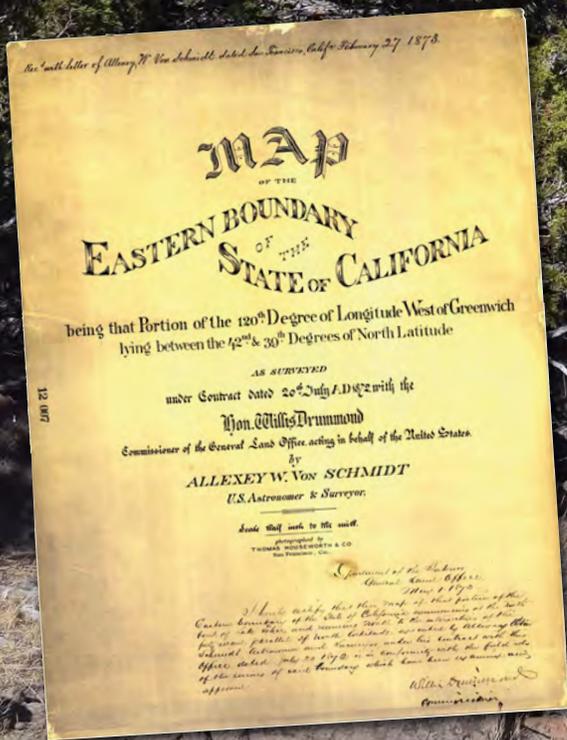




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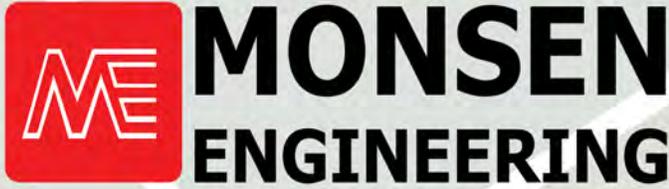
CALIFORNIA

ISSUE #189
SPRING 2019



Cover image shows a recent photo of the monument marking the North corner common to the states of California and Nevada. An inset image of the map prepared by "U.S. Surveyor and Astronomer" A. W. Von Schmidt is also shown. The controversy and confusion resulting from this jurisdictional boundary survey were highlighted in the opening session at the 2019 CLSA/NALS Conference. See article on page 7 for a full summary. **Cover photo courtesy of Paul Pace.**

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SURVEYOR CALIFORNIA

ISSUE #189
SPRING 2019



COLUMNS

President's Message – Annette Hovorka	2
Editor's Message – Paul Mabry	3
Legislative Report – Michael Belote	4
Central Office Report – Kim Oreno	5



FEATURES

2019 CLSA/NALS Conference Wrap-Up	7
Meet CLSA's Officers and Editors	11
An Experience Worth Remembering	15
Which Drone Sensor is Right for Your Business	18
Utilization of the Raw Intensity Return from Laser Scanner Measurements	22
A Monumental Round Table Meeting Hath Taken Place	25
Update on Education	29
CLSA Resolution #2018-08	30

2018 Photo Contest Winner: Steve Hennessee



"Los Angeles Chapter Camaraderie"

Matadore Bowl, Northridge, CA December 6, 2018

The *California Surveyor* is a bi-annual publication of the California Land Surveyors Association, Inc. and is published as a service to the land surveying profession of California. It is mailed to all members of the California Land Surveyors Association, Inc. The *California Surveyor* is an open forum for all Surveyors, with an editorial policy predicated on the preamble to the Articles of Incorporation of the California Land Surveyors Association, Inc. and its stated aims and objectives, which read:

Recognizing that the true merit of a profession is determined by the value of its services to society, the California Land Surveyors Association does hereby dedicate itself to the promotion and protection of the profession of land surveying as a social and economic influence vital to the welfare of society, community, and state.

The purpose of this organization is to promote the common good and welfare of its members in their activities in the profession of land surveying, to promote and maintain the highest possible standards of professional ethics and practices, to promote professional uniformity, to promote public faith and dependence in Land Surveyors and their work.



PRESIDENT'S MESSAGE

Annette Hovorka
CLSA 2019 President

What Happens at Conference, Doesn't Stay at Conference

Yes, in case you are wondering, even in Reno. Conference is, for me, an almost magical time. It feels just slightly separate from the "real world" of work and other obligations. It is a time to communicate with colleagues that you may only see once a year and to learn from some of the best minds in our profession. And then, all too soon, it is over. What do we take away?

Every time I go to conference, I always take away little somethings that help me in my everyday life and career. Whether it is listening to Jeff Lucas talk about ethics or Aaron Smith and Matt Gingrich's wonderful skit with its message of sharing, I enjoy the opportunity to hear new perspectives and be enriched by the company.

This year, I am more keenly aware of the effort that it takes to make conference what it is. Knowing more about what goes on in the background makes the experience that much richer. I want to extend a hearty thanks to CAMS staff, AMS staff, and Bill Hofferber, conference chair, for all that they did in the background to make this venture the great success that it was. I am happy to report that attendance

exceed expectations and I literally received nothing but positive feedback from those participating. We could not have wanted more from this return to a joint conference with NALS. I would also like to thank NALS president, Jason Higgins and members of NALS for their great hospitality and participation.

Now, with conference over and one of our biggest efforts this year behind us, we return to our "ordinary" tasks. One of the somethings from this year's conference that I took home was the idea that we are the face of our profession. How we express ourselves in the world is how the world views us. I am certain that we all want that experience to be positive and we want people to walk away from the experience enriched. However, manifesting such an experience can be difficult to start, if you are not sure where to start. My humble suggestion is home.

Home for us is our Chapter. The Chapter and its members are the foundation of CLSA. We want to make our chapters strong and vibrant. We want to make them a place that people want to come to and leave feeling better for the experience. We are in the business of growing better

professionals and I believe we can do that by applying some simple principals of customer service. Here are some suggestions to start:

FOCUS ON THE INDIVIDUAL:

Everyone enjoys a personalized attention. Make sure there is time in each of your meeting for attendees to meet and chat with each other. Create a greeter position whose only purpose is to make sure everyone is personally greeted and is connected to other members. This could be one person all year or a new person each meeting.

COMMUNICATION:

Your chapters ability to communicate with members is the glue that holds the group together and creates the atmosphere of involvement. That sense of involvement will keep people coming back. In your communication efforts, please consider all the avenues available to you. You must expand beyond newsletters to social media. Record your meeting and share them for members who could not attend. Reach out with member surveys to check in.

BE THE ONE:

No special position is required to strive to make your chapter

better. Small efforts by many makes light the bigger task. Your effort through positive language, knowledge of the organization, and careful listening skills is the most important position ever.

TENACITY:

Your patience and perseverance are key skills that will help your Chapter move forward. A willingness to do what needs to be done (and not take shortcuts) will provide the kind of service that people talk about.

This year it is my goal to make experiences with CLSA fulfilling and improve the member experience. It is my hope that members share this goal with me and strive to make a difference in their own corner of the profession.

Remember, be kind! ☺

Annette Hovorka
CLSA President 2019





EDITOR'S MESSAGE

Paul Mabry
California Surveyor Editor

I'm your new Editor, Paul Mabry and I hope you enjoy this issue of the *California Surveyor*! I want to thank the former Editor, Landon Blake, for his past work for the association and for his continued assistance in the future. Along with my Associate Editor David Kendall, we are searching for other editors for the magazine. Especially those of you who may be located in the south or east regions of the state. The workload will be light – I promise. And you'll get to associate with some creative and interesting people. E-mail me if you are interested. I'll also be contacting past editors to serve as a sort of think-tank to help guide us in the future. I want CLSA and the *California Surveyor* in particular to be a source of original and valuable content not available to you anywhere else.

For future issues, we are looking for authors on a diverse range of topics. If you are a writer, step right up! In each issue, we would like to offer an article on:

- * **Business.** How to operate effectively, make money, serve clients and reduce liability.
- * **Technical.** The nerdy brainy stuff that we all must know and

sometimes puts everyone else at the party to sleep.

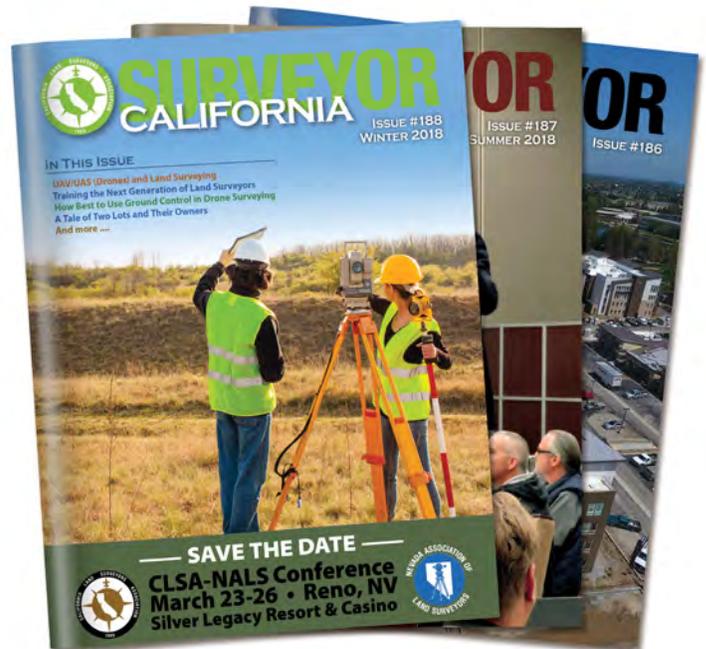
- * **Technology.** What is changing our profession and how we utilize it. User reviews of new software and hardware of interest to surveyors. Also, at least one tip or trick using software that you think would be helpful to other surveyors.
- * **Legal.** Laws and decisions that affect our profession and impact our clients.
- * **Legislative.** What changes to laws of importance to surveyors are happening and why.
- * **General Interest.** Historical, humorous or informative stories to share from our profession.
- * **Education.** An update from our colleges and universities on their students.

Another fun way to get involved with the magazine is with interviews of older living surveyors. Did you know you can download the StoryCorps app for your smartphone and publish any interview to

the Library of Congress to be saved for posterity? If you're interested in helping with this project, contact me. I'd love to have interviews on record with great surveyors. We would publish transcripts and excerpts in the magazine and create a digital library of the collective insights, anecdotes and experiences of surveyors. Do you realize that surveyors born today may never touch a chain...? May never physically walk a line or have to traverse around an obstacle? Technology is erasing the experiences of the past we consider "common" and we need to document those "earthy" experiences

of traditional surveying while we can. Imagine if you could interview a GLO surveyor today after pouring over a "headscratcher" retracement project. Wouldn't that be priceless? I invite you to create that interview record today. Please reach out and let me know of folks you would like to interview and I'll assist in any way I can.

If you have any other ideas on how we can make the magazine a better or more valuable publication, please let me know. Now, enjoy issue number 189. I wish you all a wonderful spring and summer! ☺





LEGISLATIVE REPORT



Michael Belote
CLSA Legislative Advocate

CLSA Impacts Legislation in Sacramento

As this column is written, the California Legislature is approaching the “first house” deadline, which is the date by which the Assembly must have completed action on Assembly bills, and the state Senate on its bills. This is the figurative half-way point of the legislative year. In the coming weeks, the Assembly will turn to bills passed by the Senate, and vice versa, in advance of the fall recess which begins on Friday, September 13.

2019 is a remarkable year in Sacramento from a political perspective. Never before in our collective lifetimes has Sacramento been as dominated by one political party as now: in the 80-member Assembly, there are presently 61 Democrats and 19 Republicans, a “mega-majority” of over 76%. The ratio in the state Senate is 29 Democrats and 11 Republicans, a super-majority of 72.5%. Every constitutional officer is a Democrat, and we have a new, untested Democratic Governor.

When the bill introduction deadline for 2019 of February 22 passed, over 2700 new pieces of legislation were introduced. Many were bills vetoed by Governor Brown, or which failed passage in the prior two-year session. In other

words, a lot is at stake this year in Sacramento.

There clearly are some big, overarching issues pending in the Capitol. Among the biggest are housing, responsibility for wildfires, and privacy. Another big issue relates to employment: the classification line between employees and independent contractors under last year’s state Supreme Court *Dynamex*



decision. This decision, which involved delivery drivers, does not affect land surveying any more than hundreds of other occupational groups, but it will affect CLSA members. Some legal experts believe that the decision essentially eliminates independent contractors in California; that may be overstating the legal issues slightly, but clearly it is far harder to reliably classify workers as independent contractors after *Dynamex* than before.

