



CALIFORNIA SURVEYOR

ISSUE #194
FALL 2021



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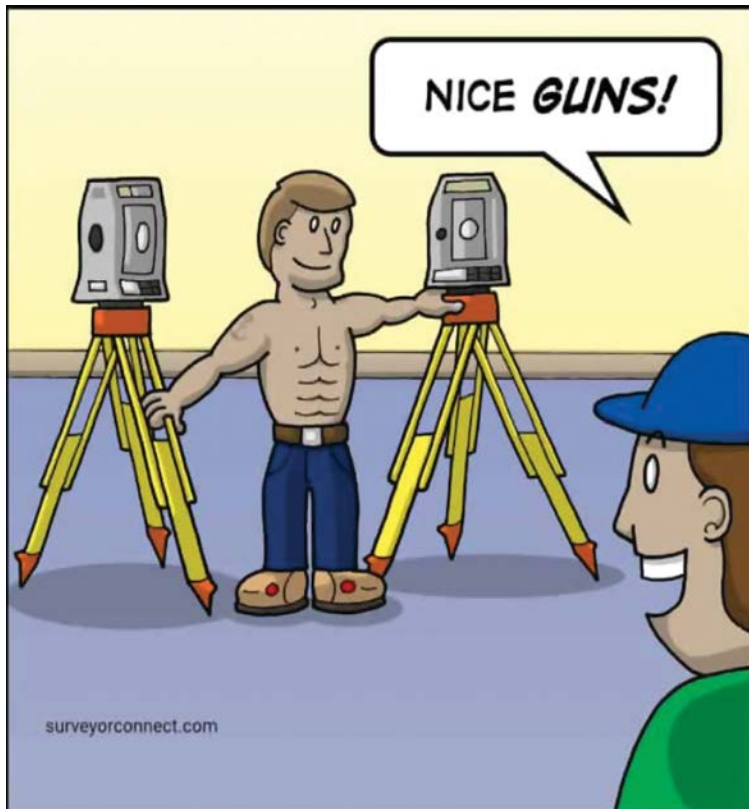
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Opinions expressed by the editor or individual writers are not necessarily endorsed by the **California Land Surveyors Association** Officers or its Board of Directors. Original articles may be reprinted with due credit given to the source and written notification to the **California Land Surveyors Association**, unless otherwise noted.



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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

Robert M. McMillan, PLS, EIT CLSA 2021 President

This year seems to be flying by. The October California PLS Exam was recently administered, and we just held our third Board of Directors meeting of my tenure as CLSA President. Our Executive Committee, Directors, Liaisons and Committee Chairs have been working hard to move CLSA forward throughout the year. Many Chapters are getting back to in-person meetings, while abiding with COVID rules. At this time, we are expecting to hold our February 5th, 2022 meeting in person at the Holiday Inn Oakland Airport. Please plan to attend.

Approved at the November 6th meeting was to offer free November and December, 2021 membership to those who join CLSA for 2022 by January 1, 2022 and waiving the Entrance Fee (\$25). Additionally, the Reinstatement Fee (\$15) will be eliminated for those lapsed members who renew their CLSA memberships by January 1, 2022. The 2022 CLSA budget was also approved by the Board which included a line item for NSPS membership. When negotiations are finalized, NSPS membership, and all that goes with it including representation on national issues, will be added to the many benefits of CLSA membership.

Please take this opportunity to discuss the importance of CLSA membership with potential new members and lapsed members. Also, Licensed Land Surveyors, Civil Engineers, LSITs, Technicians, Students, and others who rely upon the fundamentals of land surveying and of course, Sustaining Members are welcome.

CLSA works to improve the Land Surveying Profession and serves as the unifying voice in California. As members, we unite with our colleagues in the only organization that effectively represents our interests and those who choose to use our services.

The greatest benefit to be derived from membership is the opportunity to establish key relationships with others who are dedicated to the advancement of the surveying profession. Through CLSA you can participate in the exchange of new concepts and ideas. You can help to solve problems that exist within the surveying profession. You can gain new knowledge and experience through contact with others, and our conference, webinars and workshops. You can grow and develop, both personally and professionally. Additionally, CLSA saves you money on conference, webinar and workshop registrations, CLSA Publications, such as the

Professional Land Surveyors Act, Subdivision Map Act, etc. CLSA's affinity partners, Courthouse Direct, Office Depot, Shift4 Payments, and Vista International Insurance Brokers, also offer programs to help you save.

Managers and Supervisors can get a lot of mentoring for their staff by joining and participating in CLSA and encouraging their staff to participate as well. Having multiple levels of an organization attending a Chapter meeting, workshop or Conference together helps align staff at all levels.

Circling back to what I mentioned at the beginning of this article, one of CLSA's Goals is to *Publicize new licensees and LSITs*. This recognition provides positive reinforcement for their efforts, encourages others to strive for similar goals, shows the public that our profession has upward mobility, and our staff are valued members of our organizations. In the October and November issues of the *CLSA eNews* there are several examples that you can use within your firm or agency.

Now is the time to start organizing within your Chapter to obtain resolutions and proclamations from your local agencies recognizing National Surveyors Week (March 20 through 26, 2022). The goal of the week is to educate the public through

agency and classroom contact, media, and visible public service. Doing so helps raise awareness of the importance of our profession.

Remember to put the **2022 Western Regional Survey Conference** on calendars and into budgets. Springtime in Las Vegas should present excellent weather, and our negotiated room rates are very reasonable. The theme is "Mapping the Path for the Next Generation." Registration is now open at WWW.PLSEducation.org. As you visit your vendors through the year, tell them that you appreciate them supporting our profession through their sponsorship of CLSA. I hope to see you there!

Keep yourself and your people safe. 🍷

Robert M. McMillan, PLS, EIT





EDITOR'S MESSAGE

Joseph Waltz, PLS
California Surveyor Editor

Fall is by far my favorite season. The tourists have mostly left, it has the only holiday that focuses on candy and pranks, and the few maple trees in our neighborhood are changing their clothes. Plus there's nothing like a warm, gentle desert wind blowing on the beach; it's something magical.

Of course with the good also comes the bad, as those warm

desert winds can turn into hot howlers that bring fire and downed trees. The pranks on neighbors can turn ugly. Crunched up dry leaves get everywhere.

This "with the good comes the bad" is a great encapsulation of some of the work that we do. It can be rewarding, but comes with challenges. One of those is certainly opening our mind

to new ways and ideas. Using new tools to follow in the last guy's footsteps. Changing our thought processes to help our clients and citizens.

This issue has some articles dealing with these sorts of things. Mikey Mueller has written an article that is sure to be controversial but makes some excellent points. Steve Martin has an update on SPCS 2022, based

on the new NGS datum which is bound to bring challenges to many of us that work on large projects. And Laurie Pearce Price has a great book review about making our time work for us.

I also found an interesting President's Message from the Spring, 1971 issue by Robert Curtis, LS; he makes many of the same points I have made recently in trying to grow our association by signing up new members. It's in our "From the Archives" section.

Paul Mabry was gracious enough to review a new tool that he picked up recently, and one that not many of us have in our offices. There's a Lighter Side article, by William Schroeder, which will make some of you laugh thinking of similar instances of the public being the public. It sounds like it was a challenge, for sure.

We continue our series of Software Tips and Tricks, as well as the Business Ethics series. I am looking for an author to take over the Software Tips and Tricks series, so if you enjoy the intersection of Surveying and Software send me an e-mail at JoeyWaltz@Gmail.com.

Happy Fall friends, and stay safe. 🍁





LEGISLATIVE REPORT

Michael Belote, Esq.
CLSA Legislative Advocate

CLSA-Sponsored Bill Signed

Like much of the world, the legislative environment in Sacramento is gradually, haltingly inching back to normal operations. Against a typical year total of approximately 1,000 new laws, enacted per year, in 2020 the pandemic interrupted legislative year saw fewer than 400 bills signed into law. This year's total of 770 is more than last year but still lower than "normal." Of course, 770 still represents a lot of new laws.

For this year, the California Legislature limited the number of bills each member could pass to twelve, because of the sheer difficulty of processing all 2500 new bills during the pandemic. Literally each member had to pick the twelve most urgent bills to the member. We do not believe that such limits will apply during 2022, the second year of the current 2021-2022 session.

We were pleased that Senator Brian Jones (R-Alpine) included CLSA-sponsored SB 414 in his top-12 bills. On July 16, Governor Newsom signed SB 414 into law, effective on January 1, 2022. With content suggested by the CLSA Legislative Committee and approved by the Board of Directors, the bill makes the following changes:

Includes, for apparently the first time in California history, a

definition of "cadastral" surveying in the scope of practice for licensed land surveyors. While the practice of both cadastral and geodetic surveying has been limited to licensed surveyors for many years, remarkably the licensing law defined only geodetic surveying, with no definition of cadastral. The definition in SB 414 is designed to be consistent with the definition adopted by the BLM.

Clarifies that information provided by a surveyor with a record of survey, in order to permit the "intelligent interpretation" of the ROS, may be in either graphic or narrative form.

Amends Business and Professions Code Section 8780, relating to disciplinary actions against licensed surveyors by BPELSG, to separate negligence from incompetence, to permit surveyors facing discipline to more clearly understand the nature of the accusations against them.

Amends Government Code Section 66425.5 in the Subdivision Map Act, to lengthen the time in which local entities must conduct appeals of decisions on tentative maps from 30 to 45 days, because CLSA members noted that local agencies often experience difficulties conducting appeals within the allotted time.

A real expression of gratitude is due to Senator Jones and his fine Legislative Director Danielle Parsons for their hard work in enacting SB 414. While none of the provisions were particularly controversial, passing any bill in Sacramento, particularly during the pandemic, is challenging. And SB 414 was really the only surveyor-specific legislation enacted this year.

SB 414 is obviously surveyor-specific, but some of the "mega-issues" raised during the legislative year have potential effects on surveyors as well. The big issue for the year clearly was housing, one of the most difficult subjects on which to achieve consensus in Sacramento. Everyone agrees that our state needs more housing, at more affordable prices, but aligning the perspectives of NIMBYs, YIMBYs, environmentalists, unions, lawyers and local government groups presents a veritable Rubik's Cube of complexity. At its most basic level, the most

fundamental disagreement is the degree to which local government zoning authority should be circumscribed.

The most important bills enacted in the housing area this year were SB 8 (Skinner), relating to local zoning authority over housing; SB 9 (Atkins), providing for ministerial approval of construction of up to four units on single-family residential parcels, and SB 10 (Wiener), giving locals authority to approve up to 10 units on parcels near transit stations. SB 9, for example, deals with lot splits of SFR parcels, which easily could require surveyor involvement.

As California continues to fall farther and farther behind the need for housing construction, expect the subject to be front and center for years into the future. CLSA will be present for the debate, protecting the interests of our surveyor members. 🌍





CENTRAL OFFICE REPORT



Kim Oreno, CAE
CLSA Executive Director

Happy Fall CLSA Members! Thank you for picking up this issue of the *California Surveyor* magazine! I'd like to take this time to highlight CLSA headquarters activities.

2022 CONFERENCE

I'm pleased to report that planning is well underway for the 2022 conference. The conference will be a joint venture with the Arizona Professional Land Surveyors (APLS), California Land Surveyors Association (CLSA), Nevada Association of Land Surveyors (NALS), Utah Council of Land Surveyors (UCLS) and the Western Federation of Professional Surveyors (WFPS). The conference will take place from March 30 – April 2, 2022 at the Luxor Hotel in Las Vegas, NV. Conference attendees can book rooms at the Luxor now for just \$55 per night on the weekdays and \$139 per night during the weekend. Visit [pleducation.org](https://www.pleducation.org) to obtain the link to book your hotel room and to register for the conference. CLSA members should use code 201950 in place of their member number to secure member registration pricing.

The conference committee has been hard at work securing a stellar lineup of speakers including Jeff Lucas and Kris Kline. The Scholarship Auction and Dinner will take place on

Thursday, March 31st. A Bowling Tournament that will benefit the Education Foundations will take place on Friday, April 1st.

CLSA EDUCATION FOUNDATION SCHOLARSHIPS

The CLSA Education Foundation has received over \$51,000 in scholarship pledges to provide scholarships to students during the first quarter of 2022. Please let land surveying students know of this valuable opportunity. Details are posted to the CLSA website at <https://www.californiasurveyors.org/scholarships.aspx>. Please also

consider supporting the Education Foundation by donating directly through the CLSA website and making all of your Amazon.com purchases through *Smile Amazon.com*. Purchasing through Amazon Smile doesn't cost you anything and the donations that Amazon sends to the CLSA Education Foundation really add up throughout the year. Please contact CLSA Headquarters if you have questions on this. State employees can also contribute to the Education Foundation through the Our Promise campaign. Please visit www.ourpromise.org for details on that program.

RENEW YOUR CLSA MEMBERSHIP FOR 2022

Membership dues renewal notices will be mailed to all CLSA members before the end of the year. We hope that your membership in the California Land Surveyors Association has proven beneficial to you. CLSA is the only association within California that is entirely devoted to representing the Land Surveyor. We have successfully worked with the legislature, the licensing board, governmental agencies, and other professional societies to create and shape the laws, policies, and regulations which affect our daily practice as Land Surveyors. There is still much to do, and new challenges appear continually so please continue your support of CLSA!

It's been my pleasure serving the CLSA this year. Thank you all for your kindness and support and please don't hesitate to call or e-mail me with any questions, concerns or suggestions. I hope you all have a wonderful holiday season. 🌟

— Welcome New Members! —

- | | | |
|--------------------------|------------------------------|-------------------------|
| Carlos Amador | Michael G. Kidd | Francis D. Romano, Jr. |
| Hany Bakheat | Robert J. Lawless | Isaac Paul Romero |
| Carlo Bellucci | Andrew R. Lindsay | Ryan M. Scalzo |
| Michael E. Bender | Claudia Luna | Gary W. Schenk |
| Resur G. Bongolan | Richard M. Lundberg | Mark C. Sheahan |
| Shaun Bootsma | Nicholas S. Lynn | John "Chris" Shepherd |
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| Tyler C. D'Errico | Angel Murillo | Sarah Elizabeth Walker |
| Jacob Downing | Saturnino Ocampo | Ralph J. Waller |
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| Leonard H. Gabrielson | John D. Putnam | Sarah Wells |
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| Fermin Gasper | Alan John Ream | Roger A. Wilkins |
| Travis G. Headrick | Christopher Michael Reineman | Brandon T. Willard |
| Mark B. Heintz | Blake Scott Reinhart | Craig Wilson |
| Terry Holmes | Sina Robati | Mariam M. Youssef |





Laser Engraving Survey Monuments

By Paul Mabry

Among design professionals, Land Surveyors are unique in placing physical marks on the land. These marks or “monuments” are permanent evidence intended to survive years or even generations after being set. Here in the west, it is not uncommon to find evidence set by Public Land Surveyors over 100 years ago. And, in the right conditions, survey marks can survive even longer. Archaeologists in the Mediterranean regularly find mile markers from vanished Roman roads that are 2,000 or more years old. It makes sense then that such permanent records retain more than a modicum of information.

