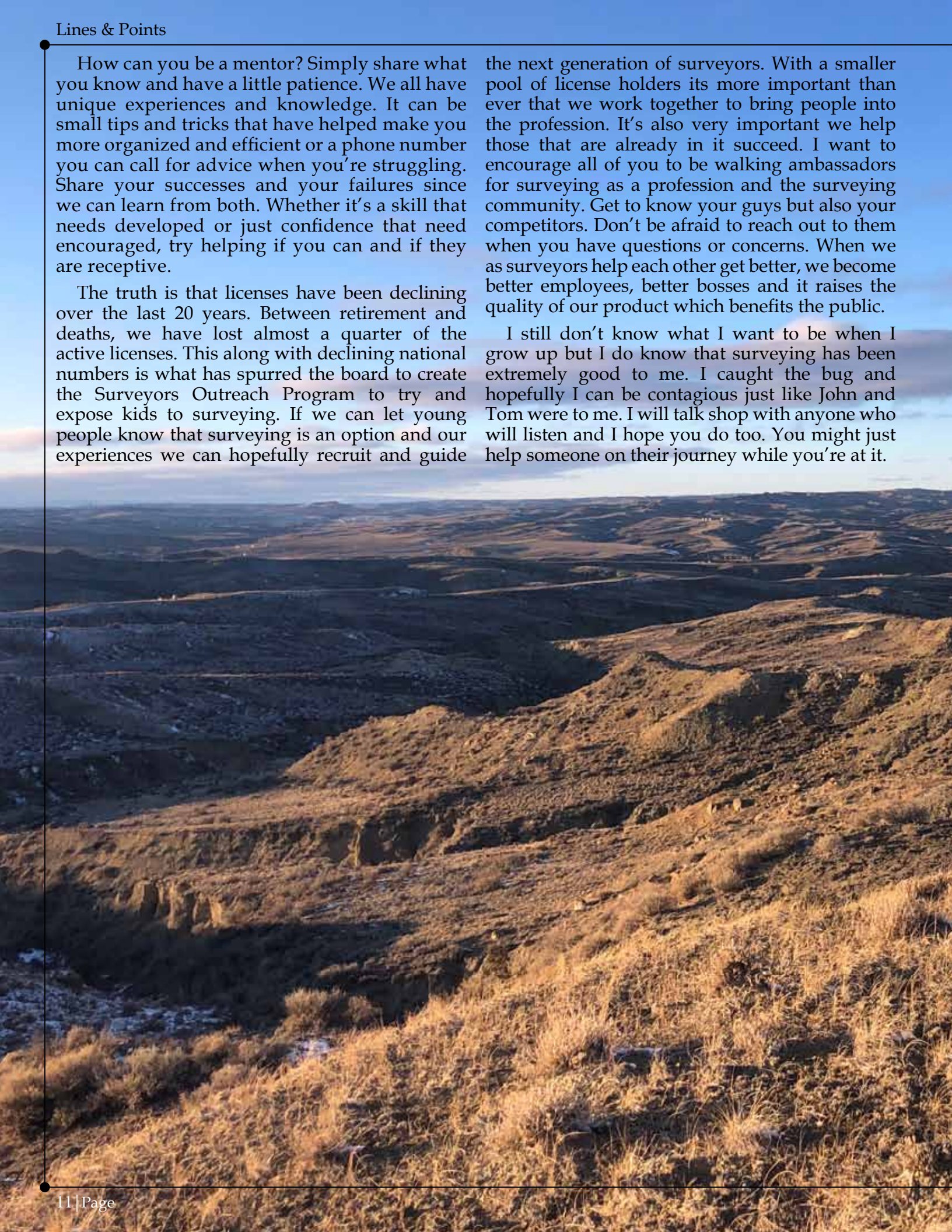
Ignorance is not a sin. The fact is we don't know what we don't know, but that shouldn't stop us from trying to learn and grow. For example, one of the downsides of new technology with smaller crews is it can lead to a gap between the office and proper supervision. If a tech or crew is sent to collect data, what they collect and don't collect matters. The decisions they make in the field can greatly affect the "picture" the office gets and the outcome of a survey. They need to have the right training and understand that they are the eyes on the ground if they are working separate from the LS in the office. Recognizing areas where you need to improve should always be on your mind. Personal development is your responsibility and no one has as much to gain from your growth as you do. A mentor can suggest things but it is up to you to actually do the work. Whatever level you're at we all need to take stock of what we are doing and how we can do it better.