The resolution of the *Dynamex* debate this year, if it occurs at all, will be accomplished by AB 5 (Gonzalez). Right now the bill is intended to codify the *Dynamex* decision, with exemptions for doctors, insurance brokers, securities brokers, and direct sellers (think Mary Kay, etc.). But additional exemptions are very likely, including potentially other professionals, business

to business relationships, and more. CLSA will be involved in the debate.

Other issues on which CLSA is engaging are far less global than *Dynamex*. An example is SB 556 (Pan). This CELSA-sponsored measure was intended to better define the lines of scope of practice for surveyors vis a vis contractors and others, especially in light of modern technology, a worthy objective to be sure. But scope of practice debates

are notoriously difficult in Sacramento, and SB 556 is no exemption. Language added to the bill on April 11 relating to contractors raised concerns with CLSA and others, as potentially resolving the scope issues in the wrong direction. Under the leadership of Legislative Chair Mike Butcher and others, CLSA input was delivered and heard. The scope changes proposed in SB 556 have now been deleted, and the remaining sections of the bill relate to creating a requirement for land surveying companies to register with BPELSG.

CLSA-sponsored SB 339 is moving forward as well. Suggested by Orange County CLSA member David Woolley, SB 339 provides that provisions of nondisclosure agreements executed by land surveyors acting as expert witnesses should not be interpreted to prevent the surveyor-expert from reporting information about suspected license violations to BPELSG. Consumer protection should permit surveyors to report suspected violations if surveyors believe violations have occurred. SB 339 passed the full Senate on a vote of 38-0, and will next be heard in the Assembly Business and Professions Committee. 🌐



CENTRAL OFFICE REPORT



Kim Oreno
CLSA Executive Director

Kicking Off 2019

Hi everyone. I hope you enjoy reading this first issue of 2019 of the *California Surveyor* magazine. I'd like to give special thanks to Paul Mabry. Paul is the new Editor of the *California Surveyor* and he has done a tremendous job putting this well-rounded and informative issue together. I especially enjoyed reading the article by Gabriel Galindo and Stephen Castillo, detailing a project they worked on together with Bill Hofferber. The willingness of CLSA members to mentor the younger generation of surveyors is something I greatly admire about this group. It's truly inspiring.

I'd also like to take this opportunity to thank the many CLSA members who attended the CLSA/NALS Joint Conference in Reno at the Silver Legacy in March. It was great to see so many of you supporting this joint venture. There were many opportunities for continuing education, camaraderie and supporting both the CLSA and NALS Education Foundations. Please read the articles in this issue by Carl C. de Baca summarizing the conference activities. He modestly left out of his article that he received the VonSchmidt Award during the luncheon at conference.

This award was created by CLSA and NALS to honor those who have gone above and beyond for both groups. Prior recipients are Steve Parrish and Marty Crook. Congrats Carl!

Speaking of awards, congratulations are also in order for the winners of the 2018 CLSA Awards:

Member of the Year:
John Tosto

Chapter of the Year:
Los Angeles Chapter

Chapter Newsletter of the Year:
Central Valley Chapter

Annual Photo Competition:
Los Angeles Chapter

I'm happy to report that for 2019, we already have over 100 new members who were not CLSA members in 2018. Please see the list below and congratulate/welcome the new CLSA members you know personally. We are still collecting membership renewals from 2018 members. Those efforts will continue through the end of June. If you haven't renewed yet, please do so right away. After June 30th, a \$15 reinstatement fee will be added to all membership renewals.

Please note, there were a few errors in the **2019 Subdivision Map Act** and **2019 PLS Act/PE Act/Board Rules/Misc. Statutes** spiral bound books. If you purchased copies before March 1, you should have received corrections in the mail. If you didn't receive those corrections, please contact

Central Office so we can get you up to speed.

That's all I have for now. I hope you all have a great summer! As always, please feel free to contact CLSA Central Office with any questions, comments, concerns, etc. I love hearing from you all. ☺

— Welcome New Members! —

- | | | |
|-------------------------|------------------------|------------------------|
| Richard Abo | John Heath | Peter Ring |
| Gencaga Aliyazicioglu | Abraham Hessabi | Erik Rivas Barajas |
| Liliana Aliyazicioglu | Yashar Hooshvar | Christopher Rojas |
| Jose G. Ambriz | Wesley K. Inman | Lenard Roque |
| Shawn Ankeny | Steven James | Matthew D. Russell |
| Nicholas Barbella | Kelly S. Johnson | Nidal H. Salman |
| Wayne E. Battleson | Thomas Jeffrey Johnson | Jim M. Schroeter |
| William Randolph Benson | Andrew Kadar | Robert Scipioblu |
| Jimi A. Billigmeier | Mary Kearins | Roberto Sedano |
| Logan Boggs | Kristopher R. Klima | Derrick Sepulveda |
| Anthony Bongiovanni | Andrew Edmun Lam | Ryan M. Sexton |
| Kyle Brinkman | Christopher Laquian | Cindy Shambeck |
| Kevin Bronson | Ryan Lee | Jacob Randall Sharp |
| Christopher Brown | Jedediah Lewis | Daniel Sheldon |
| James Brown | Chris Lum | Jamie Shulander |
| Melina Brown | Roy Macias | Robert Thomas Slater |
| Stephen Caldwell | Richard A. Maddock | Delia K. Smith |
| Dani Cano | Leonardo J. Martinez | David Sparks |
| Brian Cass | Rebekah Matteri | Brian D. Spore |
| Anthony Cocchi | Bryan Mayberry | Jennifer Steven |
| Michael Craven | James McCleary | Robert Stevenson |
| Joseph V. Dechellis | Erin Meadows | Shereef C. Surur |
| Christopher DeVrieze | Steven M. Mendenhall | Matthew Tanner |
| Dennis H. Dillman | Mark R. Meyer | Adrian Tieslaus |
| Marco Antonio Dipp | Larry Miller | Vincent James Townsend |
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| Johnny Gray | Lance Perry | Stephanie Wilhoite |
| Jacob Grindel | Roger R. Pitto | Justin Yelton |
| Jesse Gutierrez | David Rask | |
| John Hanser | Chris Riebe | |



Special Events

Saturday, March 23

Bowling Tournament
National Bowling Stadium

Sunday, March 24

Opening Ceremonies / Keynote
Expo A

Awards Luncheon

Silver Ballroom
(Upstairs, Mezzanine Level)

Icebreaker Reception

Exhibit Hall

Monday, March 25

Scholarship Auction & Dinner

Silver Ballroom
(Upstairs, Mezzanine Level)

Saturday, March 23

Closing Ceremonies & Prize Drawing
Expo A

Exhibit Hall Open

Sunday: 9:00 am - 7:30 pm

Monday: 8:00 am - 5:00 pm

Tuesday: 8:00 am - 10:30 am

BEYOND BOUNDARIES

SHAPING THE FUTURE TOGETHER

WE





2019 CLSA/NALS Conference Wrap-Up

By Carl C. de Baca
(with a few additions from Paul Mabry)

Well it's been a while since our two sister states got together for a conference and it looked like the vast majority were happy that it finally took place! If you didn't attend, go ahead and take just a minute ...and kick yourself. Some five hundred Californians and Nevadans met at the Silver Legacy in Reno from March 23rd to the 26th for fun, education and an opportunity to renew friendships.

The event started, ran, and ended like clockwork. It was an extremely well-attended affair, with a lot of moving parts taking place over several days. For this correspondent, it is gratifying to know that our two fine organizations were able to work together so flawlessly. We have laid out a blueprint for how to do this again, perhaps on a semi-regular basis (pardon the blatant editorial opinion).

Day One

On Saturday the 23rd, the pre-conference workshops ran throughout the day, while the vendors started assembling their booths and the silent auction materials were slowly accumulated on the tables in the main hall. It looked to our cub reporter

as though this was the best-attended set of pre-conference workshops in our history together. With Jeff Lucas offering two half-day workshops, the first on "Boundary Retracement Cases" and the second on "Deeds, Conveyances and Boundaries"; and an all-day class on Autocad "Civil 3D for Land Surveyors" put on by Rick Ellis, there was no shortage of educational opportunity, right out of the starting gate. Meanwhile the LS Review track started in earnest with classes on the CA PLS Act, GPS Geodesy and Water Boundaries filling out the day. A bevy of students and volunteers ported donated equipment, books, knick-knacks, gifts and artwork here and there, while the auction tables

continued on page 8



slowly took shape. It was poetry in motion. Sometimes awkward and clumsy, but poetry nonetheless.... A big thanks to everyone who donated items, everyone who bought items and all those responsible for bringing order to all this chaos!



The vendor's hall sold out this year. In fact, it did so quite some time ago. Clearly there was a pent-up appetite for having a joint conference. With a change in process this year, the vendors showed up to assemble their wares on the first day, so that the exhibit hall could open along with the Opening Ceremonies. This was a great idea and should be carried forward in future conferences.

And, finally, the first day culminated with the Scholarship Bowling Tourney at the National Bowling Stadium. More about that later!

Day Two

On Sunday the 24th, the proceedings got under way in earnest. Instead of kicking off at noon as has been the case in the past few joint conferences, we got underway at 8:00 am with the Opening Ceremonies. Co-presidents, Annette Hovorka from California and Jason Higgins from Nevada welcomed the attendees, introduced their officers and made a few announcements. An honor guard provided by the local Boy Scouts opened the formalities followed by a historical skit starring Aaron Smith (CLSA Past President) and Matt Gingerich (NALS Past President) and narrated by Steve Parrish. The Opening



Ceremony was packed with standing room only.

The historical skit re-created a conversation between two famous (or infamous) surveyors, Alexey von Schmidt and Daniel Majors, who each separately located the common line between Nevada and California, in particular near the north corner common to both states. Through the narrator we learned that each surveyor relied on different methods and technologies to establish their respective lines of latitude and longitude. Majors traveled overland with a chronograph with time initially set at Ft. Bidwell, CA. Von Schmidt on the other hand used more modern technology, the telegraph, to determine his time. One method was arguably more accurate, but regardless, the lines established by the two surveyors were hundreds of feet apart. Aaron and Matt acted out a fictional conversation where Majors and Von Schmidt met and discussed the reasons why their surveys differed. At the conclusion of that fictional meeting, an auspicious toast with Irish whiskey and a promise to meet again left the audience with a hope that perhaps it wasn't inevitable that the states would resort to litigation for over a century to resolve their boundary ambiguities. The clear message for all attendees: Talk with your fellows and save everyone headaches later!

With the conference workshops starting right after the Opening Ceremonies, it was time to let the learning begin. Over the course of the day Jeff Lucas held forth on a variety of topics, while Forest Decker, Scott Peterson and Chris Facque offered classes on respectively, the US Forest Service, Accuracy of LiDAR Point Clouds, and Water Rights. The LS Review track covered construction survey calculations, and Public Lands.



Day Three

On Monday Dave Doyle spoke throughout all four sessions, the first two on modernizing the national spatial reference system and the second two on the history of geodetic datums. Dave is a great and enthusiastic speaker who salts his speech with the occasional Grateful Dead reference, (like a true master). Also happening on Monday, Steve Parrish and Byron Johnson teamed up for a presentation on private-federal boundary determination. Boy, talk about eminently qualified.

In addition to our featured heavyweights, James Johnston outlined Least Squares Adjustments, Michael Hartley spoke on QBS, Logan Campbell discussed collecting survey-grade data with drones and Mike Barger spoke about remonumentation in Michigan. All in all, a great day for PDH's. The LS Review track tackled legal descriptions and boundary analysis.

Day Four

Ahh, Tuesday – the last day and lucky for everyone, it only went until noon. Scott Peterson gave a talk on boundary lines versus property lines, Dana Caccmise gave an NGS update, Laura Ledbetter discussed drone liability exposure for surveyors and Karl Eitenmiller discussed water rights.