Finding old survey monuments always sparks my curiosity. I recently found two out of three U.S. Coast and Geodetic Survey monuments set in 1947 near the hospital in Alameda, California.

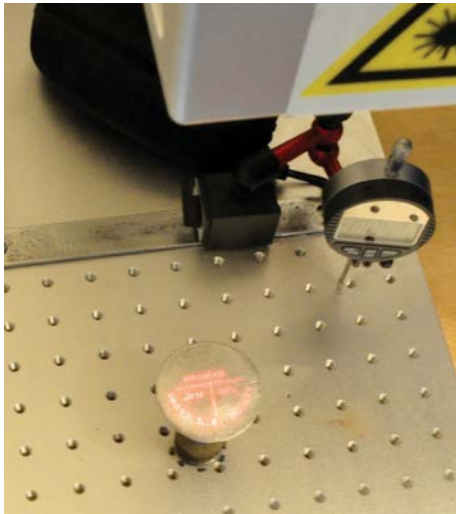


Except for one missing monument, their work has survived all these decades in plain sight – set right in the middle of a public sidewalk in a residential neighborhood. Were the men who left those marks survivors of the war; returning to civilian life after the struggle in Europe? Or perhaps they were the old guard, not young enough to fight, but still “holding down the fort” so to speak. Whoever they were, they did good work and their marks continue to firmly anchor land records in the neighborhood. Perhaps you too have wondered who set a certain mark or

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how or when. While some old marks like the USC&GS disks are self-evident, many are not. Who hasn't found a tree blaze or scar that didn't involve some ambiguity? Or how about old pipes whose diameter doesn't quite match up to their reported description? Wouldn't it be nice if every survey monument we recovered contained a bit more information? First, it would just be nice to know something about the person who left the mark. Second and more practically, it would be helpful in confirming both the location and provenance of the evidence found. **Most importantly, a mark displaying more information will tend to be more valued (and hence less frequently destroyed) by the public.** It is this last point that has led me to experiment with a way to leverage technology to enhance the value of surveyors and their marks. In this article, I'll show how a relatively inexpensive laser can add valuable information to the kind of marks typically left by land surveyors.



Some reasons I find engraving lasers attractive for surveying purposes are: 1) the hardware is relatively easy to obtain and use, 2) the software is a CAD interface that will seem familiar to land surveyors, 3) laser engraving creates an endless variety of precisely inscribed metal tags and disks and, 4) fiber lasers work on all common metals used in land surveying. I'll explain in turn more about each of these factors.

Of the lasers commonly available for engraving and cutting metal, the CO₂ laser and the fiber laser are the two varieties

of most interest to the land surveyor. I'll discuss only the fiber laser in this article, but the CO₂ laser has some comparable applications. The fiber laser is generated using fiber optic cable embedded with a special rare earth element that emits energy at a wavelength of 1064nm. This wavelength of light is deep into the infrared spectrum. Fiber lasers are solid state with long service lives of up to 100,000 hours. This is considerably longer than similar gas generated lasers such as the CO₂ laser. Fiber lasers such as this are relatively compact. A head unit containing a swinging mirror array (called a galvanometer) rapidly scans over the surface area to be engraved in a similar way to a Lidar laser measurement tool. By rapidly turning the sweeping laser on and off, the head unit can engrave just about any pattern, shape or texture onto a surface area of up to 6" x 6".



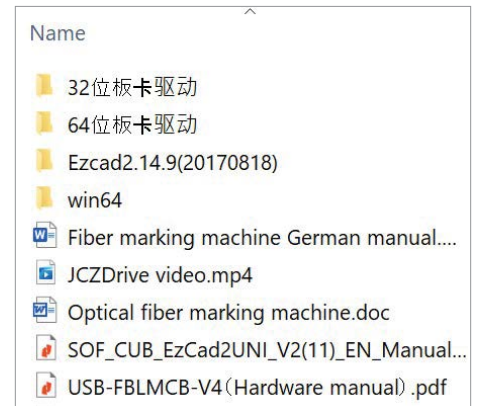
The fiber laser discussed here is a 30-watt unit produced in China and sold in the U.S. by many different distributors. A search on eBay or Amazon will return many virtually identical lasers. The model I purchased is described as a RAYCUS Fiber Laser Marking Machine. Prices vary widely from \$3,000 to \$6,000. After looking around for a while, I purchased mine for a little less than \$3,000 and received it from a distributor located here in California within a few days. The laser is comprised of two components. The business end of the laser, the adjusting bar and base plate are meant to occupy a desktop. The chassis contains the

power supply and driver software and is connected via USB to a computer. The chassis can be located under a table or on the desktop, whichever is most convenient.

To engrave with the laser, a keyed main switch and lens switch are thrown on the chassis. This activates the drivers for the galvanometer and USB communications to the separate computer. I use an older laptop computer running Windows 10, but the drivers supposedly work with older versions of Windows too.

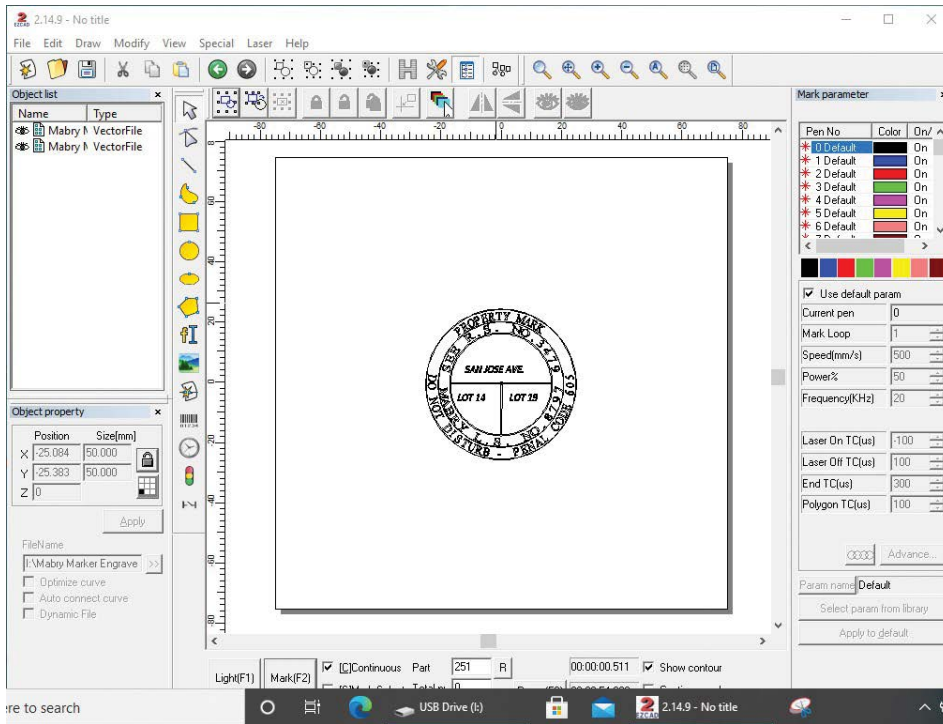


The laser comes with a USB fob containing both USB drivers for installing on the computer as well as EZCad software that communicates with the laser to drive the galvanometer. Installing the drivers and EZCad is pretty simple if you have some computer skills, but the help software (and many of the filenames) are printed in Chinese and consequently not useful for English speakers.



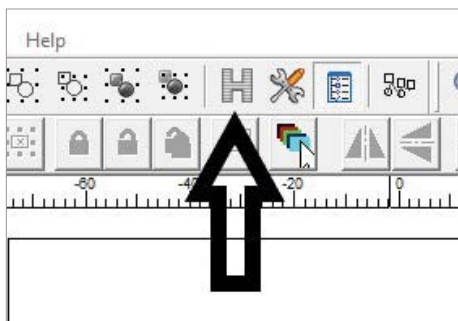
When and only when the laser is turned on, EZCad opens with no problem and connects to the laser. However, if EZCad is started without the laser, an error will pop up and EZCad will not function fully.

continued on page 9



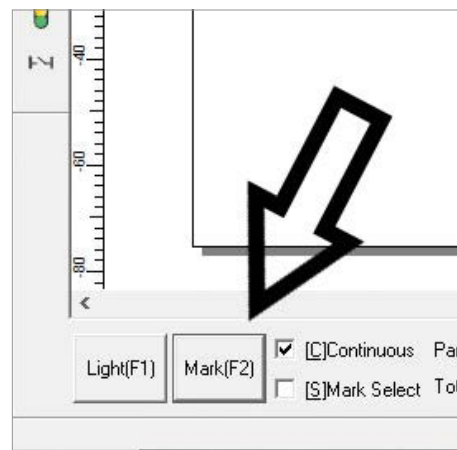
With EZCad open and the laser operative, the EZCad screen will look familiar to CAD operators.

The EZCad native file format is a .ezd, but I generally import .dxf files and don't bother saving or editing in EZCad. With AutoCAD, the editing tools are much better, so it doesn't make sense to me to bother with whatever rudimentary tools EZCad may have. The EZCad hatch tool is one exception.



This tool allows a user to hatch any closed figures (or interior of true type font text) with a variety of different engraving patterns and repetitions. This is definitely a tool worth using! Unfortunately, the hatch tool does occasionally produce artifacts. I recently found, for instance, that the letter "R" was replaced with a "*" symbol when the tool was used on certain arc aligned text.

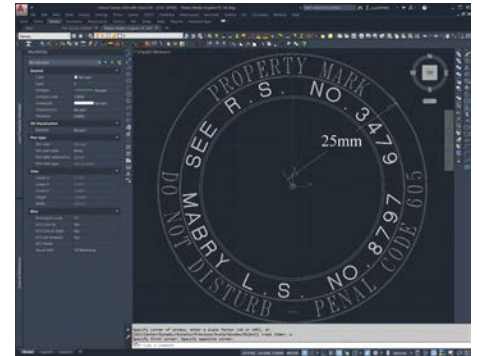
As a next step, after a .dxf is imported, the laser can outline the proposed engraving using a low power red laser visible to the eye. This tool is useful for positioning the material to be engraved. The final step is to turn on the laser power button at the chassis and select the "Mark" button in EZCad.



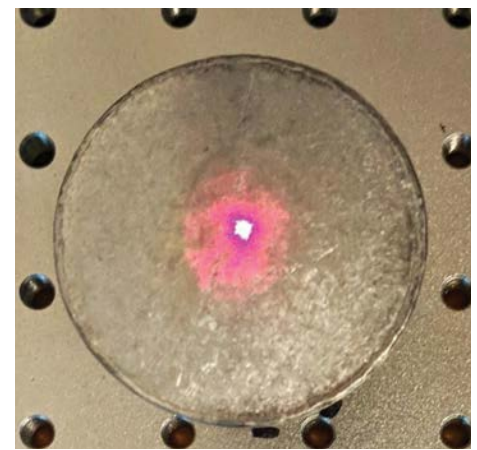
This will commence the full power laser operation of scanning (engraving) the workpiece. Note, eye protection is required when the full power laser is operating. Although the laser may not seem harmful, the full power of the laser is in invisible infrared light and just like a welding machine, can cause permanent eye damage. EZCad also contains a variety

of other controls for the laser power, frequency and repetition. I will illustrate these through the following examples.

To engrave surveying tags or disks, I start my drawing in AutoCAD with units set to millimeters. This is the native unit of EZCad and will obviate the need for scaling the drawing later. So for example, if I'm using a 2" aluminum cap, I'll start by drawing a circle of 50mm.

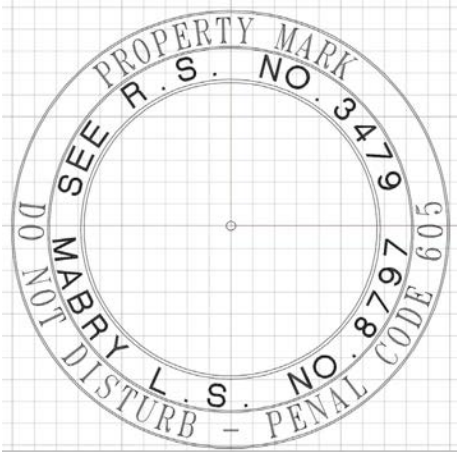


This provides an outline of the survey disk in real world units where the laser will engrave. Centering the circle at 0,0 results in the laser being centered in its platen. This is not critical, but it provides consistency from task to task and it ensures the focus of the laser is uniform over the face of the cap.



From this point, any combination of letters and linework can be drafted for the cap. I have created some standard text I use around the outside of caps.

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This is created using arc aligned text and standard true type fonts in the text style. Note that width and spacing of the ttf fonts will vary, so don't get too fancy. If spacing is important, I explode the text before exporting to dxf. Otherwise, EZCad tends to adjust the spacing – sometimes considerably. Also, keep in mind that the laser burns a very fine line, about 0.01mm. So, to draw with a wider “pen”, hatching is used to fill in the spaces between other lines. This is especially noticeable in fonts. In contrast, a printer automatically interprets the outline of fonts to include solid fill. Such is not the case in laser engraving. Unless the font is hatched (in EZCad), only the outline of the characters will be etched into the metal. And by the way, vector (linework) graphics are much faster to burn than raster (picture) graphics. The laser has such fine resolution that each “pixel” to be burnt needs to be exceedingly tiny. This results in thousands of times more passes for the laser and correspondingly slower overall burn times.



For engraving monuments, it is much more efficient to use a vector based .dxf file for graphics. In the previous column is an example of a 2” aluminum cap I used recently for a record of survey shows some of the possibilities of the laser.

For this survey, each cap is engraved differently to show the corner position relative to the surrounding lots and streets. The ring text surrounding the cap is the same from cap to cap, but the center information varies for each corner mark.



A reference to the record of survey number may alert a surveyor in the future to recover the record. And including the warning not to disturb the monument under penalty of law educates the homeowner about the value of the monument. It may also prevent a future fence installer from unwittingly knocking the corner out for lack of information about what it represents. In this example, I estimate the engraving to be about 0.3mm deep for the center line marks. That depth is comparable to the depth of marks made by conventional letter stamps. For the ring text, I estimate the engraving to be shallower – probably about 0.1mm in depth. Each of these caps ran continuously for several minutes which is equal to dozens or perhaps hundreds of passes. Also, the outline of the letters is more deeply inscribed than the filled portions because I first deeply engrave the outlines and then hatch and burn the interiors separately. When I've taken these back to the workbench and used a grinder to efface the marks, I've been able to confirm the various depths and the fact of the permanency of the etchings.

Aluminum is perhaps the easiest material to use, but stainless steel and brass also work well.



I've prepared washers to use for traverse or control points and they communicate their purpose much better than an unmarked mag nail. One unique characteristic of stainless steel is the tendency to blacken and char. Unlike aluminum which oblates and vaporizes, stainless steel tends to crust over with a hard black residue. This residue in turn partially shields the underlying metal and slightly distorts the laser's energy. A positive trait is that this makes the etching easily visible in contrast to the shiny stainless surface. On the other hand, the edges of these burns are not quite as crisp and have a brown fuzzy halo.