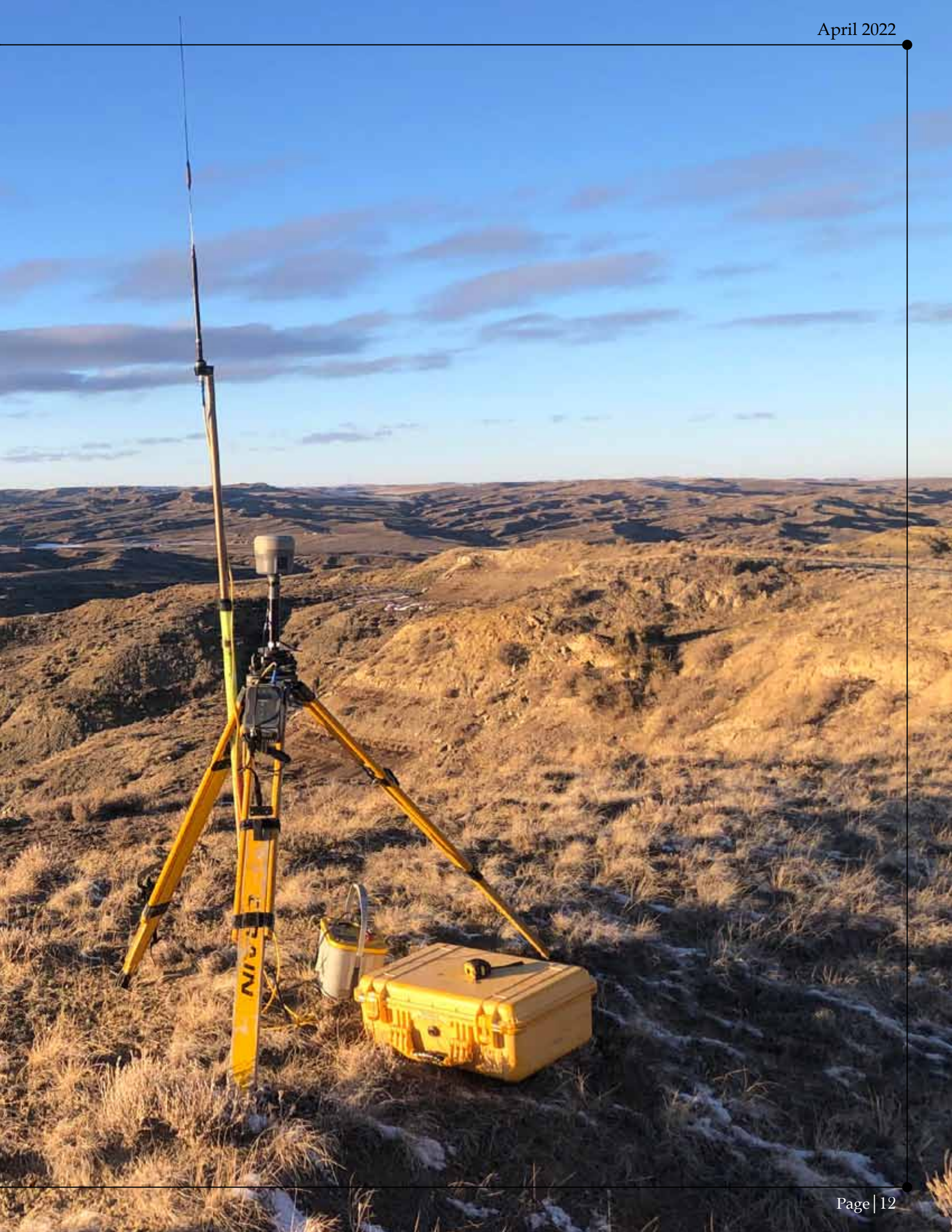
How do we find mentors? If you need a mentor look around your circle for someone you respect and have a relationship with. Someone who can be objective and honest with you about your strengths, weaknesses and the goals you're trying to hit. You also need to grow your circle. Getting to know your fellow surveyors and building new relationships is a great way to find professional mentors and can be a huge resource for you.