A Panel Discussion with a Surveyor, Attorney and a Title Company (actually a title officer) was a two-session open dialog between the audience and the panel. It started off slowly and gained speed like a snowball rolling downhill until just before the end. With about ten minutes to go it became patently obvious that the crowd was all 'conferenced out' and the questions tapered off to silence and fatigued stares. You know it has been a successful affair when a room full of surveyors runs out of things to say. A special thanks is owed to the attorney, Steve Silva and the title officer, Lisa Quilici, (mostly for putting up with the moderator). And it must be said that the surveyor, Dan Church is a true professional!

continued on page 9



Panel Discussion and Round Table Meetings

Aside from the previously mentioned surveyor/attorney/title officer panel discussion, this conference featured several other workshops done in a similar format, all of which were well-attended and gave those who came an opportunity to speak up on many issues of great relevance. Panel discussions included Meeting the NALS Officers, Meeting the CLSA Officers, Meeting the CA BPELSG and Meeting the NV BPELS. Round table sessions, all very informally moderated, covered Education and the Four-Year Degree, Women in Surveying, Concerns Facing the Profession, Workforce Development, Recruitment and Mentorship, and Outreach. Hopefully notes were taken at these jam sessions, because plenty of sage advice was offered!

The LS Review Track

CLSA once again put on a terrific LS Review track with John Adam, Mike Hart, Bill Hofferber, Armand Marois, Steve Martin, Rob McMillan, Evan Page and Ian Wilson all contributing their time and knowledge for the greater good. Attendees told your correspondent that this was terrific set of classes and that all of these volunteer instructors did a great job. Sadly, this effort probably does not get as much recognition as it should. Next time you see any of these fellas, be sure to thank them!

Social Activities

Well we did it! On Saturday night we sold out all ten lanes in the ground floor alley and packed the house at the National Bowling Stadium Bowling tourney. At this rate, we might have a stab at filling the 78 lanes upstairs someday. CLSA has a long history of bowling as an Education Foundation fundraiser, and many enthusiasts, NALS, with its brand new Education Foundation, has only been doing this for three years, but is rapidly developing its own cadre of bowling nuts. Consequently there were plenty of bowlers from both groups and some teams had members from each state on board, as the liquid refreshments and gutter balls flowed. The winner was the Diamondback team from Las Vegas.

On Sunday night the two presidents hosted their hospitality suites. Traditionally, these

events are a great opportunity to get into deep and often loud off-the-books conversations with people you might never have met before. For the first time in many years, if not ever, both states' center of hospitality could be found on the same floor, in adjoining suites, a most welcome innovation. And as always, what happens in those suites, stays in those suites!

Awards Luncheon

The Awards Luncheon on Sunday was jam-packed with touching moments as many deserving folks from both states received recognition from NALS and/or CLSA for their efforts on behalf of their organizations and the profession.

Congratulations to all! Your peers and your profession recognize and appreciate your efforts.

Comedy Luncheon

On Monday, the luncheon featured comedian Don McMillan who kept everyone in stitches with his nerd-centric jokes. A former engineer, he profiled the crowd for the nerds they really are. He was especially observant of the NALS officers, and had some great things to say about PowerPoint presentations. Everyone this correspondent interviewed found Mr. McMillan to be both extraordinarily funny and spot-on with his sense of engineers and surveyors.

Scholarship Auction

In a first for this event, the year's scholarship winners were announced prior to the start of the auction. That really drove it home – why we do this every year. In what may be one of the last times that Greg 'Lightnin' Williams will preside over our



Greg 'Lightnin' Williams

event, the bidding was fast and furious, and extremely humorous. Lightnin' made several bidders cough up extra cash at the end of the auction and one bidder in particular got the demonic stare-down resulting in a \$500 'donation'. Great job, Lightnin'! Our cub reporter was informed that over \$35,000 was raised that night. No info is available yet on the split between the states, or on the take from the silent auction. Stay tuned.

Thank You's

Thanks to Annette Hovorka, 2019 President of CLSA and Jason Higgins, 2019 NALS President, and to their respective officer corps for their hard work at the conference. Thanks also to Central offices of both organizations for their tireless efforts at keeping this living, breathing organism on track. Thanks to the conference committee for each state and especially to Crissy Willson and Nancy Almanzan of NALS and Bill Hofferber of CLSA for their dogged efforts at getting this thing together in the first place, and then after surmounting various obstacles, putting into place a terrific program. Thanks to the vendors for making this all possible and most of all, a warm and sincere thanks to those of you who attended, making Conference 2019 an awesome success.

Like Jethro Bodine would say, "Let's do this again, real soon!"

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Meet CLSA's Officers and Editors



President Annette Hovorka

I am a mother of three children and grandmother of seven. I have been married to Bob Hovorka for a year and a half. I am a Sacramento native (born at American River Hospital in Carmichael). I attended local schools and graduated from El Camino Fundamental High School. I further studied at Sacramento College. I currently reside in Elk Grove.

I began my career at 26 with the Department of Transportation District 10 in Stockton as an Office Assistant in 1990. Being a single parent, I sought a promotion and became a Junior Engineering Technician in Surveys in 1991. I took and passed the Land-Surveyor-in-Training exam 18 months later (being the first woman in my district to do so) and became an Assistant Land Surveyor. I have had a varied career experience in state service that has included working in many surveying specialties and a short break to work for Department of Water Resources. I became licensed in 2007. (P.L.S. 8246) I am currently a Senior Land Surveyor in charge of Data Management for Department of Transportation in Sacramento.

I rejoined CLSA in September of 2007 after a break. I have served my local chapter (Sacramento) in many leadership positions, including President in 2012. During my presidency, the Chapter received Chapter of the Year. I was recognized by CLSA as Member of the Year in 2011. I have served the State organization as GIS Chair, Director, member of the Executive Committee, Treasurer, Secretary, and President Elect. I

am the current CLSA President (the second woman to hold the office. The last woman served in 1989.) [🔗](#)



President Elect Keith Spencer

Keith began his career as a photogrammetrist in the US Air Force from June 1970 through November 1977, stationed with the 38th Tac Recon Squadron

continued on page 12



Meet the Officers and Editors – continued from page 11

at Ramstein AFB and Zweibrucken AFB, Germany, with the 2nd Bomb Wing at Barksdale AFB, Louisiana and with the 9th Strategic Recon Wing, at Beale AFB, California and at Kadena AFB, Okinawa. From December 1977 until November 1982, he worked as a contract surveyor with the Corps of Engineers, Vicksburg District, on the Mississippi River south from Memphis to the mouth of the river. Returning to the Central Valley in early 1983, he worked as a private sector surveyor, including a stint as owner of his own surveying firm, for over 33 years before joining Caltrans in 2016. He joined CLSA in 1988, has served on the Board of Directors since October 1990 and is a founding director and current Chair of the CLSA Education Foundation. 🌐



Immediate Past President Ron Nelms

Ron is from Bakersfield and was the CLSA President for the 2018 year as well as a Director on the Education Foundation. Previously he served as the Member at Large in 2012 & 2016, Secretary 2016, and Member of the Year 2015. He also served as the Monument Conservation Committee Chair. Ron founded Nelms Surveying, Inc. in 1992 and serves as the Principal. He is licensed in California, Arizona, and Nevada. Currently he also serves as President for Bakersfield Breakfast Rotary Club, as well as serving on the Government Review Committees for the Bakersfield Chamber and North of the River Chamber. He enjoys all sports particularly following the San Francisco Giants, Sharks, and Warriors. In his spare time he enjoys reading and writing. Stays active by playing tennis and

pickle ball. He has two sons and he has been gifted with three grandchildren. 🌐



Secretary Rob McMillan

Rob McMillan has been in land surveying and civil engineering since 1985 primarily in the public sector, but with private sector experience as well. Rob started with Caltrans District 11 in 1990, worked in Headquarters, District 4, and is currently back in District 11 as a Senior Transportation Surveyor leading a boundary, maps and deeds branch. Although he is a Carlsbad, California native, Rob is a graduate of Southern Illinois University, Carbondale. He taught land surveying as an adjunct instructor at Southwestern College and Sacramento City College. Rob has served CLSA as Sacramento Chapter Director, Alternate Director, Secretary, Vice-President, and President, statewide Education Committee Chair, Education Committee and Conference Committee member, and is currently serving as CLSA's Secretary, BPELSG Liaison, and NCEES POLC Liaison.

Rob's goal is to have every professional land surveyor and their associates join with CLSA because they recognize the incredible value of CLSA membership and the critical importance of belonging to THE organization that represents our profession. 🌐



Treasurer Warren Smith

Warren began his surveying career in his home town with the City of Fairfield in 1975. He obtained his LSIT in 1977, and started work with MacKay & Soms, preparing final maps and topographic surveys.

He moved to Tacoma in 1979 as Chief of Parties for Pacific Tech. After obtaining his California Land Surveyor's license in 1980, he moved to San Francisco, working for TransAmerican Engineers as a staff surveyor. In 1984, he moved to Oxnard, working for Neil Cummins, LS and Attorney.

Warren joined CLSA in 1986 as a member of the Los Angeles/Ventura chapter. He became Oxnard's City Surveyor in 1990. In 2013, Warren became San Joaquin County Surveyor. He is active in the the Surveyor's Policy Committee of CEAC, being named County Surveyor of 2017.

Warren is also active in the League of California Surveying Organizations. He became Tuolumne County Surveyor in 2018, and lives in Sonora with his wife, Patricia. 🌐

continued on page 13



Editor Paul Mabry

Paul has been a California licensed surveyor since 2010. Prior to that he lived in the Pacific NW where he worked in private practice for a large AEC firm and then as a partner at a business he founded in Tacoma, WA. Since moving to California, Paul has worked as a Chief Surveyor for the City of San Francisco and also as an attorney

with the law firm of Hanson Bridgett. Paul now practices law and land surveying in a solo practice focused on complex land/law matters. ☺



Associate Editor David Kendall

David Kendall began his land surveying career as a summer job in Austin, Texas in 1999 progressing through the ranks of

small lot residential construction to phased subdivision design and construction layout. Moving to Eureka in 2009 and licensed in 2017 he adapted to California style quickly and now operates a small North Coast consulting firm based in Sonoma and specializing in research intensive boundary and forensic surveys.

A champion pacer, fence jumper and steel chain thrower he is known far and wide to wield the sharpest Sandvik with fury and to dominate blackberry thickets. In his spare time he can be found coaching little league baseball, flying small manned aircraft or in the ocean sketching abalone action portraits.

For editorial comments please visit the CLSA forum as he always welcomes a hearty philosophical discussion. ☺

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An Experience Worth Remembering

By Gabriel M. Galindo, LSIT,
and Stephen M. Castillo, LSIT

EDITOR'S NOTE:

In this article, Gabriel and Stephen describe their experiences as student volunteers assisting Bill Hofferber with a volunteer project to create an easement legal description for a Continuously Operating Reference Station (CORS) at a State Park site near Hollister, California. This account relays several important lessons - most notably their trials in project management, coordination and field preparation which are obstacles I encounter on a daily basis in private practice. I also see that their persistence, diligent research and hustle paid off and they succeeded in turning out a marketable product. Most importantly, they realize the immense value of local knowledge and peer support and review. I greatly appreciate the mentorship provided to them in creating these easy to understand easement exhibits. Hopefully they are the first of many more to come for these two rising stars!



GABRIEL:

When I was a student at Fresno State, I sometimes had difficulty understanding the processes and duties of being a surveyor. Following this experience, it became clear to me why both EXPERIENCE AND EDUCATION are important requirements for licensure. There is no doubt the Fresno State curriculum covered a wide range of topics, but the fall semester of 2017 gave me an opportunity to really expand my understanding through a unique experience.

Bill Hofferber, PLS, as some of you know, is quite involved within the Fresno State surveying community. When he saw the opportunity to mentor two students as part of his work with UNAVCO, he asked our professor, Dr. Mike Berber, to nominate some student volunteers. UNAVCO is a non-profit organization that facilitates geoscience research and operates many reference stations. Stephen and I were excited to be selected and began to read up on UNAVCO and the proposed work site.

UNAVCO maintained a CORS (reference station P233) just north of the Hollister Hills State Vehicular Recreation Area. However, the contract to operate the station was coming to a close. UNAVCO desired to better define the station boundaries and create a formal easement for the parcel since these had not previously been established. We

in turn were tasked with preparing a legal description and survey exhibit in support of the easement agreement.



Our research experience at that time was limited. Stephen was fresh from a hydrographic surveying internship and I had been working in the field as a chainman for two summers. Neither of us had ever researched land title records before. On top of that, neither Bill nor Dr. Berber had any experience with the San Benito County Recorder's office. Bill didn't live or practice in the area and Dr. Berber focused on academic studies. Consequently, we faced a steep learning curve in preparing for our survey and finding supporting record documents.