In testing the fiber laser's suitability for land surveyors' use, I thought stainless steel, being relatively inexpensive, hard and durable, made a good test material. Using a square hatch pattern and dial indicator, I tested various combinations of laser power and duration and summarized results.




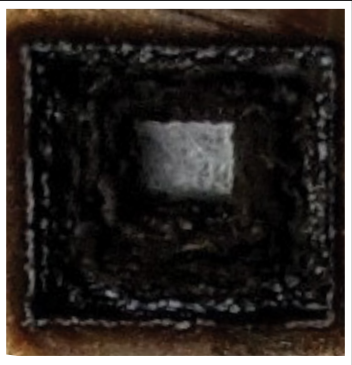
continued on page 11



Matrix of 4 tests showing 1 pass at 100%, 30 passes at 90%, 60 passes at 60% and 90 passes at 30%. Results show significant deeper etching with increasing number of passes even as laser power is lessened. Brown halo effect increases with number of passes.

One pass of laser @100% power – for reference.	30 passes @90% power.	60 passes @60% power.	90 passes @30% power.
			

Matrix of 4 tests showing hatched burns on stainless steel at 1 minute, 2 minutes, and 5 minutes. Results show depth of engraving as time of burn increased. At five minutes, the washer (1.5mm) is penetrated.

Line hatch @ 1 min. Depth = 0.13mm	Crosshatch @ 1 min. Depth = 0.2mm	Crosshatch @ 2 min. Depth = 0.7mm	Crosshatch @ 5 min. Depth = 1.5mm
			

I've reached a couple of conclusions. First, the 30watt fiber laser is sufficiently powerful to adequately inscribe survey monument caps and tags if enough passes (time) are allowed for each cap. However, it would be nice to have a more powerful laser if cost or space were not considerations. Second, the laser is extremely precise and has a very narrow cutting path – certainly precise enough for any conceivable surveyor's use. And, using a cross-hatch pattern (instead of a simple line pattern) results in material being removed more rapidly. On the software side, the EZCad software has some limitations and glitches (hatching for example). This sometimes limits the usefulness and convenience of the laser. Perhaps in a higher-end machine, a patch would be added to AutoCAD to allow .dwg files to be sent directly to the laser and avoid the clunky dxfout/import-

vector routine that currently is required. Ultimately though, the fiber laser allows a surveyor who wishes to add detailed and custom information to a permanent survey mark to do so. In a novel way, a land surveyor can, in minutes, produce a highly-detailed and informative survey mark suitable for immediate use. The cost is only his or her time and the monument materials. Although some time is required for drafting, this time is minimal once templates are saved. Like a printer, once set up, this machine can run in the background with minimal supervision. This laser is not suitable where dozens of monuments are needed, but for jobs requiring four or five monuments, perhaps on a weekly basis, this machine is adequate. And lastly, the fiber laser does vaporize metal and therefore requires plenty of ventilation. If you find this information useful and would like to

experiment with your own material, get in touch and I'd be happy to burn a sample for you. 📍



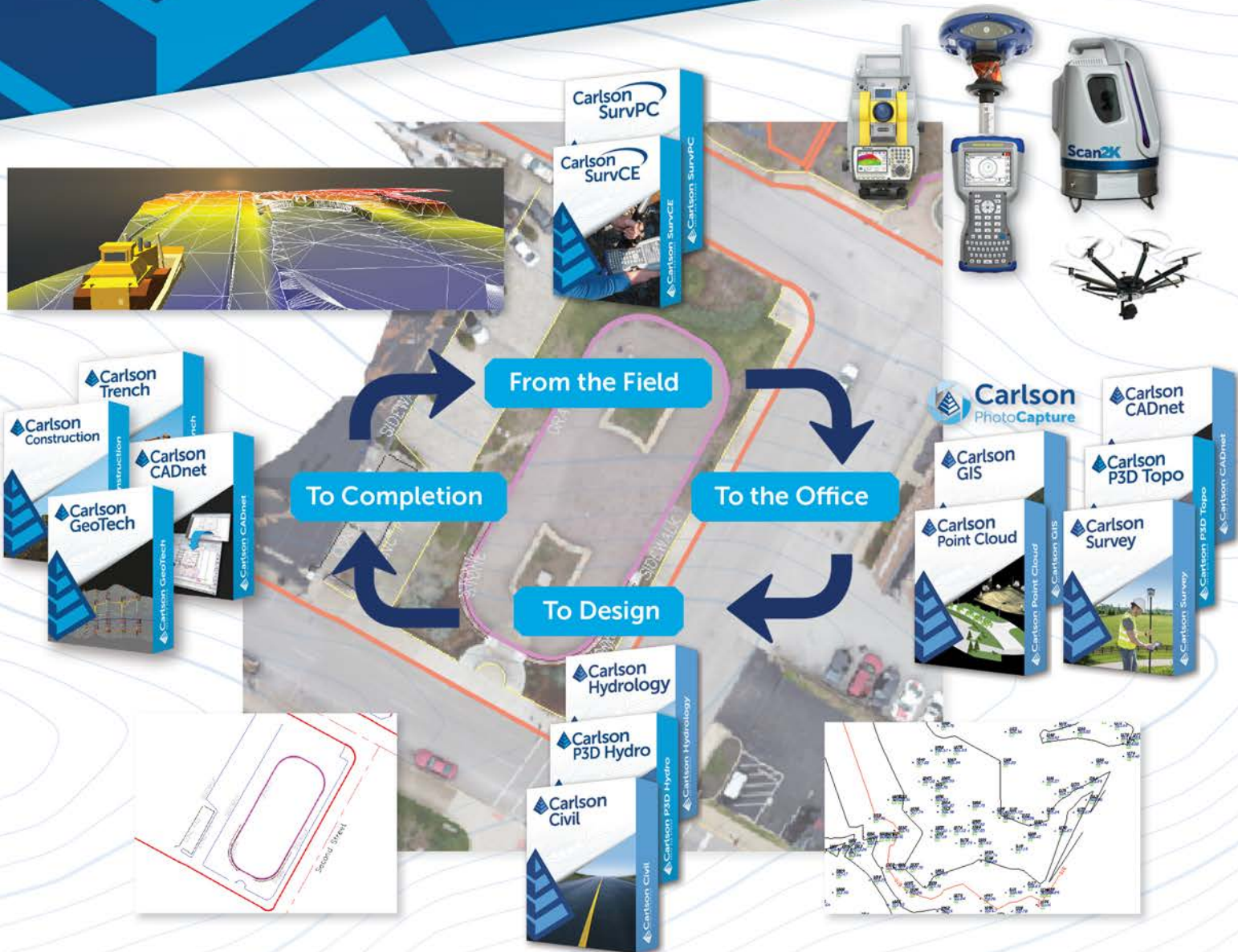
Paul is a land surveyor and attorney in private practice in Alameda, CA.

He can be reached at paul@landsurveylaw.com.

Paul Mabry



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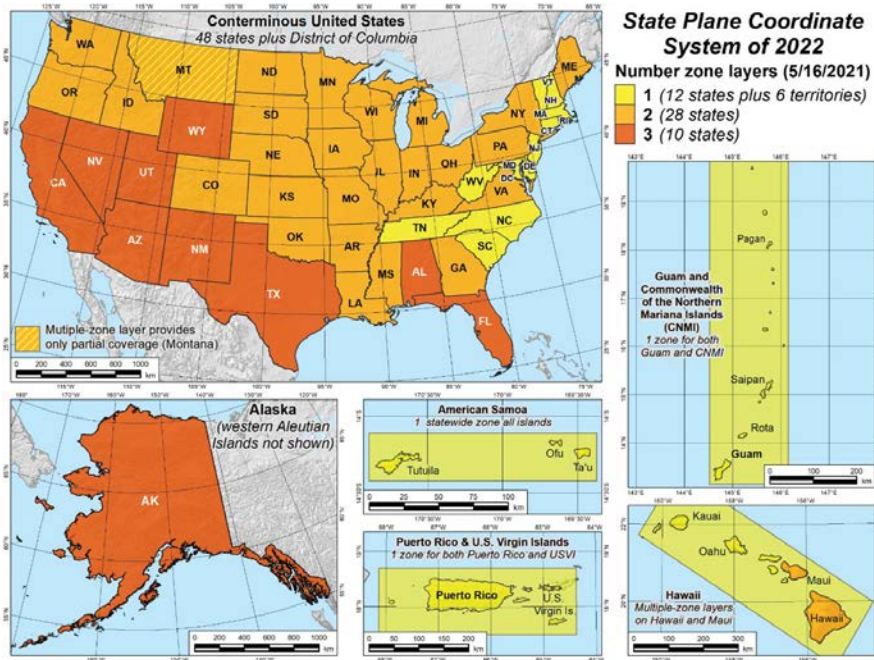
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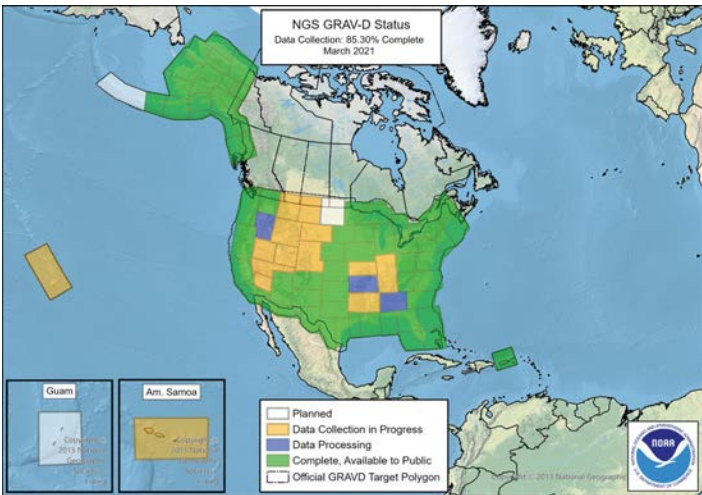
State Plane Coordinate System 2022 (SPCS2022) Update

By Steve Martin



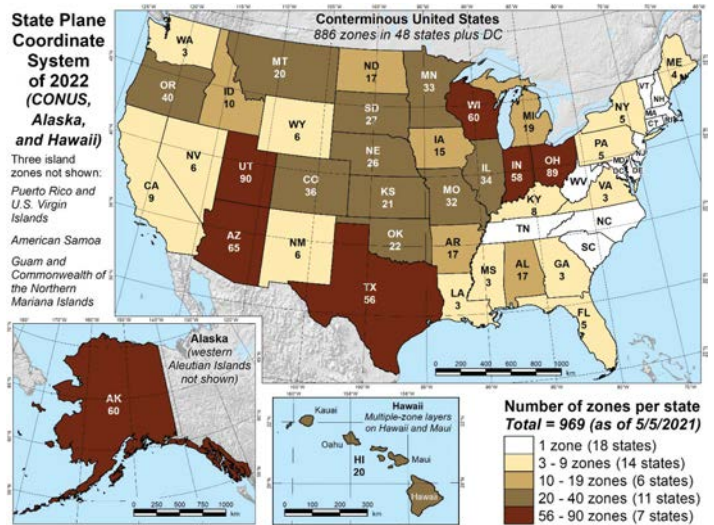
This article is a follow-up to the Fall 2019 *California Surveyor* 190 article "The State Plane Coordinate System of 2022 (SPCS2022)"

Many of you already know that the National Geodetic Survey (NGS) has delayed its plan to modernize the National Spatial Reference System (NSRS) in 2022, including new geometric and geopotential datums. There are numerous reasons for the delay, including government shutdowns, retirements of key personnel (without backfill), and something simply called "2020." Certain parts of the plan must happen first, such as the GRAV-D airborne gravity data collection portion to create a new global geoid model, so a delay in that portion delays the entire NSRS 2022 Modernization project. The SPCS2022 portion of the project is still proceeding more or less on schedule, however it will not be released until the new datums are available. While there is not a new target date announced, expectations are that this will take a few more years, after 2025.



(Figure 1)

While NGS expects to have the final SPCS Zones ready early in 2022, Pacific Southwest Regional Geodetic Advisor, Dana J. Caccamise II, shared slides of the current zones designs for California in his presentation at the League of California Survey Organizations (LCSO) annual Geospatial Summit on May 27th 2021 (see pages 14-16). These slides are draft versions of the SPCS2022 zones, however they are reputed to be close to what the final versions will be. What could possibly change is the extent of the polygons.



(Figure 2)

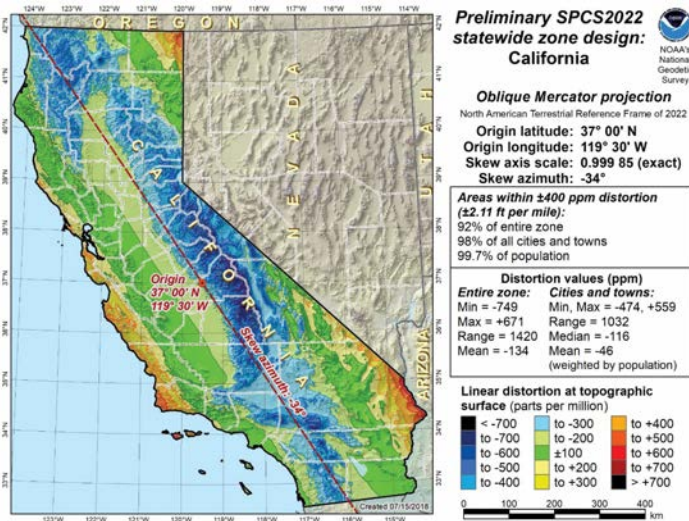
Note: The nine proposed Zones for California in the three "layers" include the (1) Oblique Mercator (OM) projection of zone covering

continued on page 14



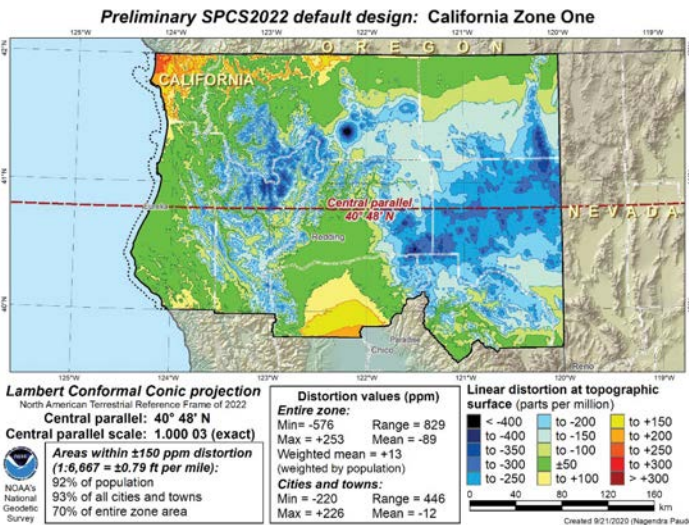
the entire state designed by NGS; (2) the six Lambert Conformal Conic (LCC) zones covering the entire state designed by NGS; and (3) the optional layer that currently consists of two OM Low Distortion Projection (LDP) zones designed by John Tosto with help from Dana Caccamise (shown on page 15).