How can you be a mentor? Simply share what you know and have a little patience. We all have unique experiences and knowledge. It can be small tips and tricks that have helped make you more organized and efficient or a phone number you can call for advice when you're struggling. Share your successes and your failures since we can learn from both. Whether it's a skill that needs developed or just confidence that need encouraged, try helping if you can and if they are receptive.

The truth is that licenses have been declining over the last 20 years. Between retirement and deaths, we have lost almost a quarter of the active licenses. This along with declining national numbers is what has spurred the board to create the Surveyors Outreach Program to try and expose kids to surveying. If we can let young people know that surveying is an option and our experiences we can hopefully recruit and guide the next generation of surveyors. With a smaller pool of license holders its more important than ever that we work together to bring people into the profession. It's also very important we help those that are already in it succeed. I want to encourage all of you to be walking ambassadors for surveying as a profession and the surveying community. Get to know your guys but also your competitors. Don't be afraid to reach out to them when you have questions or concerns. When we as surveyors help each other get better, we become better employees, better bosses and it raises the quality of our product which benefits the public.

I still don't know what I want to be when I grow up but I do know that surveying has been extremely good to me. I caught the bug and hopefully I can be contagious just like John and Tom were to me. I will talk shop with anyone who will listen and I hope you do too. You might just help someone on their journey while you're at it.





Random Thoughts

In October 2015, a land surveyor member of the Wyoming State Board of Professional Engineers and Professional Land Surveyors, contacted the undersigned concerning a proposed change in the NCEES model rules concerning processing an applicant possessing a Ph.D. (Doctor of Philosophy) in Surveying being eligible for admission or waiver to the FS (Fundamentals of Surveying) and/or PS (Professional Surveying) examinations. The reason for his request was that NCEES has had a similar procedure (and parallel procedure) for professional engineering licensure and/or registration in place. He is a member of the NCEES committee seeking information, guidance, and recommendations as to having a parallel procedure for land surveying applicants.

The following Memorandum for Record is a written response submitted by the undersigned. The following remarks are solely the opinion of the undersigned and are not the opinion of or endorsed by the Board of Directors of the Professional Land Surveyors of Wyoming.

9 November 2015 - Memorandum for Record

Subject: NCEES waiver of the Surveying examinations.

1. The potential waiver for doctoral candidates in surveying and/or geomatics has several administrative impediments.

a. In general (probably at the level of two sigma or three sigma), the graduate curriculum in surveying and/or geomatics does not address "land surveying"; real property/legal aspects; and administrative, regulatory, and case law. The major emphasis of the subject matter for these graduate programs is either geodetic/engineering surveying or geographic information systems (GIS).

b. The predominance of the graduate GIS academic programs address GIS "inventory assessment" tools and gaining training experience in operating "product" software.

c. Nearly all the current academic faculty (both graduate and undergraduate) have little formal education and professional experience in even the rudimentary aspects of land and real property surveying and the associated law/legal aspects as practiced in the United States. If the credentials and current work efforts of the academic faculty in all the leading four-year and graduate academic institutions in Canada and the United States are reviewed, the level of education, experience, publications, and research pertaining to land/real property surveying and the associated intellectual disciplines would be less than ten percent of their total subject matter expertise.

d. Most of the academic programs offering graduate programs are housed outside the engineering and engineering technology schools/colleges. If the programs are not in the engineering/engineering technology forum, the core requirements in mathematics and physical/natural sciences are minimal, and generally reflect the administrative organization's core requirements in the other academic programs. For example: if the program is in the department of geography (where several graduate GIS academic programs exist), the minimum requirements in mathematics is algebra (and possibly trigonometry) (three to eight semester credits) and two entry level natural science courses (usually summary subject matter courses).