I hit the ground running and began my research using ParcelQuest, an online parcel information tool. I was able to gain some basic information, but it wasn't easy to define our area of interest because the

property was large and located in a rural area. My next stop was the Recorder's office in Hollister, San Benito County. I made it out to Hollister the first opportunity I had, but with my class schedule I was pressed for time and couldn't verify every record my search turned up (Vol. 4 Deeds p. 30, Vol. 1 Maps p. 23, etc.) Additionally, the Recorder's computer library wasn't as user friendly as I expected so I spent a few extra hours becoming familiar with it. To top it all off, as the office was getting ready to close for the day, I found out they only accepted cash. So I had to run down to the bank in order to pay for \$80 worth of maps with only two minutes remaining until closing!

After returning to campus, I found we couldn't draft or understand all of these documents. Nothing made sense! The records were calling out to streets that didn't appear to exist near the address we got from ParcelQuest. The most recent map we had of this four parcel property was created in 1876! We were confused and apparently the surveyor in 1876 was too – the map had a number of question marks scattered within it. The more we looked, the less clear things became so I took the initiative of reaching out to a local surveyor. With a quick google search I located San Benito Survey and Engineering, Inc. literally right

continued on page 16



across the street from the Recorder’s office in Hollister. A Fresno alumni, Ken Weatherly PLS, answered my call and was kind enough to invite me over for a visit.

When Ken and I met, we headed to the Recorder’s office. I could tell right away that Ken was a local. We skipped the computer index and went straight to the vault and started our search. Unfortunately, reading through the old notes did not help us locate any of the records we needed. However, it didn’t take Ken long to move on to a map of a subdivision adjacent to our parcel. It was filed over a hundred years after our 1876 map and Ken was confident we would find some of the monuments it referenced in our area. Because he was so familiar with the local terrain, Ken helped us prepare for the field phase of the project in no time.

STEPHEN:

While Gabriel made his second journey to Hollister, I was busy leading math laboratories at Fresno State. As a result, I didn’t get involved until it was time to begin the field-work. On the day of the field survey, we planned to meet on campus early in the morning, but we failed to wake up on time. Nevertheless, we shook off the rough start and managed to meet up with Dr. Berber, and travel to Hollister, where we met Bill.

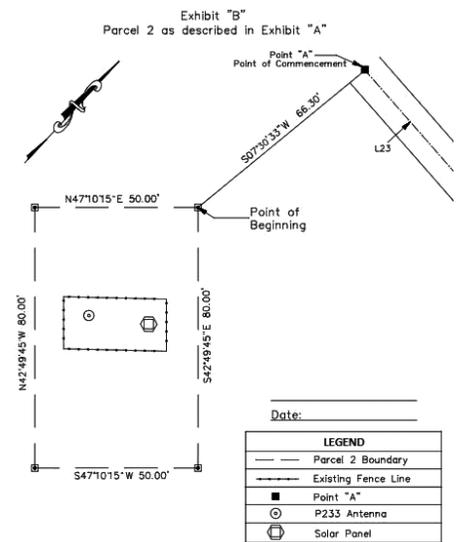
With the four of us together at last, we began the search for monuments using the maps that Gabriel had printed at the San Benito County Recorder’s Office. I used a GPS rover to give us rough search calculations for the positions of the existing monuments. For the most part, I progressed with relative ease throughout the boundary survey work. Gabriel however had a more difficult time digging through the “mudrock” to look for possible monuments.

Upon finishing the boundary survey portion of our work, which covered a wide area of hilly terrain in the Hollister Hills, we proceeded with a topographic survey of the centerline of the road up a hill to the CORS station site. Under Bill’s instruction, we measured half a mile of road consisting of the various components of curves: Beginning and End of Curve points and Points on Curve. We progressively laid

out the the easement to its terminus at the station. Following the completion of our field survey, we made sure to check our field data to catch any missed measurements before leaving. We then said our goodbyes to Bill and headed back to Fresno.

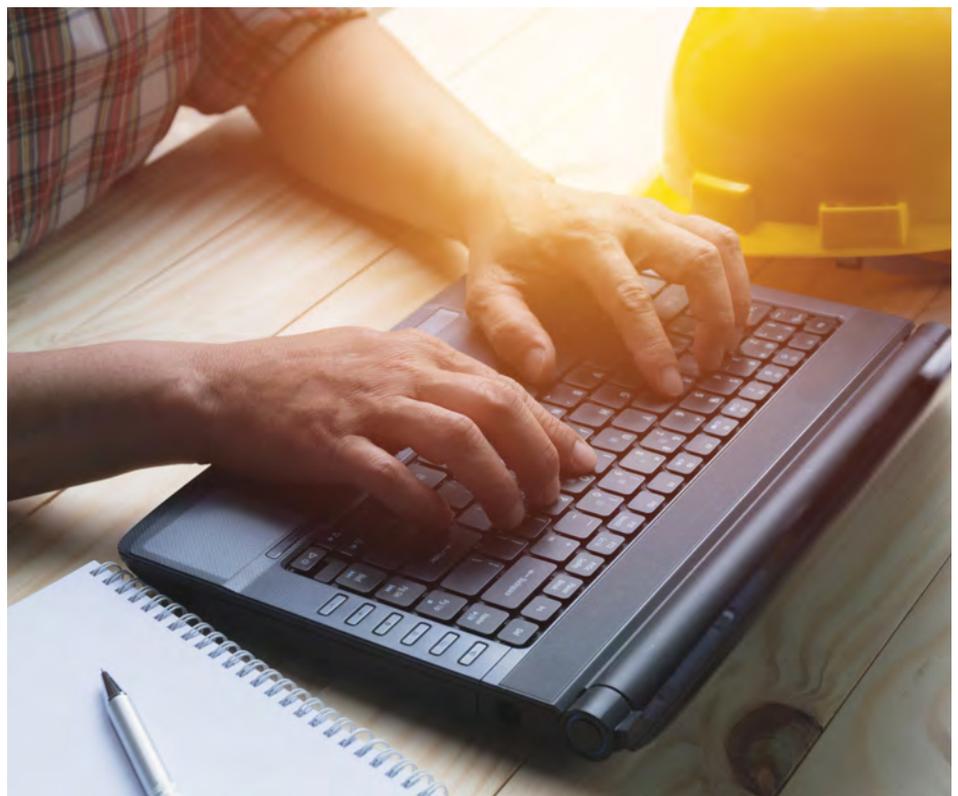


Our next task was to produce a graphic exhibit and legal description for the easement. This part of the project was of interest to Gabriel and I as we had experience using AutoDesk Civil 3D to draft exhibits and write legal descriptions in our coursework. However, we had never before used field data to fit curves. So, after reviewing the data, we began by making non-tangent curves that exactly fit the data we collected. The AutoCAD drafting was simple, but the descriptions became extremely wordy and confusing. After evaluating our dilemma, Bill advised that we make the curves tangent to the lines.



To assist in this task, I enlisted the aid of Gustavo Medina, a licensed surveyor working in the County of Fresno who came to our rescue. He showed how to edit elements of the curves, and make them tangent and avoid the use of radials. This made the wording of the description more simple and easy to understand. After I had completed this step, I sent the revised alignment to Gabriel to finish our exhibit

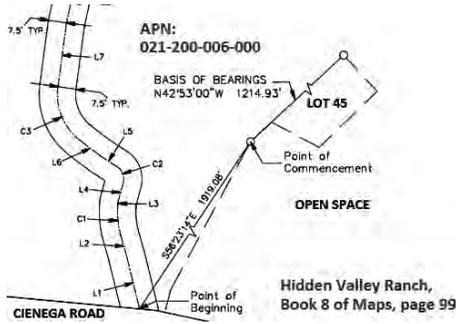
continued on page 17





An Experience Worth Remembering – continued from page 16

sketch of the easement, which turned out great!



Gabriel and I went on to draft the legal description and after several rounds of review by Bill, we finally had a polished easement sketch and description of which we were proud. Bill was happy to finally begin the submittal process with the California Department of Parks and Recreation.

In all, this experience working on a “real” project was invaluable to us. We learned the importance of knowing your area. We came to realize how you can approach the same job in more than one way. We enjoyed learning more about the process

of completing and checking survey work before submission, as well as the amazing food at Hollister House Bar & Grill! We especially want to thank Bill, Ken, Gustavo and Mike for this opportunity that we’ll remember for the rest of our careers. 🍷

EXHIBIT "A"

All that portion of that certain real property as found described in the Grant Deed from Allan R. Renz, a married man, as his separate property, as to an undivided 1/4 interest, and Allan R. Renz and Rosie Renz, husband and wife, as to an undivided 1/4 interest, and Greg A. Renz, a married man, as to an undivided 1/4 interest, to the State of California, recorded January 27th, 1989, as Instrument No. 8900768, San Benito County Records, and being more particularly described as follows:

PARCEL 1

A strip of land 15.00 feet in width, 7.50 feet on each side of the centerline which is along the center of an existing dirt road described as follows:

Commencing at the angle point southerly of Lot 45, along the southwesterly boundary of Open Space Lot which bears South 42°53'00" East, 1214.93 feet from the most westerly corner of Lot 45 recorded in Book 8 of Maps, at Page 99 in the office of the County Recorder of San Benito County, California;

thence South 56°23'14" East, 1919.08 feet to the Point of Beginning which lands in the center of the gate off Cienega Road with displayed addresses 6200, 6220, 6224, & 6226;

thence South 76°18'57" West, 144.27 feet;

thence South 74°07'30" East, 57.83 feet to the beginning of a tangent curve concave northerly having a radius of 230.00 feet;

thence along said curve 82.36 feet, through a central angle of 20°28'01";

thence North 84°02'45" West, 77.32 feet to the Point of Terminus of said centerline hereafter described as or also being Point "A."

The sidelines of said strip shall be shortened or lengthened to terminate at right angles to the described centerline.

PARCEL 2

Commencing at Point "A" as described above;

thence South 07°30'33" West 66.50 feet to the Point of Beginning;

thence South 42°49'45" East 80.00 feet;

thence South 47°10'15" West 50.00 feet;

thence North 42°49'45" West 80.00 feet;

thence North 47°10'15" East 50.00 feet to the Point of Beginning.

The above Parcel 2 contains approximately 4000.00 square feet.

Gabriel was born in Lancaster, CA; but resided most of his life in the Sierra Nevadas in Independence, CA. He was introduced to surveying from his old coach, Christopher Riesen PLS, and has loved the realm of geomatics since. Gabriel was heavily involved in the geomatics program and earned honors in Lambda Sigma and Tau Beta Pi under Dr. James Crossfield and Dr. Riadh Munjy before their retirement. Finishing his Bachelor’s in Spring 2018, he completed the year working for Triad/Holmes & Associates in the Eastern Sierra. Now he’s working and pursuing his license with the City of Los Angeles in the Bureau of Engineering. He enjoys playing basketball, drawing, hiking, and helping with his old volunteer fire department’s GIS.

Stephen is originally from Clovis, CA. Stephen was introduced to Geomatics Engineering in 2012, when he attended an open house at the Lyles College of Engineering, where no other people, besides himself and his sister, were present. Working on his Master of Science which he plans on completing by December 2020, he is currently performing research in airborne LiDAR at Florida Atlantic University. He enjoys the outdoors, gardening, writing, and a good football game.

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Which Drone Sensor is Right for Your Business?

By Logan Campbell

At Aerotas we turn drone photos into data. We have processed thousands of drone survey projects for hundreds of surveyors nationwide, and we have learned the hard way that not all drone-based sensors are created equal. The quality of the sensor matters a great deal when you get to the data processing workflow. The sensor you use will impact the quality and accuracy of your finished deliverable.

We continuously update ourselves on the latest developments in survey drone technology. We are not attached to any specific providers of drone-related technology. We remain independent so that when better tools become available, we can so advise our clients. When analyzing technology, we focus on a cost-benefit analysis: what delivers the most benefit to land surveyors for the lowest cost.

Our best advice is to start with determining the deliverable you need to provide and then work backward when selecting the right sensor. Do not take a “jack of all trades” approach. Some systems are great for creating topographic surveys, other systems are great for bridge inspection, but there aren’t systems that do all things equally well.

It is essential to understand that the drone itself is only one part of a successful drone program. Even the best drone will not deliver the results needed unless it is paired with the right field Standard Operating Procedures (SOPs) and the right data processing workflow.