Layer 1 - NGS Designed Statewide Zone



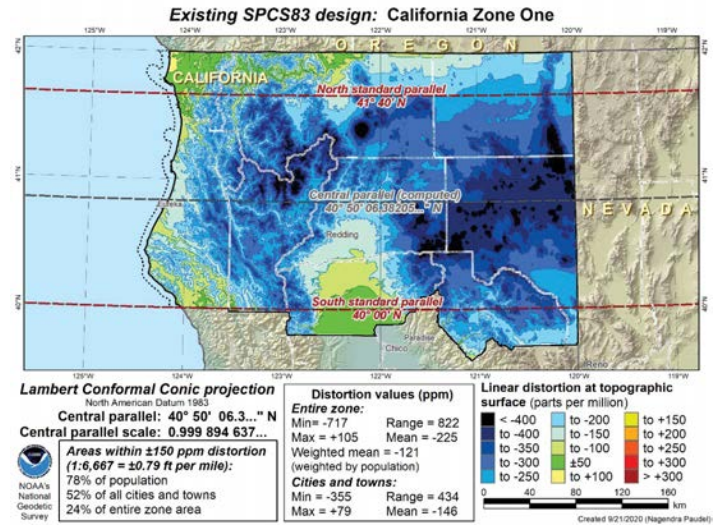
(Figure 3)

Layer 2 - NGS Designed 6 Zones – Statewide Coverage



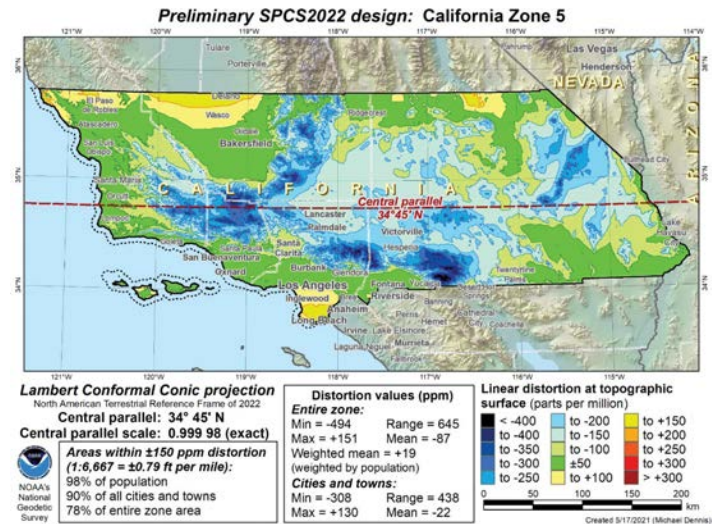
(Figure 4)

Compare the distortion (scale) values to the existing SPCS83 zone:



(Figure 5)

Note: The proposed Zone 5 (see figures 6 and 7) has changed from the two alternatives presented in the Fall 2019 California Surveyor 190 article. The additional four zones are illustrated on page 16.



(Figure 6)

continued on page 15

How Can You Participate In the NSRS 2022 Modernization Project?

You can help with the NSRS 2022 Modernization by participating in the GPS on Benchmark program. GPS data submitted through OPUS Projects on marks with published NAVD88 heights will be used to create the transformation grids between NAVD 88 and NAPGD2022.

The deadline to submit GPS on Benchmark data for inclusion in the transformation tool has been

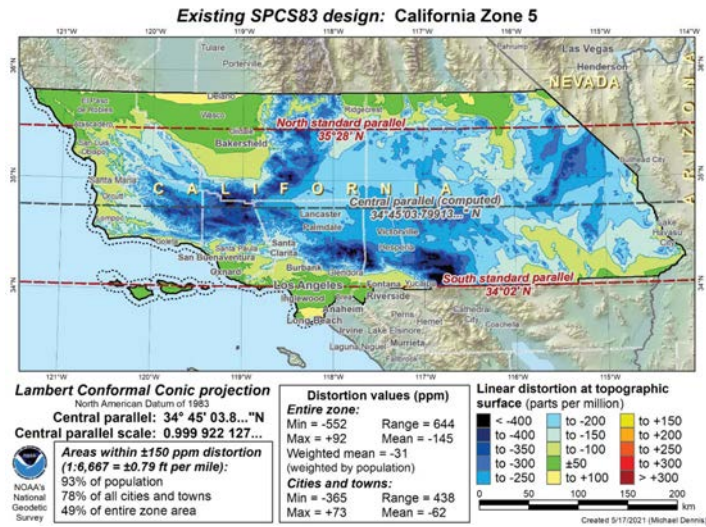
extended to December 31, 2022. Current status for California is that only 24% of the 10km priority hexagons have been completed. Participation by the survey community is needed to help develop an accurate translation in California.

Marks for which GPS data is submitted to NGS before December 31, 2022, will have 2020.0 Reference Epoch Coordinates (REC) automatically

computed and released as part of the modernized NSRS.

Link to NGS GPS on Benchmark web page: <https://geodesy.noaa.gov/GPSonBM/index.shtml>

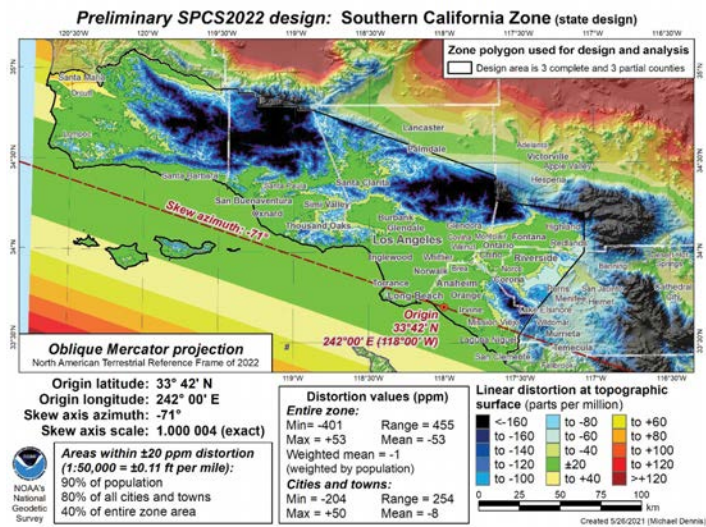
E-mail NGS GPS on Benchmark team: NGS.GPSonBM@noaa.gov



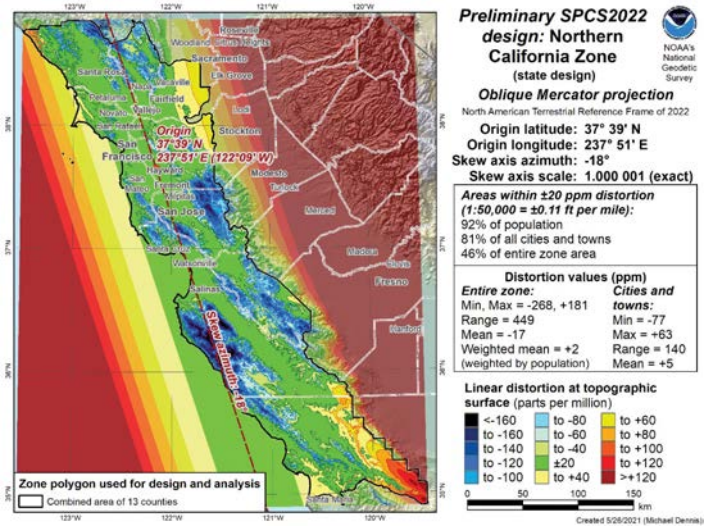
(Figure 7)

Layer 3 - User Designed LDP Zones – Partial State Coverage

The deadline to submit proposals to NGS for user-designed projections was March 31, 2020. There was interest from LA County and some in San Francisco to include Low Distortion Projections (LDPs) for those two areas in the SPCS2022. John Tosto of LA DWP prepared some designs on behalf of CLSA & CSRC. They were completed right at the deadline, with some help from Dana Caccamise and Michael Dennis of NGS. Michael Dennis had indicated that not limiting the zone extents to a County boundary and maximizing the extents while still meeting the zone distortion criteria was NGS's preference. The following two Oblique Mercator (OM) projections were the results of that effort.



(Figure 8)



(Figure 9)

With the work-from-home time during 2020, and better clarity on the tasks needed to bring the NSRS 2022 Modernization program to completion, NGS took the opportunity to update the Blueprint documents. As mentioned in the Fall 2019 *California Surveyor* 190 article, "NOAA Technical Report NOS NGS 62, Part 1 Geometric Coordinates in 2022," "NOAA Technical Report NOS NGS 64, Part 2 – Geopotential Coordinates," and "NOAA Technical Report NOS NGS 67, Part 3 – Working in the Modernized NSRS" are the definitive documents for information about the NSRS 2022 Modernization program. All the above NGS (updated) documents are available on their website under Publications. One benefit of the delayed datum implementation is that the Geometric portion will now be based on ITRF2020 instead of ITRF 2014 as previously identified.

NGS held a bi-annual Geospatial Summit on May 4, 2021 with some good presentations on the NSRS 2022 Modernization along with other NGS initiatives. Recordings of these presentations are freely available at <https://geodesy.noaa.gov/geospatial-summit/year-2021/presentations.shtml>.



Steven J. Martin

Steven J. Martin retired this past year after over 34 years with several utility and public works agencies, including most recently as the Survey Supervisor for the East Bay Municipal Utility District headquartered in Oakland, CA. He was a Director for CLSA for over 15 years, a past Chairman of the CLSA Education Foundation, a past member of the CSRC Executive Committee, and the past CLSA-CSRC Liaison.

See next page for draft versions of the SPCS2022 zones, presented by Pacific Southwest Regional Geodetic Advisor, Dana J. Caccamise II, at the League of California Survey Organization (LCSO) annual Geospatial Summit on May 27 2021.



Preliminary SPCS2022 design: California Zone 2



Lambert Conformal Conic projection
North American Terrestrial Reference Frame of 2022
Central parallel: 38° 57' N
Central parallel scale: 0.999 97 (exact)

Distortion values (ppm)
Entire zone: Min = -532 Range = 657
Max = +127 Mean = -92
Weighted mean = -13 (weighted by population)

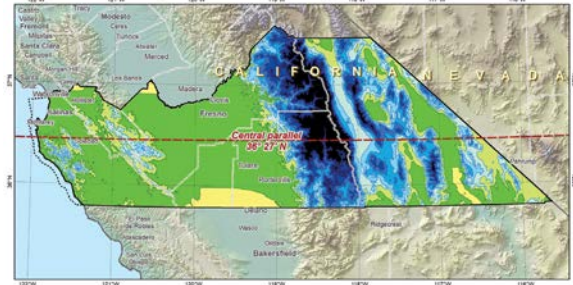
Linear distortion at topographic surface (parts per million)
Legend: < -400, -400 to -200, -200 to -100, -100 to -50, -50 to 0, 0 to +50, +50 to +100, +100 to +150, +150 to +200, +200 to +250, +250 to +300, > +300

Areas within ±100 ppm distortion (1:10,000 = ±0.53 ft per mile):
94% of population
79% of all cities and towns
65% of entire zone area

Cities and towns:
Min = -385 Range = 481
Max = +96 Mean = -50

Created 8/18/2022 (Dagoberto Pauletti)

Preliminary SPCS2022 default design: California Zone Four



Lambert Conformal Conic projection
North American Terrestrial Reference Frame of 2022
Central parallel: 36° 27' N
Central parallel scale: 1.000 02 (exact)

Distortion values (ppm)
Entire zone: Min = -642 Range = 731
Max = +89 Mean = -109
Weighted mean = +21 (weighted by population)

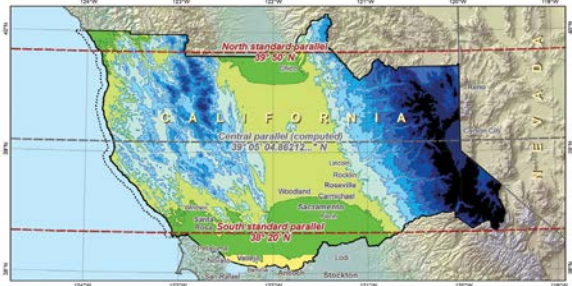
Linear distortion at topographic surface (parts per million)
Legend: < -400, -400 to -200, -200 to -100, -100 to -50, -50 to 0, 0 to +50, +50 to +100, +100 to +150, +150 to +200, +200 to +250, +250 to +300, > +300

Areas within ±75 ppm distortion (1:13,333 = ±0.40 ft per mile):
93% of population
82% of all cities and towns
52% of entire zone area

Cities and towns:
Min = -308 Range = 375
Max = +67 Mean = -13

Created 10/9/2022 (Dagoberto Pauletti)

Existing SPCS83 design: California Zone 2



Lambert Conformal Conic projection
North American Datum 1983
Central parallel: 39° 05' 04.86212'' N
Central parallel scale: 0.999 914 673...

Distortion values (ppm)
Entire zone: Min = -579 Range = 670
Max = +95 Mean = -150
Weighted mean = -54 (weighted by population)

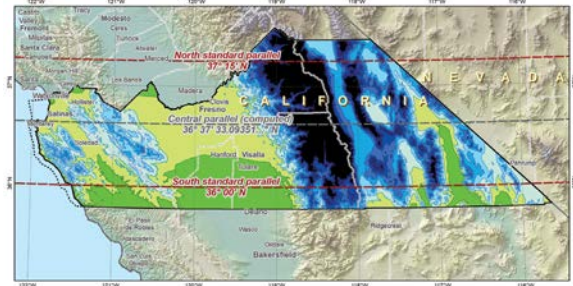
Linear distortion at topographic surface (parts per million)
Legend: < -400, -400 to -200, -200 to -100, -100 to -50, -50 to 0, 0 to +50, +50 to +100, +100 to +150, +150 to +200, +200 to +250, +250 to +300, > +300

Areas within ±100 ppm distortion (1:10,000 = ±0.53 ft per mile):
86% of population
62% of all cities and towns
44% of entire zone area

Cities and towns:
Min = -427 Range = 508
Max = +80 Mean = -102

Created 8/18/2022 (Dagoberto Pauletti)

Existing SPCS83 design: California Zone Four



Lambert Conformal Conic projection
North American Datum of 1983
Central parallel: 36° 37' 33.093571'' N
Central parallel scale: 0.999 940 762...