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e. A significant majority of the graduate students in GIS programs do not have formal undergraduate education in surveying and mapping. Therefore, they do not have a formal understanding of the procedures, philosophy, and analysis of precise mensuration and statistics. Invariably, an in depth understanding of systematic, constant, and accidental errors in refined mensuration programs has never been introduced into those undergraduate or graduate programs.

f. With very few exceptions, graduate faculty are expected to seek and provide no less than forty percent of their salary, benefits, and the appropriate administrative financial overhead through consulting and sponsored research. I personally know of an outstanding associate professor in one of the leading post secondary surveying academic institutions who taught and performed significant contributions in professional and technical societies both nationally and internationally. He was denied promotion to full professor (according to his dean), because he did not have a large sponsored research program. At the University of Maine, Orono, there was a major (internal) confrontation between the surveying faculty and the GIS faculty. The dean of the College of Engineering divided the department of surveying, retaining the GIS portion in the College of Engineering and "sending" the survey portion to the College of Engineering Technology. His argument was he wanted the research money, and that the surveying portion was not "paying its way". There was a similar, nearly successful, attempt to remove surveying from the College of Engineering at Purdue University. From the beginning of the twentieth century, until 1941, there existed a department of surveying and geodesy at the University of Michigan. Because it was a small department, it was assimilated into the department of civil engineering. When Ralph Moore Berry, Professor of Geodetic Engineering, retired in June 1974, the civil engineering faculty recommended that he not be replaced and the academic program be moth balled. The same has taken place at Pennsylvania State University; University of Wisconsin; University of Minnesota; University of Illinois; University of California at Berkeley; Rensselear Polytechnic Institute; Massachusetts Institute of Technology; Yale; U.S. Military Academy; Georgia Institute of Technology; Oregon State University; Union College; University of Vermont; University of Cincinnati; and University of Washington, to name a few examples.

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2. A significant number of the technical courses/aspects of the surveying and mapping programs is "button pushing". This has several ramifications.

a. In the last four decades, I have encountered numerous "improved" technologies, particularly in data observation, data collection, data reduction, and survey data adjustment which have serious imperfections. Many of these shortfalls resulted from the lack of technical, theoretical knowledge required to develop an operating system, in any one of these components, and having the sensitivity equivalent to the improved technology.

b. One of the major factors contributing to these problems is the "universally" published technical literature. The "general" surveying textbook remains unchanged since Professor William Gillespie (Union College) wrote his work (1855). A number of the "elementary" surveying textbooks published in the last three decades degrade the professional image. They, the elementary surveying "textbooks", degrade/demean the background intellectual body of knowledge (physical science; mathematics, statistics, etc.) and utilize inelegant English prose and grammar. I personally had several encounters with academicians in this arena. Case I: When teaching at a two-year academic program and being visited by an accreditation team, I was asked how could I teach rigorous least square adjustments to my students, when this team member, from a four-year program, stated it was impossible at their institution. My response was that I had performed least squares adjustments for over a decade, both long-hand and with digital computer (triangulation, trilateration, differential level nets, and traverses), for professional, non-academic assignments for over a decade. Case II. In the second encounter, I was teaching the second plane surveying and plane surveying computation courses, in which I introduced five different trigonometrical and surveying figural area computations of plane figures. A faculty from a "leading" four-year surveying program called this approach "over kill". My personal/professional philosophy was that the intention of this treatment was to introduce the students to the concept of the existence of alternative solutions to a particular problem which would produce equivalent (and professional) results.