Many people think that photos and videos are the only useful things that can come out of a drone program, but that isn’t true! Drone technology today is capable of generating enormous amounts of topographic and planimetric data using off-the-shelf drone hardware. Anyone who is only getting pictures and videos out of their drone is not utilizing the technology to its fullest extent.

An effective drone program involves dozens of components, and we regularly test the options available for each. The three specific technology components we get the most questions about are drone airframes, sensors, and georeferencing options. This article will focus specifically on the second option: Selecting the right sensor for your business.

TYPES OF DRONE SENSORS FOR SURVEYORS

There is an incredible variety of sensors made for drones, for an astonishing array of drone applications. The drone sensors most

surveyors are likely to consider fall into four general categories: built-in cameras, small independent cameras, high-end independent cameras, and LiDAR. The first three options are different types of standard cameras, used as photogrammetry tools, while a LiDAR sensor is effectively a laser scanner mounted to a drone. Each of these sensors has its benefits and drawbacks. All four are viable and can be used in an effective drone survey program with the right SOPs and processing workflow, though they differ in their real-world applications.

	Built-in Camera	Small Independent Camera	High-end Independent Camera	LiDAR
Airframe Requirement	Small, multi-rotor, camera is built into	Fixed wing, or custom small or medium multi-rotor	Large multi-rotor	Large multi-rotor
Common Price, with Likely Airframe	\$1,500	\$2,000 - \$40,000	\$20,000+	\$150,000
Real-world Accuracy	0.1'	0.1' - 0.3'	0.1'	0.2'-0.3'

BUILT-IN CAMERA

Built-in cameras are attached to a single drone; they are designed and built to be used specifically with that drone. They are completely integrated into the drone airframe and cannot be removed or replaced without significant manual modification. While only a small number of drone manufacturers build first-party cameras, they have proven to be so dominant as to deserve their own category. DJI is the largest manufacturer of these drones, with the Phantom series being the one most commonly used in survey applications (note: The Phantom 4 Pro is no longer in production. DJI is either moving you up-market to the Phantom 4 RTK or the Matrice 210 RTK V2, or they are pushing you laterally to the Mavic 2 Pro which now has a 20 MP Hasselblad Camera). 20-megapixel built-in cameras are what you most frequently see on small multirotor airframes.

The primary benefit of this type of sensor is its high accuracy capability relative to its low cost and high reliability. With the right data collection SOPs and data processing workflow, built-in cameras can reliably get you 0.1' vertical accuracy. They are also extremely inexpensive, with the Mavic 2 Pro costing ~\$1,500, including the 20 MP Hasselblad Camera. Given that they are built specifically for use

continued on page 19



in one aircraft, these sensors are extremely simple and reliable. The simplicity of the system ensures minimal maintenance, calibration, and downtime, and maximum return on investment.

These systems are less flexible because the sensor is built into the aircraft; operators cannot swap the sensor to perform another function (e.g., using FLIR for thermal imaging and inspection). Because the image sensors are smaller than some alternatives, they need to be flown relatively low (~100') to attain the 0.1' accuracy, meaning their range is somewhat constrained – approximately 25 acres/hour.

With their low cost, high reliability, and high accuracy, built-in sensors are usually the best bet for most surveyors focused on topographic and planimetric mapping on projects less than 250 acres.

SMALL INDEPENDENT CAMERA

These are third-party sensors mounted onto airframes either by the drone manufacturer or by aftermarket modification. They are often ~20-megapixel image sensors with global shutters. These are most common for fixed-wing aircraft, which have more weight limitations, as well as some custom-built small multi-rotors. Due to the mechanics of fixed-wings and the complexity of custom integration on small multi-rotors, these cameras are often not mounted on a gimbal – a device that allows the camera to move independently of the airframe.

The main benefit of these cameras is their ability to be used on fixed-wing airframes, which have longer ranges than multi-rotors. If used on a multi-rotor with a gimbal, they can produce equivalent accuracy to a built-in sensor. Since they are not integrated into the airframe, they can be swapped easier than a built-in sensor.



Because they are not built into the airframe, however, they often require more complex work, calibration, and maintenance than a built-in sensor. Specifically, in our experience, the camera shutter-trigger mechanism can be particularly challenging, resulting in unpredictable data-collection failures. Whenever a camera is used without a gimbal, as on nearly all fixed-wings, there are additional data quality issues. Without a gimbal, whenever the drone vibrates, turns, or banks to fight wind gusts, images will be blurred, resulting in lower-accuracy data.

The best use-case for a small independent camera is on a fixed-wing drone when large acreages need to be covered at lower accuracy. If a large project only requires spot elevations sufficient for one-foot contours, this type of sensor is an excellent choice.

HIGH-END INDEPENDENT CAMERAS

These sensors are larger cameras developed for uses other than drone mapping (e.g., digital SLR cameras), which must be carried on large multi-rotor airframes that are designed to carry large sensors. These cameras can often have up to 40-megapixel sensors.

The primary benefit of these sensors is the very high image resolution they can produce, which translates to lower (better) ground sampling distance in aerial imagery. The resolution and ground sampling distance of these sensors translates to accurate deliverables when paired with good field SOPs and the right data processing workflow. Because of their higher resolution, they can achieve ~0.1' vertical accuracy at higher flight altitudes than built-in cameras, meaning they can cover slightly more ground and clear tall obstacles without sacrificing accuracy.

The main drawback of these sensors on a drone is their complexity. They almost always require custom integration, thus being more prone to faults and requiring regular maintenance and calibration. The shutter-trigger integration is particularly fault-prone, and managing autopilot settings to ensure consistently optimal overlap is challenging. Despite the higher resolution of the camera, there is no benefit to accuracy since they must be flown higher to avoid warping and artifacting in data-processing. And, despite the larger image sensor, range benefits are minimal due to the heavier camera and airframe. Finally, high-end cameras and the airframes they require are quite expensive, making it harder for a business to get a return on the investment.

Our analysis is that a built-in camera is usually preferable to a high-end independent camera because you get comparable accuracy from a less expensive and more reliable tool. The best use-case for a high-end camera is if very high-resolution orthophotos are required as base-maps on special projects, or if an airframe with swappable payloads is needed (e.g., to swap for a thermal sensor for roof inspections) – though often it will be cheaper and more reliable just to have separate dedicated drones for other sensors. Regardless, high-end cameras are only recommended for very experienced custom drone technicians.

continued on page 20



LIDAR SENSOR

Several companies are starting to make drone-specific LiDAR sensors. These sensors produce point-cloud data, which require laser scanner software to manage and reduce into usable survey deliverables.



The primary benefit of LiDAR sensors over cameras is that they can penetrate some ground cover. On projects which have some sparse tree, bush, or grass cover, LiDAR can return some true ground elevations beneath the cover, reducing the amount of supplemental ground data collection needed. But, buyer-beware, drone-mounted LiDAR is less powerful than you are used to with tripods and manned aircraft primarily because a drone requires a much lighter payload. Because it is less powerful, you get a lot less ground-cover penetration. You are unlikely to discover Mayan Ruins with drone-mounted LiDAR given the current state of technology. However, all this could change soon; this technology is progressing at breakneck speed.

The primary drawback of LiDAR comes down to complexity and cost. LiDAR integrations are highly technical and complex, so very prone to faults, and require a great deal of time-consuming calibration and maintenance. LiDAR data management is also very complicated. Whereas drafting linework from photogrammetric orthophotos and 3D mesh surface models is somewhat straightforward and familiar to land survey technicians, LiDAR requires working in point clouds. This requires very high-powered computers and a time-consuming process of selectively reducing point clouds down to only the points needed to create the surface. Despite this added complexity, LiDAR sensors are substantially less accurate than cameras – though LiDAR lasers are very precise, their ground-tested accuracy is usually around 0.3'. Finally, LiDAR is very expensive, making for a challenging business investment.

Our current analysis shows that LiDAR is still maturing. With its high cost to accuracy ratio, it is not a good investment for many survey firms today. However, for firms that frequently work on sites with moderate to sparse ground cover or those have a great deal of experience with custom drone technology, LiDAR sensors, and point cloud management, these sensors could become a profitable option.

CHOOSING THE RIGHT TOOL FOR THE JOB

	Built-in Camera	Small Independent Camera	High-end Independent Camera	LiDAR
Benefits	<ul style="list-style-type: none"> Simple & reliable Best-in-class accuracy: 0.1' 	<ul style="list-style-type: none"> Capable of greater range on fixed-wing Capable of 0.1' accuracy on multi-rotor Interchangeable 	<ul style="list-style-type: none"> Very high resolution Best-in-class accuracy: 0.1' Can achieve 0.1' accuracy at higher flight altitude Slight range benefit over built-in camera Interchangeable 	<ul style="list-style-type: none"> Can penetrate some sparse ground cover
Drawbacks	<ul style="list-style-type: none"> Inflexible: can't interchange sensor Limited range (~25 acres/hr at 0.1' accuracy) 	<ul style="list-style-type: none"> Integration complexity can lead to unreliability Data quality issues when used without gimbal 	<ul style="list-style-type: none"> Integration complexity can lead to unreliability Substantial maintenance needs Expensive 	<ul style="list-style-type: none"> Integration complexity can lead to unreliability Substantial maintenance needs Data management is very time-intensive Low accuracy Very expensive
Best For	<ul style="list-style-type: none"> Most standard survey work <250 acres 	<ul style="list-style-type: none"> Use on fixed-wings for regular very large projects with low accuracy needs 	<ul style="list-style-type: none"> Very high-resolution imagery Very drone-experienced team 	<ul style="list-style-type: none"> Frequent work in sparsely-vegetated areas Very drone-experienced team

There is no 'right choice' that applies to every company. For most firms focused on small to medium sized topographic, ALTA, or similar projects, a drone carrying a built-in camera is usually the best option. For firms focused on large projects with lower accuracy requirements, a small independent camera mounted on a fixed-wing aircraft can be a great choice. For firms with substantial drone experience that want to differentiate themselves with very high-resolution imagery, a high-end independent camera can work well. A LiDAR sensor may be the right tool for firms that regularly work on sites with some ground cover, have a large budget, and have ample experience with point cloud management.

Remember that the drone is your broad brush and should be viewed as just another tool in the truck. A drone is not a magic bullet, nor is it a stand-alone data collection device. The surveyor and their years of experience and technical expertise determines the right tool for the job. You know your business and the projects that you work on better than anyone else, so start with the deliverable you need to finish with and work backward when selecting the right sensor. 📍

Logan Campbell is the founder and CEO of Aerotas. He began his career as a statistician and went on to found Aerotas in 2014, which provides drone photogrammetry and CAD drafting services to land surveyors. Logan holds an MBA from Harvard Business School and is a Certified Mapping Scientist – UAS by the American Society for Photogrammetry and Remote Sensing (ASPRS). As a recognized industry expert, he regularly speaks at survey and drone conferences, and regularly writes in various land surveying publications.



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Utilization of the Raw Intensity Return from Laser Scanner Measurements to Assist in Control and Validation Targets

by Ayad Hamza Q Ahmed, Yushin Ahn,
and Scott M Peterson



Two-dimensional circular planar targets are commonly used as control and validation for Terrestrial Laser Scanning projects. Target acquisition occurs through high volume geometric measurements on the target that help to fit a true model of the target, thus allowing for computation of the controlling center of said target; being a form of image matching commonly used in photogrammetric/remote sensing applications. In many situations, dense geometric measurements of the circular target are not possible due to time or location constraints. This study tests the feasibility of utilizing the raw intensity return from a given measurement, to act as a 3rd dimensional element to help identify the controlling center of a circular planar target with minimal measurements. A Leica P20 Scanner is used to conduct the experiments utilizing two 0.152m diameter circular targets with varied radial intensity gradients at multiple distances and angles of incidences. Through proper modeling of the target's radial gradient, identifying the controlling center occurred with high precision and accuracy very comparable to traditional standard targets used conventionally.