Distortion values (ppm)
Entire zone: Min = -723 Range = 773
Max = +50 Mean = -184
Weighted mean = -60 (weighted by population)

Linear distortion at topographic surface (parts per million)
Legend: < -400, -400 to -200, -200 to -100, -100 to -50, -50 to 0, 0 to +50, +50 to +100, +100 to +150, +150 to +200, +200 to +250, +250 to +300, > +300

Areas within ±75 ppm distortion (1:13,333 = ±0.40 ft per mile):
97% of population
75% of all cities and towns
32% of entire zone area

Cities and towns:
Min = -383 Range = 408
Max = +25 Mean = -88

Created 8/18/2022 (Dagoberto Pauletti)

Preliminary SPCS2022 default design: California Zone Three



Lambert Conformal Conic projection
North American Terrestrial Reference Frame of 2022
Central parallel: 37° 33' N
Central parallel scale: 0.999 99 (exact)

Distortion values (ppm)
Entire zone: Min = -671 Range = 755
Max = +84 Mean = -117
Weighted mean = -2 (weighted by population)

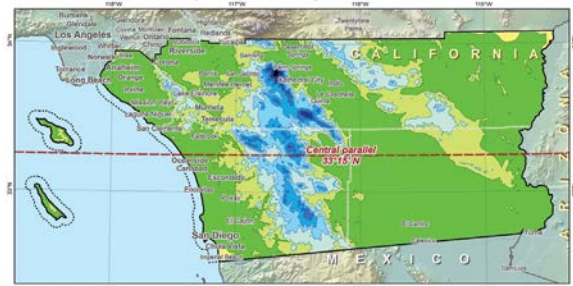
Linear distortion at topographic surface (parts per million)
Legend: < -400, -400 to -200, -200 to -100, -100 to -50, -50 to 0, 0 to +50, +50 to +100, +100 to +150, +150 to +200, +200 to +250, +250 to +300, > +300

Areas within ±50 ppm distortion (1:20,000 = ±0.26 ft per mile):
98% of population
81% of all cities and towns
51% of entire zone area

Cities and towns:
Min = -381 Range = 447
Max = +66 Mean = -22

Created 8/18/2022 (Dagoberto Pauletti)

Preliminary SPCS2022 design: California Zone 6



Lambert Conformal Conic projection
North American Terrestrial Reference Frame of 2022
Central parallel: 33° 15' N
Central parallel scale: 0.999 99 (exact)

Distortion values (ppm)
Entire zone: Min = -462 Range = 542
Max = +80 Mean = -45
Weighted mean = +7 (weighted by population)

Linear distortion at topographic surface (parts per million)
Legend: < -400, -400 to -200, -200 to -100, -100 to -50, -50 to 0, 0 to +50, +50 to +100, +100 to +150, +150 to +200, +200 to +250, +250 to +300, > +300

Areas within ±50 ppm distortion (1:20,000 = ±0.26 ft per mile):
92% of population
87% of all cities and towns
62% of entire zone area

Cities and towns:
Min = -270 Range = 331
Max = +62 Mean = -9

Created 11/13/2022 (Dagoberto Pauletti)

Existing SPCS83 design: California Zone Three



Lambert Conformal Conic projection
North American Datum of 1983
Central parallel: 37° 45' 03.8...'' N
Central parallel scale: 0.999 929 179...

Distortion values (ppm)
Entire zone: Min = -735 Range = 805
Max = +74 Mean = -178
Weighted mean = -61 (weighted by population)

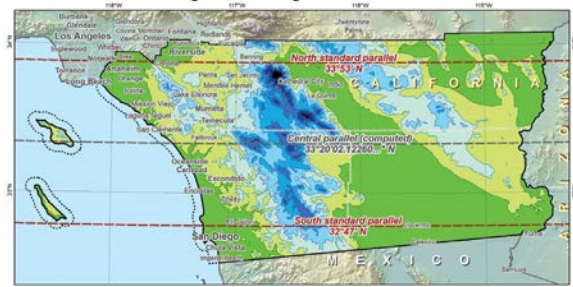
Linear distortion at topographic surface (parts per million)
Legend: < -400, -400 to -200, -200 to -100, -100 to -50, -50 to 0, 0 to +50, +50 to +100, +100 to +150, +150 to +200, +200 to +250, +250 to +300, > +300

Areas within ±50 ppm distortion (1:20,000 = ±0.26 ft per mile):
25% of population
23% of all cities and towns
19% of entire zone area

Cities and towns:
Min = -442 Range = 482
Max = +40 Mean = -85

Created 8/18/2022 (Dagoberto Pauletti)

Existing SPCS83 design: California Zone 6



Lambert Conformal Conic projection
North American Datum of 1983
Central parallel: 33° 20' 02.1...'' N
Central parallel scale: 0.999 954 142...

Distortion values (ppm)
Entire zone: Min = -511 Range = 567
Max = +56 Mean = -83
Weighted mean = -32 (weighted by population)

Linear distortion at topographic surface (parts per million)
Legend: < -400, -400 to -200, -200 to -100, -100 to -50, -50 to 0, 0 to +50, +50 to +100, +100 to +150, +150 to +200, +200 to +250, +250 to +300, > +300

Areas within ±50 ppm distortion (1:20,000 = ±0.26 ft per mile):
73% of population
66% of all cities and towns
40% of entire zone area

Cities and towns:
Min = -311 Range = 355
Max = +44 Mean = -48

Created 11/13/2022 (Dagoberto Pauletti)



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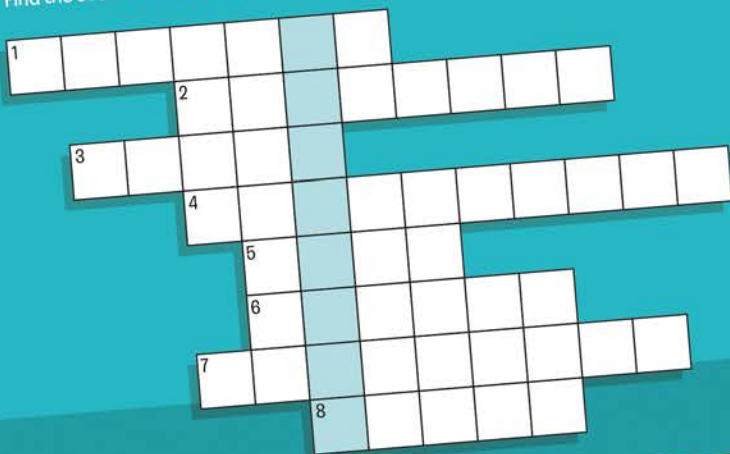
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2. A line which marks the limit of an area.
3. The method of echolocation used by animals like bats.
4. The process of planning and following a route.
5. Another word for 'robot', used by the Last Surveyor!
6. The final 'S' in the abbreviation GNSS.
7. The subject you study in school where you learn all about the world!
8. Where grown-ups drive their cars.

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Basis of Bearings

What Is It Good For?

By Michael (Mikey) Mueller

Many aspects of survey lore and knowledge are passed down person to person. That tradition is wonderful and absolutely necessary to teach many of the nuances of land surveying, but it has a dark side. Some of the practices and procedures that are taught and perpetuated by habit become increasingly obsolete. It is my belief that the Basis of Bearings (BoB) is one such practice that has become obsolete and merits review because to many people it has incorrectly become conflated with “boundary resolution.” The boundary resolution is the evidence and procedures used to locate each boundary on the ground and resolve any conflicts or ambiguities as best as one can. The Basis of Bearings is simply the arbitrary azimuth that was chosen from which to start turning angles.

Some surveyors have told me their basis of bearings are not arbitrary, because their survey is on True North, or perhaps State Plane. The arbitrariness of State Plane is self-evident when you consider how the semi-major axis has to be defined, or the fact that our State Plane coordinates were completely changed in the 1980’s with NAD 83. I will grant that a survey with True North as its BoB is not arbitrary if you accept that the $\pm 25,700$ -year precessional cycle of the earth’s axis of rotation changes slow enough as to be considered fixed and

could be considered a natural constant like Pi. However, it is quite rare to find a survey based on solar observation these days. Most often the BoB for a map is determined by holding two existing monuments that were given an azimuth through previous work.

This is not a new issue. In a memo written by George Abbott (LS 2297, CE 3748) in 1961 at the age of 86 after a lifetime spent surveying (he helped map Corregidor before WW1) he summarizes what he understood about the “Basis of Surveys in Sonoma County”

... It is practically the universal practice, both by the forces of the County Surveyor and by Licensed Land Surveyors and Civil Engineers, to base their system of bearings on some line, using the bearing given for that line as shown on a recorded plat or in a recorded deed. This has led to there being a different basis of bearing, for nearly every survey, with consequent error in retracement...

The consequence of the above situation is that every survey and every deed written off those surveys has a unique (a.k.a assumed) basis of bearings. If you hold two monuments and rotate your points so that the bearing between them matches another map, you are actually on your own personal unique datum because it

is based on your unique measurements. Considering that the map you used for your BoB likely did the same, that means your unique datum is just adding your errors and inaccuracy to whatever errors were in the reference map. So, a BoB done this way is really just the sum of all the errors and movements in monuments from when you did your survey back in time to the original surveyor making some measurements off a star (Polaris or Sol) or the magnetic needle. Granted the difference in your unique datum to its immediate predecessor is likely negligible in the real world, but just as a traverse accumulates errors, so too will BoBs built up on an increasingly long chain of maps.

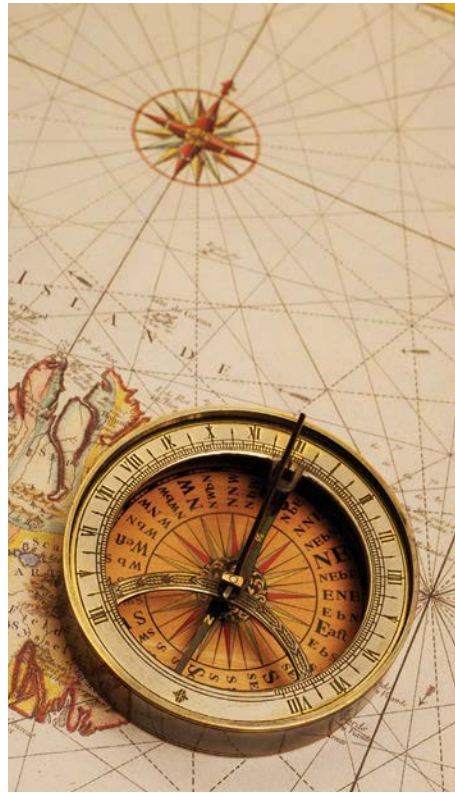
When every map and every deed prepared from that map have their own unique BoB, then it necessitates using each document’s interior angle relationships from found monuments to property retrace and replace missing positions based on what is effectively a series of local basis of bearings for each map or deed rather than hold the stated record bearing of the line. That sort of boundary solution might not be how everyone approaches it, but I think remembering to separate out your BoB from the boundary resolution helps remind us to not do the two-point tango and call all the found monuments “out of position”.

continued on page 20



This is not to advocate for all maps being on True North. Having your map on True North and showing how all the boundaries of your subject have a measured bearing based on your work, and a record bearing from the deed just adds confusion to understanding how each line was resolved. It will also cause problems for many title folks, city planners and other laypeople who will think that the survey is changing the description.

When the line chosen for the BoB is an important line for the boundary resolution, it is very informative about how that map solved the boundary of the subject parcel because it will allow for quicker comparisons of record to measured. It also lets the map look cleaner because there will be less reported differences to record and minimizes or eliminates the need for elaborate explanations of your boundary resolution. The usefulness and elegance that can be achieved in a map that makes the BoB match the linchpin of



the boundary resolution is what has made it a very common practice, and which led to the conflation of boundary resolution and Basis of Bearings.

Regardless of what arbitrary line you choose for your BoB, and however you decide is the best way to resolve the location of the boundaries it is always useful to remember that they are different procedures.

So, what is the point of listing your Basis of Bearings aside from satisfying 8764? 🗺️



Michael Mueller

Michael (Mikey) Mueller, PLS 9076 works at Hogan Land Services in Sonoma County. Like many in surveying he found the profession by a happy twist of fate and then promptly fell in love with its combination of library researcher and Indiana Jones-esque treasure hunting.

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Book Review: How *Deep Work* and *Getting Results* Can Help Land Surveyors Make Time Work Better



By Laurie Pearce Price, LSIT

Time is an elusive commodity for land surveyors. When we feel like we have enough of it, or maybe even a little bit extra, we consider it a blessing. Quite often, however, we can boil our perceived lack of time down to one clichéd, yet real, sentiment: “There aren’t enough hours in the day.”

A recent experience from the field highlights the problem of time in land surveying, especially for rural surveyors. My partner and I manage the only land and water rights surveying company in remote, rural Modoc County. He is a Professional Land Surveyor (PLS) and Water Right Surveyor in California and Nevada, and the only PLS within 100 miles; I am a Land Surveyor-in-Training (LSIT) in both states.

We recently conducted an initial field inspection of a boundary line with a client and his neighbor. When we arrived on site, we encountered another licensed surveyor and his technician from a company based in a neighboring county; they had driven over two hours to be present for this meeting, at the neighbor’s request. The other surveyor expressed his frustration that he had not been told that a local surveyor had also been called to take a look at the boundary problem. He said he was already working ten hours a day, seven days a week, with a huge backlog, getting calls for local work as well as jobs out of the county. We empathized, as we work locally and outside of our community on boundary issues and water rights cases.

As an LSIT, I was curious to see how the two licensed surveyors would handle this situation. They decided to take a walk

together along the boundary in question to look at the monuments and confer. When they returned, the out-of-county surveyor decided that there was no reason for him to take this job amid his already shattered schedule, when there was a perfectly capable professional locally available. He and his survey technician were cordial but departed in haste, with almost 120 miles ahead of them back to the office, lamenting that they had just “shot the whole day.”

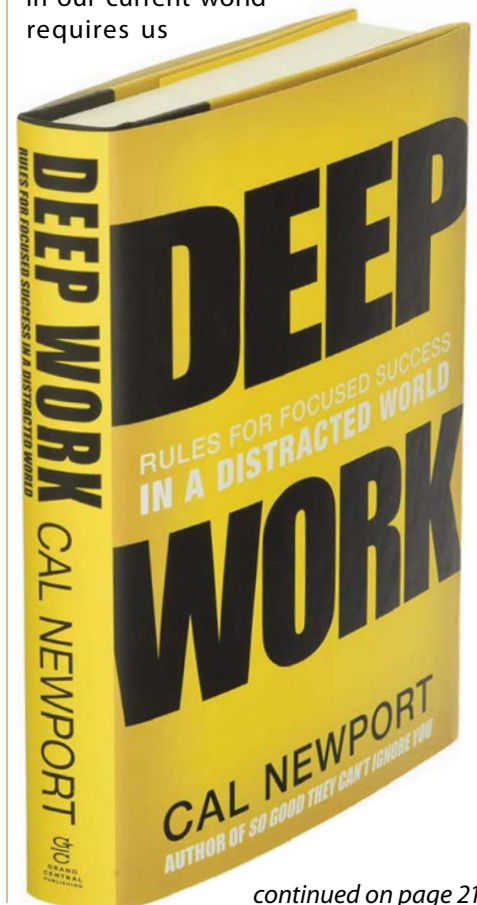
This situation brought home to me the crisis of time that our profession is experiencing. I found myself curious about how the overstretched out of town surveyor and his firm organized their time. Professional blogs and journals express the fear of a diminishing pool of qualified land surveyors as longtime professionals retire (Trunick, 2019). It has become common practice for independent surveyors to schedule jobs several months or even a year out, especially in rural areas like Modoc County. Time often seems like an enemy for all of us – clients and agencies, as well as surveyors.