c. Since World War II, the "definition" of the surveying (usually called land surveying) profession has been increasingly narrowed. This "narrowing" has altered the career path of work assignments to achieve the minimum land survey professional qualifications. Even if an individual had an appropriate associate or baccalaureate degree, the career path was: rod man - note keeper/recorder - instrument man - party chief - project surveyor trainee/project surveyor. To date, this philosophy has basically remained unchanged. When I was a land surveyor member of the New York State Board for Engineering and Surveying, it was very common to observe that the applicants had less than five percent of their reported experience performing legal/courthouse research, performing the final legal solution analysis, and writing legal descriptions.

d. Another problem with the image of the profession results from interpreting public statements provided by the land surveying profession. In a professional journal one advertisement stated: ". . . seeking a registered professional surveyor (or be on the track to be able to sit for the PLS exam soon) . . .". The statement is a "cop-out" for desiring a professional person, but willing to accept a technician. The second advertisement read: "Candidate must be familiar with CAD & robotic survey equipment." This statement means the individual has a level of operational competency, which can be achieved by a technician. Also, the question is begged, if the potential candidate is hired, is there a land surveyor registrant superior/supervisor who will be able to "sign-off" on the applicant's subsequent work experience for professional registration [because there must be no "blank" experience, time intervals]?

3. Personal Observations.

a. The reader has probably comprehended that the undesigned has a very strong opinion about surveying education and the qualifications for academicians and practitioners.

b. In the 1950's and 1960's the American Society of Civil Engineers, American Congress on Surveying and Mapping, and several state professional land surveying societies (particularly Michigan Society of Registered Land Surveyors (MSRLS)) addressed the role of professional land surveying. The first of these papers was the Austin Barry report (ASCE). Several other professional papers, which are in the files/ archives of the undersigned, also addressed the theme. The MSRLS was asked by the Michigan Board

of Registration to develop a four-year curriculum in surveying to satisfy the recently enacted legislation requiring a four-year degree for land surveying registration. The Michigan Society of Professional Surveyors report [to which the undersigned had first-hand knowledge of the committee's deliberations], accompanied by the Ralph Moore Berry minority report (which was not negative, but pro active of the MSLRS final report) provided a detailed curriculum under the engineering philosophy. In that era, every author/committee believed that surveying was a branch of engineering. These papers/documents subsequently have been relegated to the dust bin. Since the mid 1970's, there has been no significant or seminal paper or report addressing the problem or issue. The national surveying educators' meetings have been silent in this matter.

c. Since the 1950's, the paramount philosophical question is whether Is Surveying a Branch of Engineering? But to specifically address and answer this question, the underlying, fundamental question requiring a definite definition is What is Engineering? or What are the Definitive Definitions of the Subject-Matter Topics of Engineering? For nearly seven decades, there has been a widening difference of philosophies between the engineering and surveying (land surveying) professions (by both professional practitioners and academicians). One professional entity (engineers) believes that they are the professionals, and that the other professional entity are only technicians.

d. In a number of states, the combined professional engineering and professional land surveying boards have been separated into two separate and distinct entities.

4. Questions should be directed to the undersigned.

Respectfully submitted,

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

Below is the Trig-Star Answer Key. Find the problems within, "Are you smarter than an eleventh grader", by Darby Schock, PLS in Lines and Points (January, 2022)

TRIG–STAR ANSWER KEY LOCAL CONTEST

PAGE 1

∠ ACB =	43°56'41"
DISTANCE AB =	724.85

PAGE 1

∠ EGF =	22°39'25"
DISTANCE EH =	212.57
DISTANCE FH =	208.82
DISTANCE FG =	542.08
DISTANCE GH =	500.25

PAGE 2

DISTANCE AB =	535.21
DISTANCE AD =	784.91
DISTANCE AC =	875.21

PAGE 3

ARC LENGTH AE =	48.00
DISTANCE AB =	108.72
DISTANCE BC =	199.19
DISTANCE DE =	159.25
CHORD LENGTH AE =	46.91

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