INTRODUCTION

Laser technology has been used by geomatics engineers for over 30 years. Millions of data points from each returned electromagnetic pulse are translated into a 3D point in space along with a returned radiometric intensity of the measured object. For absolute/relative positioning, targets are used to either validate or control the registration of individual point clouds as well as registration of multiple clouds together, ultimately providing a true geometric representation of a given scene. Overall accuracy of the registered data depends on the instrument used, the quality of the scanned data, the distance to the objects, as well as the angles of incidence upon those objects. For a resection, a terrestrial laser scanner needs three or more control points (of good geometry) to accurately translate the measured data into the control points coordinate system, whether absolute or relative. Past and current Leica terrestrial laser scanners utilize two-dimensional planar targets placed over control points to achieve an accuracy within three millimeters at a distance of 50 meters (Geosystems 2013). Because Laser scanning data measures random positions of objects, high volume scans for each target are made to then match against a known target image to determine the controlling center of the circular target.

An existing problem with current targets is the potential of mismatching the scanned target data to the known target image, producing poor accuracies for the registration process. Researchers that are investigating these targets are still relying upon the usage of Iterative Closest Point (ICP) process to join point clouds together (Besl and McKay 1992); whereas some researchers are trying to explore the quality of the scanner (Ahokas et al. 2005), and others are trying to utilize the laser scanners that are still using the (ICP) process in their fields (Darboux and Huang 2003). The

laser scanner that is being utilized in the field uses an (ICP) process to identify the two-dimensional targets to have the ability to join the point clouds sets together. The laser scanning (ICP) process requires images and detailed scans of the targets to be able to identify these targets. A great amount of time is consumed when completing such scanning and gathering operations due to the requirement of higher volumes of scanned data.

In this study, extremely low volume data (four points) on a 0.152m circular planar target with a radial intensity gradient will be tested and compared against known values produced from the Leica P20 scanner with the Leica provided circular planar control targets. Measured returns of Planar Coordinates (e.g. X, Y) and intensities from each measurement will be converted to radial distances from the control center of the target, producing data (e.g. X_n, Y_n , radius) for a geometric solution to the targets center through a least squares computation based on a resection process.

The objective of designing a low volume laser scanning target to be utilized in the field requires investigating several key areas:

- ✦ The target's design – gradient and color
- ✦ The impact of measured distance and angle of incidence
- ✦ The use of only raw intensity values (no radiometric calibration due to distance nor angle of incidence).

METHODS

Solving for the controlling center of a circular target using four randomly acquired data points, requires knowing the radius of each

continued on page 23



point. With known radii and 2D coordinates of each measurement using equation 1, the controlling center can be computed using least squares adjustment procedures.

$$r_n^2 = (x_n - x_0)^2 + (y_n - y_0)^2 \quad (1)$$

Gradient/Radius

For this project, a Leica P20 Scanstation (see figure 1) and Leica 0.152m circular target were used to complete the control tests. The Leica P20 Scanstation specifications



Figure 1. Leica P20 Scanstation and its control target

(Geosystems 2013) include a 3D positional accuracy of of 3mm at 50m and 6mm at 100m, a dual axis compensator, Waveform Digitizing technology to reduce noise, and a 12-bit scanner for intensity. It has a 3mm standard deviation up to 50m on acquisition of the targets.

With Radius as an unknown from each laser scanner measurement, the goal is to derive the radius from the radial intensity. Four targets were created and tested (Figure 2).

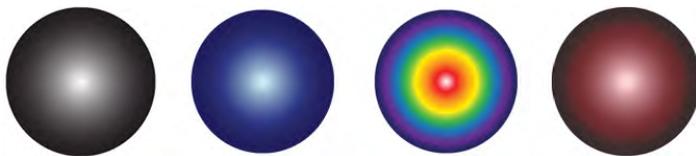


Figure 2. Target designs with varied radial intensity gradients

Photoshop was used to create the designs of the targets. The gradient used to create the black target (Figure 2), was the intensity in the hue from a scale of 0 to 100. The design of the blue and red target (Figure 2) is a mix of color intensity and saturation to test the impact of the targets' intensity and saturation on the absolute raw intensity. The multi-colored target (Figure 2) is designed to examine the impact of hue change on the absolute raw intensity. The targets were then printed and placed on the front surface of the supplied Leica target (figure 3).



Figure 4. Typical extracted cross sections

Figure 3. Typical measured targets

Each target was scanned at a distance of 5m with a high resolution/quality (1.6mm resolution). A cross section of the scanned data was taken from each to examine the relationship of the raw intensity value with regards to the center of the target (Figure 4). With the cross sections evaluated, best fit equations were applied to relate a radial distance given a single raw intensity measurement. Upon analysis, only the black and red targets were suitable to be used. The blue target and the multicolored target each had multiple raw intensities equalling the same radii; the goal is to have one radius per intensity value. Figure 5 shows the resultant equations for the black and red targets and the R² value showing how well the equation fits the data.

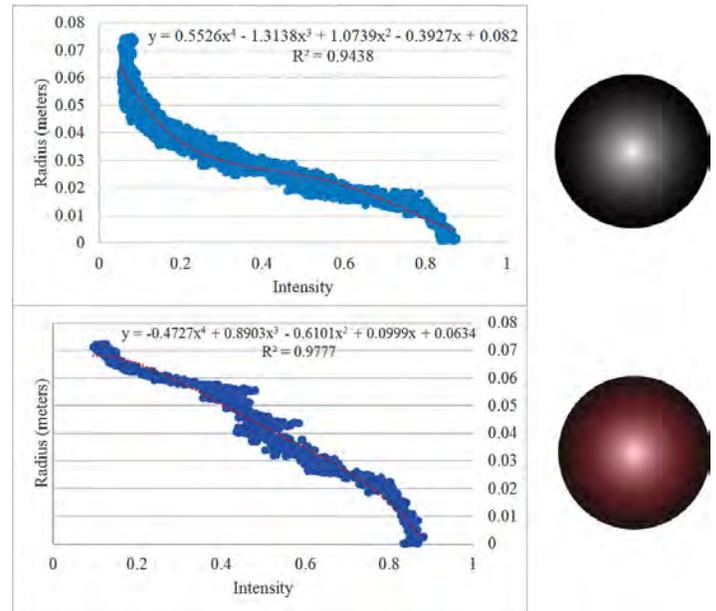


Figure 5. Radial equations relating radius with respect to return intensity values

Distance and Angle of Incidence

With each measurement containing three known parameters (2D coordinates and radius) on the target's plane, the center of the controlling target can now be computed and identified as control following the least squares methods as seen in equation 2 and 3 (with x_0 and y_0 as the unknown center coordinates). The radius is computed and known through the computation as shown in figure 5.

$$X = (A^T A)^{-1} \times (A^T L) \quad (2)$$

$$A = \begin{bmatrix} \frac{\partial f_1}{\partial x_0} & \frac{\partial f_1}{\partial y_0} \\ \frac{\partial f_2}{\partial x_0} & \frac{\partial f_2}{\partial y_0} \\ \frac{\partial f_3}{\partial x_0} & \frac{\partial f_3}{\partial y_0} \\ \frac{\partial f_4}{\partial x_0} & \frac{\partial f_4}{\partial y_0} \end{bmatrix} \quad X = \begin{bmatrix} \Delta x \\ \Delta y \end{bmatrix} \quad L = \begin{bmatrix} f_1(x_0, y_0) \\ f_2(x_0, y_0) \\ f_3(x_0, y_0) \\ f_4(x_0, y_0) \end{bmatrix}$$

$$f(x_0, y_0) = r_i^2 - (x_i - x_0)^2 - (y_i - y_0)^2 = 0 \quad i = 1, 2, 3, \dots, n \quad (3)$$

continued on page 24

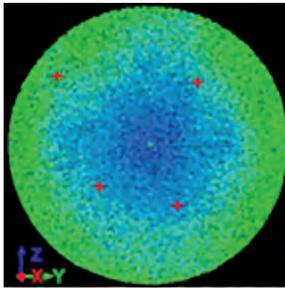


Figure 6. Sample scanned target with 4 picked points

With the coordinate system rotated to match that of a local system on the target, four random points are chosen from the scanned image ($x_n, y_n, radius_n$) as shown in figure 6. With the four chosen points, and using equations 2-5, the center of the controlling target can be computed, and compared to the known position. Each target was tested at distances of 5m, 10m, 15m, and 20m and angles of incidence of 0°, 15°, 30°, and 45°. For each combination of distance and angle of incidence, 20 sets of data (20 sets of four measured points) were tested with the RMSE (root mean square error) as shown in equation 6 and RMSE_{xy} as shown in equation 7, being used as the method to measure the overall quality and error of the test target.

$$RMSE = \sqrt{\frac{\sum \sigma^2}{n}} \quad (6)$$

$$RMSE_{xy} = \sqrt{RMSE_x^2 + RMSE_y^2} \quad (7)$$

DISCUSSION AND CONCLUSION

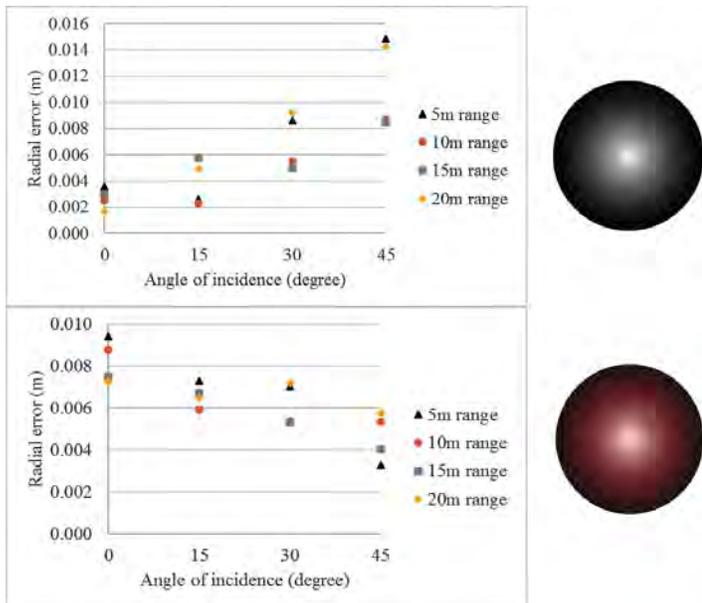


Figure 7. Radial errors (m) of black and red target at varying combinations of distance and angle of incidence

The Leica P20 Scanstation has a 3D target acquisition positional accuracy of 3mm at 50m (Geosystems 2013). The results shown in figure 7 show that sub-centimeter accuracies are possible except for the 5m and 20m test on the black target. Without radiometric calibration and with a simple radially printed intensity gradient, this test shows that low volume data targets overall are possible to achieve accuracies in the sub centimeter range within a range of 20m. It is worth noting that a typical target used for mobile lidar or terrestrial lidar would typically have a larger volume of data with which to calculate the center. The results do not yet achieve the order of accuracies as the typical and provided Leica target; results are not survey grade accurate, however, using the target as is without any changes would result in GIS grade accuracies that are not as constrained.

Findings from this experiment show promising results and provide a direction to better the target and the experiment. Further research will include tests for radiometric calibration, different printing techniques to improve the radial gradient smoothness, as well as different gradient colors that may be affected by certain terrestrial scanner wavelengths. ☺

REFERENCES

Ahokas, E., Yu, X., Kaartinen, H., Hyyppä, J., Kaasalainen, S., Matikainen, L., Honkavaara, E., Hyyppä, H., Rönholm, P., and Soinen, A. (2005). "Quality of laser scanning." *Proc., Proceedings of the Workshop: 3D Remote Sensing-Use of the Third Dimension for Remote Sensing Purposes.*

Besl, P. J., and McKay, N. D. (1992). "Method for registration of 3-D shapes." *Proc., Sensor Fusion IV: Control Paradigms and Data Structures, International Society for Optics and Photonics, 586-607.*

Darbox, F., and Huang, C.-h. (2003). "An instantaneous-profile laser scanner to measure soil surface microtopography." *Soil Science Society of America Journal, 67(1), 92-99.*

Geosystems, L. (2013). "Leica ScanStation P20 System Field Manual." *Leica Geosystems, 2.*

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A Monumental Round (But Somehow Square) Table Meeting Hath Taken Place

By Carl C. deBaca, PLS

EDITOR'S NOTE:

The following is a report on a surveyor's meeting that was held in conjunction with, but just prior to, the 2019 CLSA/NALS Annual Conference. This discussion is of interest to all in the surveying profession. In many ways the discussion mirrored an earlier discussion held in 2008. A report on that discussion can be found in Issue 159 of the *California Surveyor*, available online for download in the members section of the website: www.californiasurveyors.org.