While it is true that we cannot conjure up more hours in a day, we can reach outside of our own professional box for help in embracing the deepest potential of the few hours we do have. There are loads of books addressing the issue of time management, but the cruel joke is that extracting the nuggets of wisdom out of all of these resources takes ... time. This article provides a review of two such books written by thoughtful authors outside of our field, both of which have useful suggestions for how we might reframe the ways in which we manage our precious time.

Carve out time for focused work and dump the virtual distractions through *Deep Work*

Dr. Cal Newport is a Computer Science professor at Georgetown University. He proposes a radical approach to managing time that can help land surveyors make the most out of increasingly hectic work lives with *Deep Work: Rules for Focused Success in a Distracted World* (2016).

Newport believes that professional success in our current world requires us



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to do “deep work,” which is the skill of concentration without distraction on a challenging task. When engaging in this level of focus in our workday, we can condition our capacity to “create new value” or produce insights or outcomes that elevate our production and, ultimately, our profession. Deep work tasks create new value out of our intellectual capacity, actually improve our skills, and “are hard to replicate” (p.3). This process requires us to arrange our work lives to allow for “long, consecutive, uninterrupted time-chunks” for “focused production” (p. 5). One way to identify a deep work task is to consider whether it is specialized and whether it would take a substantial amount of time to train someone else to do that job (p. 229).

Newport points out that deep work is psychologically beneficial when it produces a state of “flow” in which we are totally immersed in something challenging, about which we are completely passionate, and in which “we are stretched to the limits in a voluntary effort to do something worthwhile and hard” (p. 84). Furthermore, if we view our work as a “craft” that “can be honed and applied with respect and care,” we add philosophical meaning to our professional lives that can only come from deep work (p. 90).

“Shallow work,” includes the kind of work we do that is crucial to our profession, but which does not require a great deal of informed professional consideration or experience. These are straightforward, often logistical tasks that can be done the same way every time and are easily taught. This work tends to “dominate the time and attention of knowledge workers” and distract us from more focused production (p. 218), if we do not manage how we address these tasks.

Land surveying is highly specialized, requiring years of experience, education, and rigorous testing. Surveyors give scrupulous attention to detail, both in measurement and in communicating our findings, that cannot be accomplished “on the fly” or while attending to other tasks. The following chart provides a sample of what surveyors consider deep and shallow work:

DEEP Work Examples	SHALLOW Work Examples
Research to prepare for field work – studying historical and recent survey plats and field notes for pertinent data on early settlers and calls for monuments, researching federal and county government sources for appropriate historical records (including entrant files from the National Archives and Records Administration, county tax and deed records), mapping a UAV flight plan, and decoding water rights files	Fieldwork preparation – charging equipment, setting up new projects in a data collector, identifying possible base locations, creating .kmz files to upload for point approximation, and packing the truck
Other Research – decoding and scrutinizing old and/or handwritten deeds and maps to build solid chains of title, reviewing patent, homestead entry and other historic documents	Field work procedures – base set up and take down, instrument operation
Executing and processing field work – collaboration with peers on findings in situ, making connections with historical research done in preparation phase, the use of intuition to interpret previous surveyors’ findings in the field, and calculations for sectional breakdowns and traverse checks	Administrative activities – ordering homestead entry files or other records, logging hours in an accounting program, and communicating with clients about contract matters, scheduling
Creation of final products for clients – post-processing field data and crafting land descriptions and plats for Records of Survey, the research and composition involved in writing expert witness reports, lot ordinances for municipal Lot Mergers, and professional articles	Procedure-based office tasks – renewing annual filings for clients’ mining claims, preparing Reports of Conveyance for water rights, following a checklist for checking a Record of Survey or water rights map before submitting for approval
Composition – writing contracts for projects, and reports for clients and attorneys, preparing expert witness testimony	

While shallow work serves a purpose and deserves scheduled time each day, it is grounded in and should not be allowed to hinder our capacity to think deeply and focus at work.

Newport believes that we can train our brains to make space for and embrace

the concept of deep work, even amid the distracting settings of modern life. He suggests options for ways of scheduling time for deep work into the day. The most isolated style is “monastic,” which involves completely isolating yourself for long periods of time – a luxury most surveyors cannot consider. “Bimodal” scheduling involves setting aside at least one whole day to spend in complete focus, which is occasionally possible for our profession. “Rhythmic” scheduling of deep work into time blocks every day becomes a predictable pattern that becomes a “rock-solid routine” (p. 111). A final version of scheduling deep work is a “journalistic” plan, fitting random periods of deep focus whenever the opportunity arises (p. 117).

In his own practice, Newport takes a rhythmic approach. He maps out his anticipated day first thing in the morning and revises his schedule as he needs to throughout the day. I find that a rhythmic schedule also works for me to keep my day organized. I keep a simple composition notebook with an actual pen or pencil, not just a virtual schedule on my smartphone. I love to cross things off lists; this system both gives me two chances to do that and keeps me on track for fitting priorities into the flow of my day.

Another strategy that Newport recommends is creating rituals, which he defines as “organized and systematized behaviors that minimize the transition” from shallow activities to deep focus time (p. 119). Rituals allow us to control where and how long we will spend in this uninterrupted mode and what supports we need to work best. If my focused task involves writing, my rituals include waking up very early, booting my computer while I put on the kettle for tea or coffee, and stepping outside to breathe the fresh air and orient myself to the day before returning to the computer to work. After an hour or two of deep work, I take a movement break by going for a run or a walk; if my schedule permits, I can dive back into my project again for another block of time.

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Newport also proposes honoring a strict end to the workday, to allow us to switch gears, free our minds to sort through problems that arose during the day and “gain unbidden insights” (p. 146). Newport has a “shutdown ritual,” in which he sets aside a few minutes at the end of every work day to scan his e-mail inbox for items that need an urgent response, transfer new tasks to tomorrow’s list, check his current day’s list to see if there is anything urgent that still needs to be done. After he has run through these final tasks, Newport actually says “Shutdown complete” out loud to officially end his day (p. 146). Since I work from home, I have found this ritual to be an amusing way to make myself stop work and transition to personal activities in the evening.

While much deep work happens in a solitary mode, Newport stresses the value of working deeply with someone else, because “innovation benefits from collaboration” (p. 133). Decrying the vast open-plan office in which coworkers are in constant auditory and visual contact as highly distracting, he describes a “hub-and-spoke” arrangement that supports both deep work and collaboration: a central common shared space allows for workers to run into each other and share ideas, while every worker also has a soundproof private area to which to retreat for solitary deep focus work, which may include building on inspirations they have gained from those “serendipitous encounters” in the hub (p. 132).

In our independent company, collaborative work looks different depending on the situation: in the field, we might each use different instruments and consult record notes together to uncover evidence of the earliest possible use of water for livestock. In the office, we often collaborate in the intuitive process of making a map that goes beyond merely following software procedures; we often must connect what one person remembers seeing in the General Land Office (GLO) field notes to topographic features that show up in a GIS program and translate that into applications in a CAD program.

Newport encourages us to “embrace boredom” by planning breaks from focused work, with set amounts of time reserved for using the Internet, checking e-mail and only responding when necessary, and spending time in “productive meditation,” periods of time in which your body is busy but not mentally challenged. The only limit to what constitutes productive meditation is that it should NOT include mindless Internet surfing or watching TV – this focused reflection happens with physical movement that frees your mind to review what you have done, learned, or produced in your day. Productive meditation could mean taking a walk, going for a run, or anything that allows quiet contemplation. In an office setting, taking a walk around the block might offer some time to move and think. In the field, I experience opportunities for productive meditation in situations in which I am working alone on a fairly simple task for an hour or more. For example, if I am walking a stream bed taking quick topo readings, I am my own captive audience, and free to think through discrepancies in the record or other problems that have been nagging me about a project.

In our culture that values the illusion of being busy, Newport bemoans the “shift to the shallow” in which constant online connectivity “fragments workers’ attention into slivers” and diminishes our ability to do deep work when needed (p. 7), turning work that should derive from deep focus into half-hearted approximations of our best work (p. 58). Newport attacks social media as a “dangerous” enterprise that robs us of the value of downtime. Social media, he says, is not the “lifeblood of our modern connected world” but rather, “just products, developed by private companies, funded lavishly ... designed ultimately to capture then sell your personal information and attention to advertisers” (p. 209). Newport invites us to protect our attention, “so that you don’t fragment it, you allow it to stay whole, you preserve your concentration so that when it comes time to work, you can do one thing after another, and do it with intensity, and intensity can be traded for time” (Newport, TEDx Talk, “Quit Social Media,” 9/19/2016, <https://www.youtube.com/watch?v=3E7hkPZ-HTk>). He advocates keeping only those

network tools that have a positive impact on your core values and dumping those platforms that have a negative or no impact. In deciding whether to keep a social media account, for example, Newport encourages us to try disappearing from the platform for thirty days, unannounced, then considering whether anyone noticed our absence. When we remove our attachment to “likes” and collecting followers, we may be shocked at how much more time we have.

Newport ends his book with specific strategies for making the most of every moment of the workday. He recommends scheduling every minute of the day into blocks that can be revised as needed, in order to “maintain, at all times, a thoughtful say in what you’re doing with your time going forward;” deciding whether a task is deep or shallow by considering how long it would take to train someone else to do it; employing “fixed-schedule productivity” by ending work at 5:30 pm (p. 236); and becoming “hard to reach” by using sender filters on incoming e-mail, sending fewer e-mails, and ignoring e-mails that are not easy to process (p. 256).

Building in flexibility with J.D. Meier’s *Getting Results the Agile Way*

While Cal Newport dives deep into exploring the psychological benefits of focused contemplation and simplifying our process in *Deep Work*, another author takes a more stylized approach to implementing a flexible system that supports growth and productivity. J.D. Meier is Director of Innovation at Microsoft for Digital Transformation, Change Leadership, and Agile Program Management (<https://www.linkedin.com/in/jdmeier/>). He presents his plan for *Getting Results the Agile Way* (2010) in a straightforward format that seems unnecessarily repetitive. Meier’s big idea is that we can get our best results if we adopt a systematic structure to our day, week, month, and year in pursuit of “compelling outcomes” in which we “fix time and flex scope” (p. 18), setting time limits for specific activities across our day, and adjusting when needed. Meier

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encourages us to delegate to others or do least preferred, “worst things first,” saving our strongest skills for “power hours” when we have the most positive energy for work that requires our greatest attention (p. 13). Many surveyors may read his suggestion to delegate and think, “What other people?” However, Meier’s encouragement to get the hardest or least fun tasks out of the way is a good reminder of a strategy that many of us have heard since our school days.

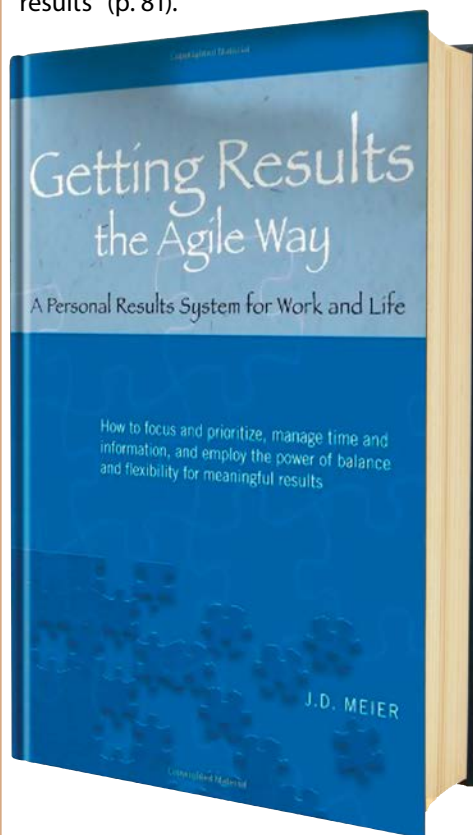
One highly useful concept for the land surveying profession in *Getting Results* is Meier’s “Rule of 3” (p. 29). This framework simply means choosing three outcomes to achieve every day. Meier emphasizes that outcomes are not simply shallow activities, such as sending out invoices, calling the BLM Public Room, or making sure the rod for the rover made it into the truck. Outcomes should reflect a work “hot spot” (p. 20), his terms for an area of life that presents opportunities, or “pain points” which require time, energy, and focus.

Meier’s consistent message is that we create the reality of how we spend our time “by design or by default” (p. 63). If we do not have a clear yet flexible plan, other people or the situation itself will determine how we spend our time. Meier presents highly structured templates to use as guides for prioritizing tasks and developing a weekly pattern to work toward outcomes, extending his approach to all areas of our lives.

Central to Meier’s system for getting control over our time is the notion of “timeboxes,” which are simply marked out blocks of time that we reserve for focused work, with set time limits. He strongly recommends building a day around non-negotiable timeboxes for eating healthily, sleep, and exercise (p. 69), with *minimum* limits for these activities. After tending to those basic needs, we can make the most of our workday by choosing three meaningful outcomes from our map of priorities and do only those activities that help meet those outcomes, here with *maximum* time limits. If the outcomes need to change, we can be flexible and adjust as needed. If we achieve the outcomes, or need to replace them, we can move on to the “next best

thing” on the list of activities. Any activity that does not serve our desired results is on the backlog and can be brought forward to complete as needed.

Meier shares an elegant model for designing a week that may help those of us who can use support in crafting an effective week (preferably including actual days off). Meier’s pattern involves “Monday Vision,” “Daily Outcomes,” and “Friday Reflection” that allows us to create a week in which we “spend each day working on the right things with the right people and making the right impact” for “sustainable results” (p. 81).



The Monday Vision is a simple yet potent routine that involves identifying three outcomes for the work week and then planning the week around supporting the realization of those outcomes. For example, how would you be able to tell on Friday that you had achieved the goals that you set on Monday? Completing activities that support the three main outcomes for the week will bring you full circle in your Friday Reflection.

Meier, like Newport, recommends a “startup routine” (p. 63) for the beginning

of the day that involves nutrition and exercise, then setting aside half an hour in the morning for “administration time” (i.e. shallow work tasks). Meier chunks the bulk of the workday into three “power hours” to focus on the outcomes from the Monday Vision. These power hours are the times of day when he is at his most productive (for example, 10 to 11 AM, 1 to 2 pm, and 3 to 4 pm). Meier schedules breaks and “think time” (p. 75) (productive meditation) into his day, before ending his workday with more administration time. At the end of the day, Meier recommends that we “dump our state” (p. 72) – a term from his software world – by noting where we stopped working on the last project of the day and reflecting on what we learned and enjoyed and where we could improve.

The last component of Meier’s scheduling approach involves a Friday Reflection which can be “timeboxed” as an activity at some point on Friday. The Friday Reflection is a regular pause to review the week, listing three things that went well and three areas of improvement for the coming week. Meier believes that this routine helps to identify our “actual capacity” and gauge our energy levels throughout the week. If things went well and we achieve our outcomes, we can try to maintain the same level of activity and balance through the next week; if we hit snags with our productivity, we might consider adjusting the structure of our daily schedules for the coming week (p. 24).

Meier’s routine-based approach to using the Rule of 3 seems like a good fit for the demands of our profession. In the best-case scenario, we should be able to balance a full workday with active movement, focused thinking, and breaks that will help us achieve the outcomes we want for our clients, whether we are in the field or in the office. Getting more value out of those focused chunks of intense concentration, Meier and Newport both say, will save us time because we will always have a (flexible) plan with dedicated sessions without distraction, rather than playing catch-up or feeling like we are putting out fires all day.

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Our company has several projects at once that always need attention; the needs of each project can change daily. In our office, we organize our jobs in a fairly low-tech, but effective way: we list on a whiteboard our active jobs and what tasks need to be done for each, as well as a list of projects that need maps only, and a list of new or potential projects that need follow-up. As we start each day, we take a look at the board and gauge what else is going on that day, whether there is a professional development webinar, a meeting, or phone conference, and plan our outcomes accordingly. The list usually feels overwhelming; but using the Rule of 3 main outcomes on which to focus will keep it manageable. Once we meet an outcome for the day, we can choose a different focus for that project and move on in a more organized way.

Meier urges us to take a look at the recurring activities in our schedules that may be cluttering up our time and not supporting our outcomes. For example, during the COVID-19 pandemic, I signed up for several regular Zoom meetings that were professionally related and became automatic appointments on my Google calendar. As work got busier, I found that I kept bumping up against these time commitments that became more of a burden than a support, so I dropped them and freed up more space for focused work during my power hours. Mindful scheduling for professional development allows us to avoid scheduling and living by default and to embrace living by design.

A final contribution from J.D. Meier promotes a “growth mindset” in which we build on what we know, stay open to opportunities and new ideas, and “fail fast, learn fast” (p. 182). There will always be learning curves in land surveying as technology and datums change; Meier encourages us to adopt a mindset that embraces change, asks different questions, with a focus on developing from “unconscious incompetence” in which we are clueless as to how much we *don't* know, to “unconscious baked-in competence” (p. 193) in which we perform our jobs with skill and finesse without needing to think through each step.

Managing our time with intention for greater productivity and balance

Both *Deep Work* and *Getting Results the Agile Way* promote the cultivation of balance across our professional and personal lives. This approach calls to mind another book that I read recently. *Ikigai: the Japanese secret to a long and happy life* (Hectór García and Francesc Miralles, 2017) presents the Japanese concept of *ikigai*, an ideal state of being where our passions, skills, contributions, and livelihood all come together. This book is an excellent resource for ways to live a long, healthy, and meaningful life; its chapter on work and the flow state is particularly insightful, especially as it reflects many of the ideas presented by Newport and Meier. Attaining the state of *ikigai* requires that we reach a state of flow in which we are “completely immersed in the experience, not thinking about or distracted by anything else” (p. 57). The strategies that the authors share for attaining flow are very similar to those promoted by Newport and Meier: choose a challenging task about which we are passionate that is “slightly outside your comfort zone,” have a clear objective before starting a work session, and concentrate on one task at a time (pp. 58-60). The concept of multi-tasking, García and Miralles say, is an illusion; rather than doing more than one thing at the same time, when we say that we are multi-tasking, we are actually switching back and forth between single tasks very quickly. This habit can sap our energy and makes it difficult to do any one task well (p. 60).

In the same spirit of seeking the Japanese ideal of *ikigai*, Newport and Meier encourage us to focus our time and attention to be our best selves and produce work that contributes to the community. Newport uses a more creative approach and Meier a more simplistic mathematics-based path to building capacity to generate this state of peak production and flow. Newport’s work is full of stories from the worlds of business and academia, with mindful content that may inspire us to create space for uninterrupted work time and whittle down the brain-sucking use of social media. Meier’s book, on the

other hand, is not as cerebral and contains multiple lists and templates that may be useful for those who just have time for a quick read and don’t mind heavy repetition. In the end, both books offer hope for the land surveying profession as we struggle to keep up with the changes in the industry of land surveying. Carving out at least one “timebox” for deep, focused concentration every day, for example, may help quell some of the feeling of not having enough hours in the day. If we can learn how to put our limited time to the best use, we can increase our capacity to create work of new value for our clients and the profession. We might find ourselves able to say, as Cal Newport manages to do every evening, “Shutdown complete.” ☺

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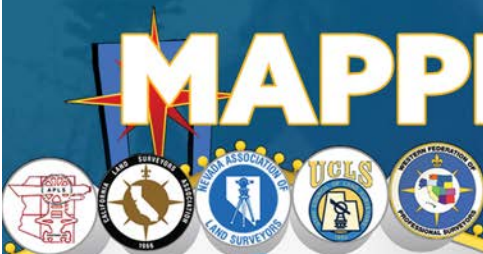
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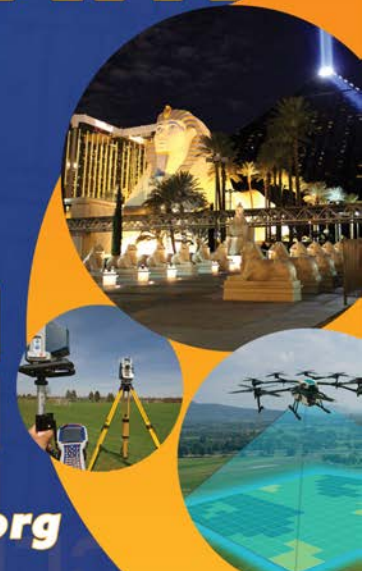
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The Lighter Side of Surveying



By William Schroeder, PLS

If you've spent any time standing at a survey instrument on a public street or road, you've had people drive up and ask you for directions. This makes sense; we're map people, and we should be able to help. But it doesn't always make sense. My first surveying job was two summers at the North Rim of the Grand Canyon (lucky me!); a dad actually drove up and asked me, "how long does it take to see this place?" It's been three decades since then, so I've had practice in dealing with these requests. When a nosy neighbor drives up and asks, "What are you surveying for?" I might answer, "Aw, 'cause I didn't finish college." (Actually, I did). When people assume I'm with the government and ask, "Are you guys finally gonna fix this road?" I might answer, "Yep ... widening it out to the new prison ... minimum security." I'm a sole proprietor and can gauge when it's OK to kid people; don't embarrass your client or your boss. Probably the funniest, and certainly the most extreme interface I had with a driver happened without me saying a word.

I was doing the surveying for the remodeling of a good-sized neighborhood shopping mall in Marin County, California. All of the buildings were getting a new façade and covered walkway, and the 200-space parking lot was being completely reconfigured. Naturally the mall stayed open and that meant

cordoning off sections of the parking lot to work on them sequentially. This really increased the traffic, and the competition to get a parking spot was intense at times. Adding to the pressure on the contractor was the presence of two dead cars; cars that maybe didn't start one day and were abandoned by their owners. The mall owners told the contractor that dealing with them, legally and otherwise, was his problem.

One breezy day I was standing at my instrument and talking with Randy, the contractor's brother, when a middle-aged lady drove her Volvo under the billowing ribbons and into our work area and got out.

"You can't park there," said Randy.

"But I'm just going to be a minute," she replied.

"You can't park there," repeated Randy as he walked toward an enormous backhoe improbably called a Bantam.

"But I'll just be right there," she said pointing at a nearby store.

"You can't park there," repeated Randy as he climbed into the Bantam.

She then turned to me and said, "But he's parked here," and pointed to one of the

dead cars, a '70s era Ford Thunderbird with two flat tires and a half-detached vinyl roof that was flapping in the breeze.

Before I could answer Randy gunned the Bantam, rotated toward the T-Bird and brought the huge bucket down fast, crushing the cabin and exploding every window simultaneously. Then he reared the Bantam back and rotated toward the Volvo. All of us workers were shocked at first and then laughed as it was the first time we had ever seen a Volvo burn rubber.

I got another laugh when I arrived at the job the next morning. Randy said, "Take a look in that dumpster." I peered over the edge and saw a blue Ford V-8 engine still attached to its left front fender; Randy had chopped the dead cars into pieces with the Bantam and thrown them in a dumpster! I had another chuckle driving home that day as I thought of the dumpster driver making his pickup and thinking, "Hmm this one's kinda heavy."



William "Bill" Schroeder

William Schroeder is a semi-retired sole practitioner; he is active in creating free public archives for private survey records.



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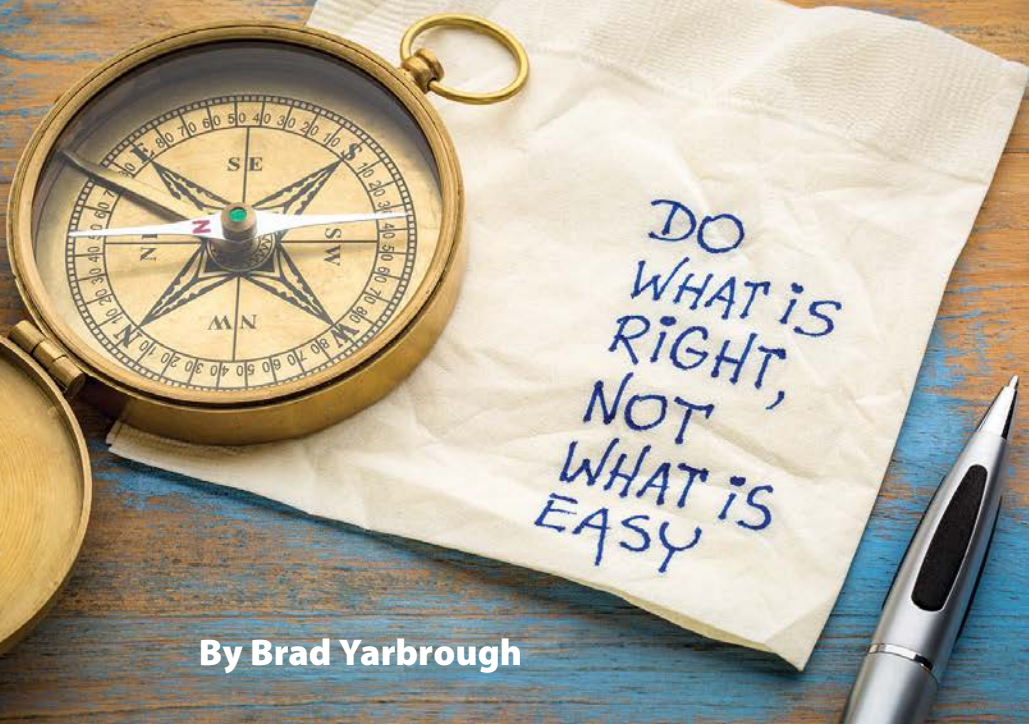
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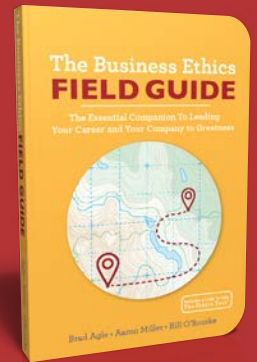


By Brad Yarbrough

The Business Ethics Field Guide - part 4

Challenge 3: Intervention

This series features 13 articles from Brad Agle, Aaron Miller and Bill O'Rourke, co-authors of *The Business Ethics Field Guide*. Each article focuses on a common work dilemma, while providing real life examples and insightful solutions. For more information, please refer to the cover story in the November/December 2018 issue.



This article deals with an ethical issue that we all have encountered. It's when you know of wrongdoing, but you aren't sure if you should intervene. I remember when I had helped a friend get a job at the company where I worked. His poor initial performance began to suddenly improve. That's when I discovered that he was using false information to persuade folks to sign a contract that benefited our company and himself. I talked to him, but he denied any wrongdoing. However, one of the contracted individuals showed me a document given to him by my friend that contained misleading information. I took this to our supervisor who immediately acted to correct the situation, but my intervention bruised our longtime relationship and to make the situation worse, he told many of our mutual friends that I had maliciously targeted him to gain our employer's favor. Were my actions ethical? This article contains valuable information that will help you with the issue of intervention.

You see something that's wrong. What are you to do? Usually, doing something will involve some risk and maybe retaliation. But not acting is itself an action and condones the behavior. Keeping silent does not avoid responsibility. After all, that choice has moral significance. Once you understand that non-action is a choice, you have to evaluate whether restraint or intervention is the morally superior choice.

HOW TO INTERVENE

Whistleblowing – a dramatic and difficult choice – is one type of intervention. Publicizing inappropriate conduct that the wrongdoers want to keep private takes particular courage and willpower. It also takes preparation. If your intervention involves accusing others, expect to be

accused in response. Therefore, document the facts with hard evidence. Be sure to eliminate any conflicts of interest that could taint your report or impugn your motives. Be prepared to have your integrity attacked as well. Whistleblowers often suffer great personal harm and incur significant personal cost. But once you decide to blow the whistle, don't stop. Don't drop the accusation in response to promotions or bonuses that are typically offered to make you stop.

Often you can intervene without accusing anybody. For instance, if a patient is being strongly encouraged by their doctor to get surgery when you know there are less invasive and less expensive options, you can encourage the patient to get a second opinion without accusing the doctor of anything.

QUESTIONS TO CONSIDER

As with anything, there are a number of considerations to take into account before deciding to intervene. The following are some concerns to keep in mind:

Are you the right person to intervene?

There's probably somebody in your organization with the responsibility for the area where inappropriate conduct is occurring. Try to get the issue into their hands.

Can you solicit help?

There may be mentors, advisors or others in the organization who can help you navigate through the many concerns and alternatives. Solicit their help and advice.

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Is there an urgency that causes you to act now?

If injury, damage, or catastrophe have a likelihood of happening unless you intervene right now, you must act fast. But for the majority of dilemmas, it is prudent to wait, observe and consider alternative courses of action. If you are in a leadership position, it is prudent to act as soon as you observe poor behavior to coach the employees in the moment. If you allow the behavior, even for a short time, you might send a message that poor behavior is acceptable.

Does your intervention cause you to act unethically?

Often, we learn of inappropriate behavior or circumstances through confidential communication. Disclosure of the confidential information would breach that confidence. In these situations, the ethical consequences need to be weighed and compared.

Will intervention fix the problem permanently?

Temporary fixes are not the objective. Try to correct situations in a manner that they will not recur.

RISKS

There are a number of pitfalls to avoid when you see that something is wrong. Consider the following:

- Not acting or remaining silent.
- Acting without information. First gather all the pertinent facts.
- Remember there are often more than two sides to a story.
- Communicating harshly. Fact-based communication can be objective, not accusatory.
- Demonizing the wrongdoers. That's most often unnecessary.
- Ignoring expertise. Seek the advice of the experts and weigh their advice but make your own decision.

The most common risk of intervening is that some will not look kindly on you for accusing others. Despite that risk, those in leadership have a duty and obligation

to intervene because they establish the culture. If you observe off-color jokes, profanity, or disrespect, you must step in and let those employees know their behavior is unacceptable. Set the example.