A summons was sent out throughout the lands for a select group of knowledgeable surveyors to gather and debate. Nothing less than the Future of Surveying was at stake! (Permit me the slight exaggeration.)

Whereupon a great assembly of surveyor muckety-mucks, heavyweights, big kahunas and grand pooh-bahs sat around a table and debated some of the challenges and opportunities facing the profession in anno Domini 2019. A meeting with such an objective could have gone on almost forever, but sadly there were only two hours allotted for this ambitious undertaking. As one might imagine, this esteemed group ran out of time before running out of subject matter. Ah well, there's always next year.

Amongst those who heard the clarion call and responded in person:

- **Kim Leavitt**, Idaho PLS, past president of ISPLS and 2018 President of NSPS
- **Pat Tami**, California PLS, past president of CLSA and 2018 President of NCEES
- **Nancy Almanzan**, Nevada PLS, past president of NALS and past chair of the Western Federation of Professional Surveyors (WFPS)
- **Jason Higgins**, Nevada PLS and 2019 President of NALS
- **Annette Hovorka**, California PLS and 2019 President of CLSA

- **Ric Moore**, California PLS and Executive Director of the California Board of Professional Engineers Land Surveyors and Geologists
- **Robert LaRiviere**, Nevada PLS, past president of NALS and LS member of the Nevada Board of Professional Engineers Land Surveyors
- **Michael Kidd**, Nevada PLS, City Surveyor for the City of Henderson and LS member of the Nevada Board of Professional Engineers Land Surveyors
- **Aaron Smith**, California PLS, past president of CLSA and past chair of WFPS
- **Ray Mathe**, California PLS, past president of CLSA and past chair of WFPS
- **Greg Phillips**, Nevada PLS and president-elect of NALS
- **Todd Enke**, Nevada PLS and president of NALS Lahontan Chapter,
- **Jon Scarpa**, California PLS and Sacramento County Surveyor
- **Armand Marois**, California PLS, past president of CLSA and outgoing Director-At-Large of NSPS
- Your humble correspondent, Nevada PLS, past-president of NALS and Nevada Director of NSPS

Alas, were I to but list the accomplishments of these powerful, enlightened and influential individuals, there would no

room left in these pages for the article which follows. Suffice it to say, alone and in aggregate, these giants have indeed stomped the Terra.

The following epic conversation, informal in nature but substantive in content, was captured without the use of modern recording equipment and transcribed with haste so as to be brought to you, dear reader, without delay. This being the case, consider this piece as liberal paraphrasing rather than exact quotation (I made stuff up...). No set agenda was provided or followed so as to have the conversation 'develop organically' (does anyone else hate that phrase? It's right up there with 'synergy', 'core competency' and 'drinking the Kool-Aid'). Without a pre-determined schedule, topics came round in their own sweet time.

NEVADA TRAVERSE (NT): Well to kick this conversation off, does the profession of Surveying have an identity problem, a self-esteem issue?

BOB: As a profession we are not good at tooting our own horns.

JASON: We tend not to reach out to the other professions and look for opportunities to collaborate. We could put on workshops that satisfy continuing education credits for others, like attorneys and real estate professionals.

continued on page 26



Round Table – continued from page 25

ANNETTE: We need to be more social media savvy. People don't see us as much anymore. We need more presence in LinkedIn and Facebook, and Twitter, etc.

BOB: Also, it's a real loss not having a surveying class in most college engineering programs these days.

JASON: You know part of it is we have forgotten who we are. Why do we call our education programs "Geomatics"? What's wrong with "Surveying"?

NT: Interesting point, let's talk about education and outreach to students

MIKE: Question for NALS – Can we use scholarship money to reach out to younger kids and not just for college scholarships?

NT: The money in the NALS Education Foundation is for 'educational purposes' and could definitely be used for reaching into schools at any level. We should look into more creative avenues for youth outreach, and the Foundation could fund some of that.

MIKE: NALS and CLSA are in the best position to be the clearinghouse for issues and opportunities. We need to get to the high school students but also to grade school and junior high students. If they knew about them, there are things in this profession that would get the attention of younger kids.

TODD: And we need to revamp the Scouting Survey Merit Badge. The feedback I hear is that it's too hard and takes too long for a scout to get that badge and nobody is interested in going after it.

NT: I've heard of proposals to update the merit badge and turn it into something that can be accomplished in one day. At the national level, NSPS has connections to Scouting that could make that happen.

TODD: Also, we need to make a connection with the Girl Scouts too. That is a group of young people we should try to reach.

KIM: I recently attended the national high school counselors conference. I was told more than once that if they see another brochure with a person standing by an instrument, they're gonna puke.

JASON: At our Strategic Planning meeting, our youngest attendee, who teaches at Great Basin College, said that when addressing high schoolers, we need to quit falling back on the Mt. Rushmore imagery. It has no relevance to this generation. Instead, how about showing them a phone app for compass and lead a discussion on the concept of direction. That's a pretty good idea.

KIM: I think it is definitely possible to find STEM money for teaching Surveying at high schools.

NT: I've been intermittently beating the drum for a few years now about the SkillsUSA program. Maybe there is a way to combine STEM funding and a SkillsUSA program throughout our two states.

ARMAND: The problem with any program, TrigStar or SkillsUSA or the Scouting Merit Badge, is the need for committed volunteers. We have never been able to attract as many as we need.

KIM: One thing is for sure, we are going to have to find new ways to attract people to the Surveying profession. We need to identify not only future professionals, but future technicians, too. Not everyone wants to be a professional.

JASON: NSPS needs to look down the road and make a blueprint for the next generation of surveyors.

RAY: If it ever was, Surveying is not a Journeyman profession anymore. We don't take field technicians in and develop professional surveyors anymore.

PAT: Surveyors need to get out of our own way and look at the broader picture. We should represent something larger than just Surveying.



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continued on page 27



ANNETTE: I work primarily with GIS data, but really our jobs are all data management positions, regardless of who created the data.

RIC: Exactly, embrace your expertise and market yourselves as experts who validate geospatial data.

RAY: Take a look at the difference between 2008 and now. What do we want our profession to look like? Maybe we are over-focusing on technical skills and missing the boat on legal education.

Note: Ray, Pat and NT are holdovers from a similar roundtable meeting held in San Diego at a conference in 2008. A summary of that epic meeting was written in California Surveyor No. 159 which can be found on the CLSA website. It is striking how many issues that were relevant then are still so today! —NT

NT: How do the core requirements for a college Surveying program get created anyway? How does a state board decide how much math is enough and how much law is enough?

PAT: State Boards and NCEES look to ABET and ABET looks to NSPS for recommendations on requirements. Regarding technicians and technology, we worry too much about changes in technology and what it means to the profession. Is anyone familiar with the term ‘disruptional innovation’? Periodically something comes along and changes everything that came before. The measurement technologies we’ve all used, EDM, GPS, etc, are done. We can either adapt and embrace the new dynamic, or cry ‘poor me’. You should ask yourself “What kinds of these disruptional innovations can I get behind?”

ARMAND: we need to find professionals, social media consultants maybe, to help with establishing a presence in social media and to help with strategies for recruitment.

PAT: Maybe we don’t need as many technicians as we used to. But, if we

had the same amount of people coming into the profession as we had before, we could keep them busy – just not doing the same tasks technicians have traditionally done.

JASON: One of the things that came out of our Strategic Planning meeting last month was a suggestion to get our technicians more involved by allowing them voting rights and the ability to serve as committee chairs and chapter officers. We are going to explore that further this year.

MIKE: With respect to outreach for the Board of Engineers and Land Surveyors, should the board spend money for outreach outside the professions we oversee?

RIC: the California board is looking at making YouTube videos for outreach, “How to file a complaint,” “How to take an exam,” and so on. And, maybe spending money on webinars is still a good idea.

PAT: But really, the question is, can we find common branding? Is our message up ‘til now getting stale?

JON: Surveyors don’t embrace the concept of ‘value-added’ services. We aren’t educating our clients on the importance of having a survey and helping them toward solutions that don’t strictly involve the profession.

NANCY: One thing that was emphasized in the NSPS/NCEES ‘Future of Surveying’ forum that I took part in was marketing the profession. The forum looked like a good opportunity to find a way forward and then it fizzled out.

PAT: Has anyone seen the Tennessee Association of Professional Surveyors promotional video on YouTube? (<https://www.youtube.com/watch?v=0avrQyHw5Rg&t=4s>) This is an excellent example of how to present the profession to the public.

MIKE: Going back to something that Ray said earlier, more law and less math in

college survey programs would be a good idea to take back to NSPS.

KIM: I can take that message back and sit in on the Education Committee meeting.

NT: I’d like to talk about the threat to licensure going on in West Virginia right now. Across the country there are bills being introduced in state legislatures that would disempower or eliminate licensing boards. Let me read you a quick summary of House Bill 2697 in West Virginia:

The Bill would allow unlicensed practice of a variety of licensed activities. Language in the “Legislative Purpose” stated in the Bill proposes to “expand opportunities, promote innovation and increase competition by allowing consumers to make decisions in hiring and contracting with providers of their choice; relieve providers from burdensome occupational licenses; promote the use of less-restrictive regulatory alternatives to occupational licenses to protect consumers’ health and safety; encourage trade associations and similar private organizations to self-regulate; promote interstate mobility and flexible labor markets; and reduce the exposure of members of occupational licensing boards to liability under federal and state antitrust laws.” There is language in the “Definitions” section of the Bill which would allow non-licensed individuals to provide services to the public as long as they present a “non-licensed disclosure” statement to prospective clients. A proposed example for such disclosure reads: *Provider’s Disclosure: “West Virginia state law requires providers of the service that you, the consumer, are agreeing to purchase in this contract to hold an occupational license. I am not licensed by the state, but by providing this non-licensed disclosure I am allowed by (cite this section) to perform the service in this contract.”*

PAT: First of all, please – let’s call these ‘threats to public protection’ rather than ‘threats to professional licensure’. And for a minute look at this from the perspective of taxis versus Uber or Lyft.

continued on page 28



Round Table – continued from page 27

How many of us care what happened to taxi drivers once we could get an Uber using an app more easily than getting a taxi? The public needs to know us. It will be harder to eliminate us if people know who we are. Join other organizations like Rotary or whatever and look for opportunities to speak to people.

NT: Well – our two hours are up so I guess we'll have to leave it there. I feel like we barely scratched the surface, but one thing is for sure, conversations like these need to continue at all levels, chapter, state and at the NSPS. Thanks to everyone for finding the time to sit in on today's meeting.

And with that, the meeting adjourned. I sincerely hope that as you read through this conversation, thoughts are triggered

in your head. Thoughts of how can you help the profession – social media, youth outreach, marketing the profession, supporting college education, combatting bad and poorly thought out legislation – in fact there are a million ways you can help. This group of committed leaders didn't

have all the answers but they did have most of the questions, and that is good start.

As Otter said in Animal House, "I think this situation absolutely requires a really futile and stupid gesture be done on somebody's part!" ☺



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Update on Education

Editor's Note:

For this issue, the students from Fresno State attending the conference were able to provide a quick update on their program. For future issues, we anticipate updates from each college or university offering degrees in land surveying or geomatics. Please reach out to your connections at other schools and let them know.

FRESNO STATE by Melina Brown

The Geomatics Engineering program currently has forty-two students. Five professors work so hard and so patiently to guide each student through the courses required for this bachelor's program. The program has been approved by the Senior College Commission of the Western Association of Schools for two years in a row without requiring any changes. Below is a picture of the Geomatics students from the 2018 CSUF Geomatics Engineering Conference in downtown Fresno, CA.



If you are interested in the program or would like to donate scholarships or surveying equipment to our program, please feel free to contact us. Donations are also accepted on our website: <http://fresnostategeomatics.com/>

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Melina Brown is the Editor of the *Foresight* magazine Fresno State's Geomatics Engineering program. She has been editing for a year and believes it has been a great investment of her time in college. As Editor, it is her job and joy to learn more about the program, her classmates and her professors.

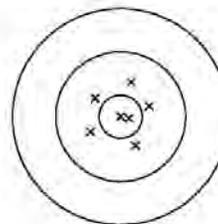
Wildfires recently destroyed major populated regions throughout the state. One overlooked casualty in the fires are the physical boundary monuments. If not physically burned, the monuments are in danger of being destroyed by the reconstruction efforts to re-grade lots, re-pave streets or rebuild other damaged infrastructure. This is a concern to all land surveyors and the Central Valley Chapter is doing something about it. They are compiling data from surveyors working in these areas and would like your participation.

Contact mike@quartaroli.com for more information. Or, complete the Wildfire Zone Questionnaire at: www.surveymonkey.com/r/6B7T97D

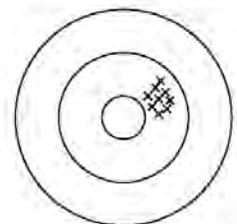
Central Valley Chapter
California Land Surveyors Association
c/o 2809 Carmella Way, Modesto, CA 95355



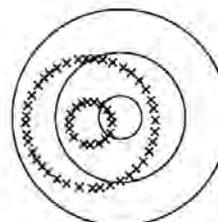
HUMOR by Joey Waltz



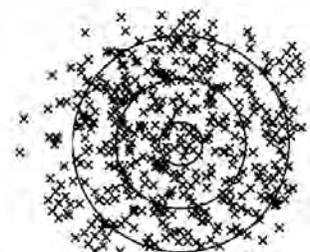
ACCURACY



PRECISION



DRONE



SCANNER



RESOLUTION NO. 2018-08

Date November 3, 2018



WHEREAS, It has been deemed necessary, for the orderly and efficient operation of the Board of Directors and Association business, to modify the set of rules in Resolution 69-03 for the conduct of meetings of the Board of Directors, be it therefore

RESOLVED, That we, the Board of Directors of the California Land Surveyors Association, do hereby adopt the following:

ORDER OF BUSINESS AND RULES OF PROCEDURE
FOR
MEETINGS OF THE BOARD OF DIRECTORS

GENERAL OUTLINE

- I Call to Order and Roll Call
- II Minutes and Agenda
- III Old Business
 - A Committee Reports
 - B Chapter Reports
 - C Resolutions
- IV New Business
- V General Provisions

I Call to Order

- A Recording of Board members present, and their Association titles.
- B Opening greetings or remarks may be made by the President, Secretary or other presiding officer. Remarks may include the Pledge of Allegiance and/or a moment of silence for surveyors who have passed.

II Minutes and Agenda

- A Minutes of the previous meeting will have been provided in advance of the current meeting. Once any corrections have been made, the minutes will be approved by the Presiding Officer.
 - 1 Minutes will include a reference to all formal actions taken at the previous meeting, with reference by number and subject to the appropriate resolution or motion.
 - 2 Minutes will include a list of all committees and chapters which reported at the previous meeting, and those which did not, according to the officially published list of chapters and committees.
- B The Presiding Officer will call for the approval of or amendments to the Orders of the Day/Agenda
 - 1 If there are only minor corrections or additions to the agenda, these may be made at this time.
 - 2 The agenda will include all resolutions, motions items for discussion before the Board, and all other unfinished business. The agenda need not include details of chapter reports or committee reports, as these reports are mandatory at each Directors Meeting.
 - 3 The tentative agenda, along with copies of resolutions or business to be discussed, will be distributed by the Central Office to all Association Officers, Directors, Past Presidents, Committee Chairs and Chapter Officers at least one week prior to any Directors Meeting.

III Old Business

- A Committee Reports
 - 1 Committee reports will be prepared in writing and submitted to the Central Office not less than three weeks prior to any Directors Meeting.
 - 2 All committees have the responsibility of submitting a report at each Directors Meeting.
 - 3 Committee reports shall include:

continued on page 31

- a) Reference to all specific investigations or reports which they have been requested to work on.
 - b) Report of any progress made, meetings held, or conclusions reached. This should include explanation of, reasons for, and purposes of, any motions or resolutions to be offered or recommended.
 - c) A final draft, in writing, or any resolution or motion on which the committee is recommending that the Board of Directors take action. This draft shall conform to the requirements set forth for resolutions in section III-C of these Rules of Procedure.
- 4 If any committee has nothing to report, or if the committee has not yet completed its work, this fact shall be stated in place of “3” above.
 - 5 Each committee will be called upon in turn. At this time the committee will present its report. At this time the Board of Directors may discuss or take action on any of the committee’s recommendations that were included in the written report.
 - 6 If there are any questions or Board decisions needed by the committee which were not included in the committee report, these may now be discussed, subject to the provisions under Sec. IV for new business, and the general provisions, Sec. V.

B Chapter Reports

- 1 Chapter Reports will be prepared in writing and submitted to the Central Office not less than three weeks prior to any Directors Meeting.
- 2 All Chapters have the responsibility of submitting a report at each Directors Meeting.
- 3 All directors have the responsibility of reviewing the agenda items. The directors shall bring these items to the attention of their chapters and convey the wishes of their chapters to the Board of Directors.
- 4 The chapters will be called upon in turn. If there are no questions, the chapter report will stand as submitted.
- 5 Any new business not included in the chapter report may now be discussed.
- 6 If any chapter has nothing to report, the chapter report will still be submitted, stating this fact.

C Resolutions

- 1 A draft of any resolution to be considered by the Board of Directors shall be submitted to the Central Office at least three weeks prior to any Directors Meeting.
- 2 A copy of all drafts or resolutions shall be distributed by the Central Office to all Association Officers Directors, Past Presidents, Committee Chairs and Chapter Officers at least one week prior to any Directors Meeting.
 - a) Before distribution, the Secretary shall assign each proposed resolution a number for the year, in the following manner: “66-1, 66-2, 66-3, etc.”
- 3 All resolutions to be considered by the Board of Directors shall be accompanied by a report containing:
 - a) Explanation of, reasons for, and purposes of, the resolution.
 - b) Directives concerning who is to carry out any action required, and by what methods.
 - c) Provisions or motions for any necessary expenditures.
 - d) A time or date limit for completion of the provisions of the resolution.
- 4 The Board of Directors reserves the right to correct or amend any such resolution submitted, or to change it to better suit the broader goals of the Association, or to return it with recommendations.
- 5 All resolutions of the Board of Directors, as finally adopted, shall be published in the “California Surveyor” or “CLSA eNews” for the information of the membership.
 - a) If any Association Member has a correction or protest to any resolution, he should notify the President, Secretary, or his chapter director in writing. This revised resolution may then be resubmitted to and considered for approval or disapproval by the Board of Directors.

IV New Business

- A Any item of new business will be submitted in the following manner:
 - 1 The person bringing up the new business will, after being recognized by the chairman, state their name and the purpose of the new business. (This is to facilitate accurate recording of the proceedings)
 - 2 The item of new business is then open for discussion.
 - 3 When the discussion is completed, the item of new business and any action thereon shall be postponed until brought forward as an agenda item.

V General Provisions

- A All reports, resolutions, motions or other items of business to be placed on the agenda shall be submitted to the Central Office at least three weeks prior to the scheduled Board of Directors meeting. The Central Office will then distribute to all Officers, Directors, Past Presidents, committee chairs, and the Editor. It shall also be posted to the website, in the members only section. These reports, etc., along with the proposed agenda, will be distributed at least one week prior to the scheduled Board of Directors meeting.



CALIFORNIA LAND SURVEYORS ASSOCIATION

Membership Application

2520 Venture Oaks Way, Suite 150 Sacramento, CA 95833

Phone: (916) 239-4083 Fax: (916) 924-7323

Corporate \$220

Shall have a valid California Professional Land Surveyors or Photogrammetric license.

CE Corporate \$220

Any California registered Civil Engineer who is authorized to practice land surveying pursuant to Article 3, Section 8731 of the PLS Act, and must be actively practicing land surveying.

Affiliate \$110

Any person who, in their profession or vocation, relies upon the fundamentals of land surveying. Has no voting rights.

Associate \$110

Any person who holds a valid certificate as a Land Surveyor- in-Training. Has no voting rights.

Out-of-State \$110

Any person who resides in a state other than California, who is a member of the other state's Association, and meets the requirements of a Regular Corporate Member. Has no voting rights.

Student \$22

A student enrolled in a college or university actively pursuing a surveying education. Has no voting rights.

Sustaining \$440

Any individual, company, or corporation who, by their interest in the land surveying profession, is desirous of supporting the purposes and objectives of this corporation. Has no voting rights.

First time members must pay a \$25 entrance fee, lapsed members must pay a \$15 reinstatement fee. First year dues are pro-rated from the month of application.

Member ID First Name Last Name License Number

Home Mailing Address City, State Zip

Email Telephone Chapter

Company, University or Firm Public or Private

Company Mailing Address City, State Zip

Company Telephone Fax

Payment Information

Please complete this form and fax or mail it with payment to the address above.

If paying with a credit card DO NOT E-MAIL this form. Instead, fax the form to (916) 924-7323.

CLSA estimates that 22% of your total dues is allocated to lobbying and not deductible for income tax purposes as ordinary and necessary business expenses. Contributions to CLSA Education Foundation are deductible as charitable contributions.

Method of Payment: Visa MasterCard AmEx Check Number:

Name on Card: Last 4 Digits of Card:

Billing Address:

Signature:

Full Credit Card #: Expiration Date: CVV#:



SUSTAINING MEMBERS

SUSTAINING MEMBERSHIP

Membership in the California Land Surveyors Association, Inc. as a Sustaining Member is open to any individual, company, or corporation who, by their interest in the land surveying profession, is desirous of supporting the purposes and objectives of this Association. For information regarding Sustaining Membership, contact:

CLSA Central Office

2520 Venture Oaks Way, Suite 150 • Sacramento, CA 95833
 916-239-4083 • 916-924-7323 Fax • clsa@californiasurveyors.org

 <p>Dan McMahon <i>Geospatial Sales Representative</i></p> <p>760.271.4681 (cell) dan@alleninst.com</p> <p>714.238.3434 OFFICE 2940 E La Palma Ave. Ste F Anaheim, CA 92704 alleninstruments.com</p>	 <p>The Online Marketplace for Surveyors, Engineers & Contractors</p>	<p>Berntsen <i>Custom Identification Products</i> Tim Klaben <i>Marketing Manager</i></p> <p>Berntsen International, Inc. PO Box 8670 Madison, WI 53708-8670 www.berntsen.com tklaben@berntsen.com</p> <p>Tel. (608) 249-8549 Fax (608) 249-9794 Tel. (800) 356-7388 Fax (800) 249-9794</p> <p>Marking the Infrastructure of the World.</p>
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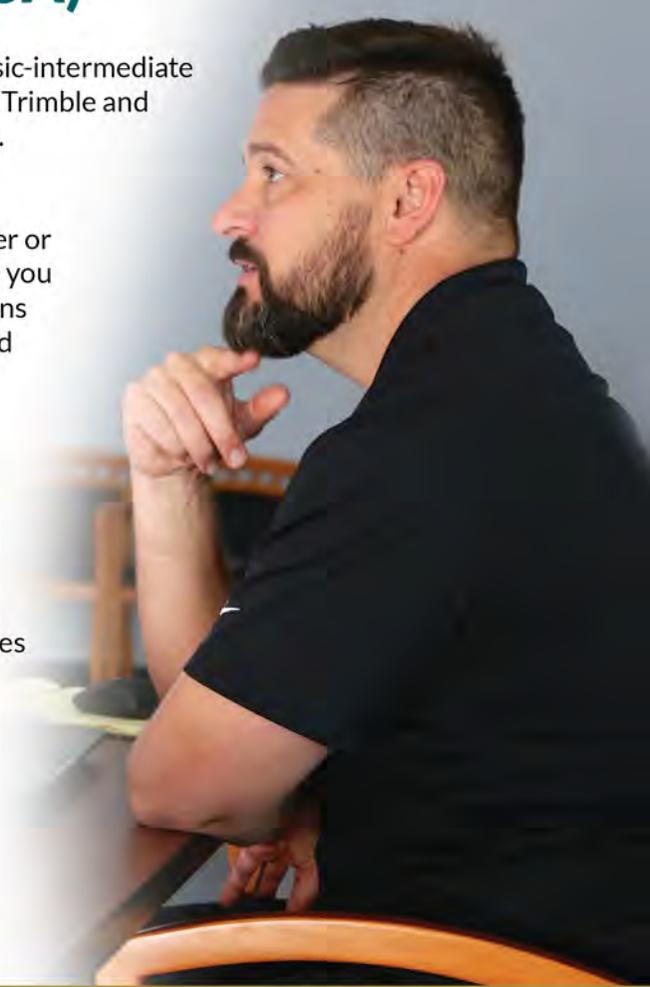
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