UNHEALTHY FAVORITISM

Supervisors show favoritism. It's natural. If the special treatment is based on work performance and is applied fairly, it could create a very positive work environment where all employees are motivated to perform. For instance, if an employee is given a flexible schedule so she can attend her husband's surgery and that same flexibility is available to others with similar circumstances, that's fair. But if the favoritism is arbitrary, that is not fair.

If you observe unfair favoritism and it is frequent or egregious, speak-up. With the right culture, you can make such observations directly to the supervisor. Without the right culture, you may have to use the human resource function, a mentor or even a compliance hotline dedicated to report unfair behavior. Intervention will require facts and tact, but usually the intervention will improve the situation.

IN SUMMARY

Most of those who intervene feel badly because they are accusing others. They may be criticized and they wonder how the organization will react. For that reason, there is a tendency to run away from ethical dilemmas or hide. Don't run from these situations! They are clear opportunities to let everyone know about your character and integrity. Be proud of yourself for doing what is right and proactively trying to improve the ethical culture and reputation of your organization. 🌟



Brad Yarbrough

Brad Yarbrough is the Owner and CEO of Pilgrim Land Services, a right of way services company in Oklahoma City. With over 35 years experience in oil and gas, he has clients nationwide and an extensive network of landmen and agents.

13 ETHICAL DILEMMAS

Upcoming articles in this series will take a closer look at each dilemma.

- 1 STANDING UP TO POWER**
Someone in power is asking you to do something unethical.
- 2 MADE A PROMISE**
Conflicting commitments force you to choose.
- 3 INTERVENTION**
You see something wrong. How do you proceed?
- 4 CONFLICTS OF INTEREST**
Multiple roles put you at cross purposes.
- 5 SUSPICIONS WITHOUT ENOUGH EVIDENCE**
You believe something is going on, but you're not sure.
- 6 PLAYING DIRTY**
Achieving justice but by doing something unethical.
- 7 SKIRTING THE RULES**
Bending a rule for a better outcome.
- 8 DISSEMBLANCE**
Misrepresenting the truth for better outcome.
- 9 LOYALTY**
Giving up ethical stance to protect valued relationship.
- 10 SACRIFICING PERSONAL VALUES**
Living ethically might put burden on others.
- 11 UNFAIR ADVANTAGE**
When opportunity exists to wield an unfair upper hand.
- 12 REPAIR**
When you are responsible for a mistake.
- 13 SHOWING MERCY**
You could grant forgiveness, but you don't know if you should.



Software Tips and Tricks

— part 3

By Joseph Waltz, PLS

FREE AND OPEN SOURCE SOFTWARE

Although many of us Land Surveyors use Microsoft, AutoCad, and the various equipment vendors' published software, there are many free alternatives.

I'll start with a caveat. I work for a public agency, and therefore have a full suite of commercial software for my needs. I have only experimented with these as someone who is interested in the Free and Open Source Software movement. One thing that is nice about typical, off-the-shelf, commercial software is the support system. If you have problems or stuff isn't working correctly there's a person to talk to on the phone (Shout out to Ed at MicroSurvey and Chad at Topo Element!) Some of these packages below do have additional support that you can purchase, others have active forums online, and a few you have to hack away at 'till they work. But that's all part of the fun....

RTKLIB: "An Open Source Package for GNSS Positioning"

Project website: <http://www.rtklib.com/>

RTKLIB Provides many robust tools that you would want in a true GNSS positioning software, including standard and precise positioning algorithms from all the major constellations, all major data formats including RINEX, and it even supports

communication through NTRIP and auto-download from an FTP.

SciLab / GNU Octave: open source alternatives to Matlab

Respective project websites: <https://www.scilab.org/> and: <https://www.gnu.org/software/octave/>

SciLab and GNU Octave have slightly different development philosophies. SciLab is intended to be a wholesale replacement for Matlab, while GNU Octave is meant to work almost seamlessly with Matlab scripts. If you have developed an entire process using Matlab scripts, the GNU Octave developers try to ensure that they will also run smoothly in GNU Octave. SciLab scripts may require some tweaking because the developers have tried to fix some of Matlab's quirks. Both could be used to build your own Least Squares adjustment algorithm.

Speaking of least squares: "SALSA" – Surveyor's Applications for Least Squares Adjustments

Project website: <https://www.arlut.utexas.edu/salsa/>

This software package was developed by the Applied Research Lab at University of Texas, Austin. It is a full suite of 3D geodetic Least Squares adjustment software. It includes user-defined weighting and geoid models, as well as the option to script your own custom reports and graphs. It can take

a variety of 1D, 2D, and 3D conventional and GNSS measurements as data input.

Libre Office

Project Website: <https://www.libreoffice.org/>

Libre Office is an open source office suite application. It includes a document writer, spreadsheet program, database program, presentation creation program, and much more. It was originally created to run on Linux as an all-in-one office program suite, but now also runs on Windows and Mac.

QGIS

Project website: <https://www.qgis.org/>

QGIS is an open source Geographic Information System. It comes with Grass GIS Toolbox (a sister project focusing on data analysis) built in, and supports various vector, raster, and database formats and functionalities.

LibreCAD

Project Website: <https://librecad.org/>

This is strictly an open source 2D Cad program. It has no 3D component, but it may be useful for exhibits and simple maps.

TopoCal

Project Website: <http://www.topocal.com/>

TopoCal is a commercial Spanish language topographic calculation software, but the

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Tips and Tricks – continued from page 31

“Lite” version is totally free. If you try it and like it, the Pro version is free for 30 days. The main language of the software is in Spanish, but there is an option to switch all menus to English.

Cloud Compare

Project website: <https://www.danielgm.net/cc/>


Open source point cloud and mesh processing software. There are a few different versions of this one as well but all of them are free and open source.

GeoEasy

Project Website: <http://www.agt.bme.hu/osgeolab/index.php?page=start&lang=en>


Hungarian software that was formerly commercial but now open source. Network adjustment, DTM creation, intersection and regression calculations.

There are so many great options out there now for free and open source software. The best thing about them is the price, but they are often supported by a community of people that are passionate about the software and want to improve it. Maybe one of your suggestions will make it into the next release! ☺



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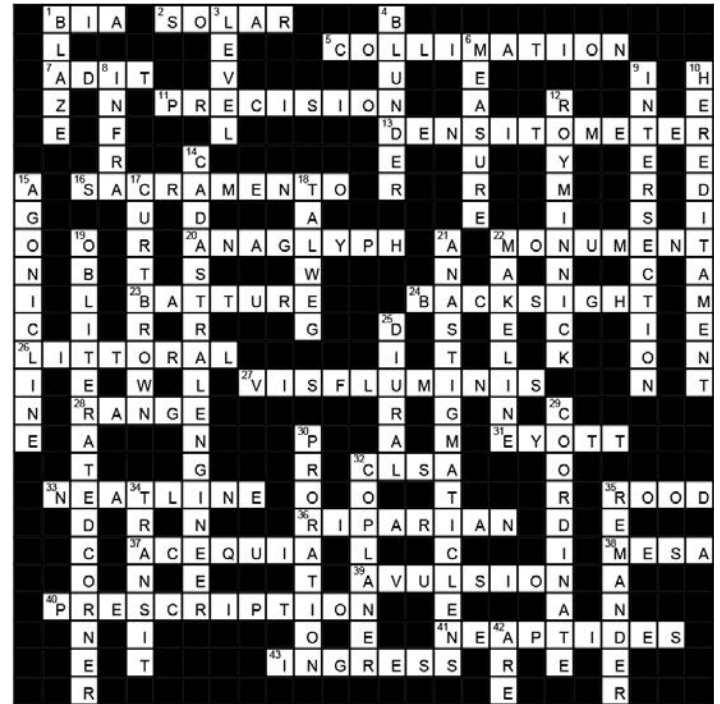
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Crossword Puzzle Solution (from Issue #193)



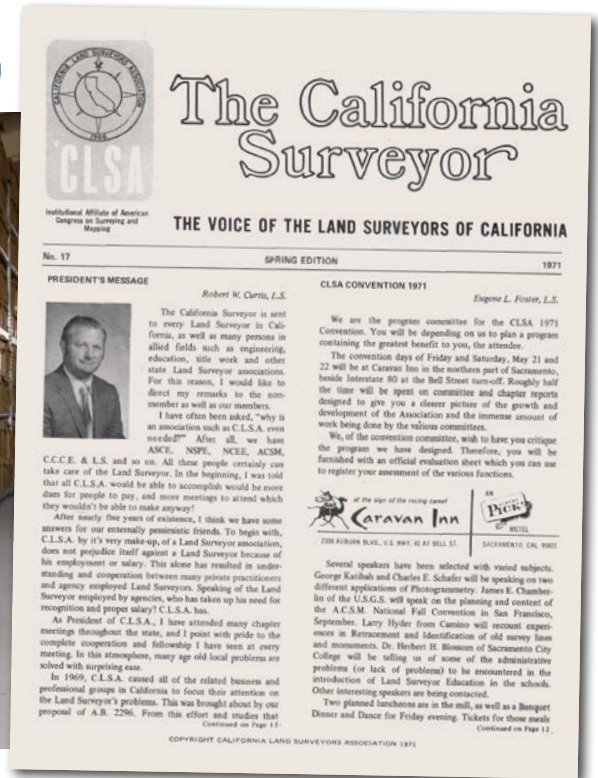
ACROSS

- 1 Tribal authority **BIA**
- 2 Not the moon measurement **SOLAR**
- 5 To adjust some equipment **COLLIMATION**
- 7 A horizontal excavation to a mine **ADIT**
- 11 To be right where things should be. **PRECISION**
- 13 Device used to measure the average grey-tone density of images in a piece of film **DENSITOMETER**
- 16 Home of legislation **SACRAMENTO**
- 20 A stereogram in which two views are printed in complementary colors, red and blue or red and green **ANAGLYPH**
- 22 To mark out **MONUMENT**
- 23 A marine term, used to denote a bottom of sand, stone or rock mixed together and rising toward the surface of the water **BATTURE**
- 24 Not forward looking **BACKSIGHT**
- 26 Having to do with water **LITTORAL**
- 27 In law, the force of the water **VISFLUMINIS**
- 28 Part of a township **RANGE**
- 31 A small island **EYOTT**
- 32 Organization **CLSA**
- 33 The line on a map or boundary of the mapped area **NEATLINE**
- 35 A square equal to 1/4 acre **ROOD**
- 36 Sort of littoral **RIPARIAN**
- 37 A ditch used in irrigation **ACEQUIA**
- 38 A level place **MESA**
- 39 A quick removal of land **AVULSION**
- 40 a way to acquire rights in another's land **PRESCRIPTION**
- 41 Water measurement event **NEAPIDES**
- 43 A way in **INGRESS**

DOWN

- 1 A cut in a tree **BLAZE**
- 3 Even with the earth **LEVEL**
- 4 A mistake **BLUNDER**
- 6 To determine size **MEASURE**
- 8 Below or under **INFRA**
- 9 Where two or more lines meet **INTERSECTION**
- 10 Property subject to inheritance **HEREDITAMENT**
- 12 Great author **ROYMINNICK**
- 14 Specialist **CADASTRALENGINEER**
- 15 The locus of all points on the earth's surface at which the magnetic north coincides with astronomic north **AGONICLINE**
- 17 Author of world renown **CURTBROWN**
- 18 Location in stream **TALWEG**
- 19 It is gone now obliterated **CORNER**
- 21 A lense corrected for curvature of field **ANASTIGMATICLENS**
- 22 A scale line furnished to a camera operator **MAKELINE**
- 25 A period of, or occuring in a day **DIURAL**
- 29 A precise location **COORDINATE**
- 30 To distribute a measurement **PRORATION**
- 32 Lying in the same plane **COPLANER**
- 34 A piece of equipment **TRANSIT**
- 35 To establish a new meander line ... **REMANDER**
- 42 A metric unit of area **ARE**

From the Archives



An excerpt from issue #17 of *California Surveyor*, published Spring 1971

EDITOR'S NOTE: This article has been edited to correct spelling and for clarity and length. It may be read in its entirety in our archives, available at: <https://www.californiasurveyors.org/CalSurv.aspx>

President's Message

by Robert W. Curtis, L.S.

The *California Surveyor* is sent to every Land Surveyor in California, as well as many persons in allied fields such as engineering, education, title work and other state Land Surveyor associations. For this reason, I would like to direct my remarks to the nonmember as well as our members.

I have often been asked, "why is an association such as C.L.S.A. even needed?" After all, we have ASCE, NSPE, NCEE, ACSM, C.C.C.E. & L.S. and so on. All these people certainly can take care of the Land Surveyor. In the beginning, I was told that all C.L.S.A. would be able to accomplish would be more dues for people to pay, and more meetings to attend which they wouldn't be able to make anyway!

After nearly five years of existence, I think we have some answers for our eternally pessimistic friends. To begin with, C.L.S.A.

by its very make-up, of a Land Surveyor association, does not prejudice itself against a Land Surveyor because of their employment or salary. This alone has resulted in understanding and cooperation between many private practitioners and agency employed Land Surveyors. Speaking of the Land Surveyor employed by agencies, who has taken up their need for recognition and proper salary? C.L.S.A. has.

As President of C.L.S.A., I have attended many chapter meetings throughout the state, and I point with pride to the complete cooperation and fellowship I have seen at every meeting. In this atmosphere, many age-old local problems are solved with surprising ease.

In 1969, C.L.S.A. caused all of the related business and professional groups in California to focus their attention on

the Land Surveyor's problems. This was brought about by our proposal of A.B. 2296. From this effort and studies that resulted from its demise, we have a new proposal, the model law as proposed by N.C.E.E. but modified to follow our existing administrative procedures and incorporate our Record of Survey provisions.

C.L.S.A. now has inter-professional relations with many other groups and we have liaison committees working with some groups on common goals.

Where in California, or the entire United States, could a young person obtain a proper education in Land Surveying? With few notable exceptions, Land Surveying education has been all but non-existent. We now have a Bachelor of Science

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Degree in Surveying and Photogrammetric Technology at Fresno State. C.L.S.A. has pledged itself to work towards the success of this program and is asking for the support of every Land Surveyor and agency in the state. C.L.S.A. chapters are also establishing educational programs for Surveyors throughout the state.

Because of our membership from both sides of the fence so to speak, C.L.S.A. Chapters have been effective in assisting city and county staffs in in establishing

meaningful local survey standards, Parcel Map requirements and proper compliance with Record of Survey requirements to mention just a few.

As a direct result of C.L.S.A.'s efforts, the Board of Registration has formed a top-level professional committee to study matters brought to their attention by C.L.S.A.

I would not, for a minute, suggest C.L.S.A. has all the answers or that we haven't made our share of mistakes. Nor would I suggest

C.L.S.A. can, in any way, replace such fine organizations such as A.C.S.M. and C.C.C.E. & L.S. I personally have membership in all these groups and actively support them. C.L.S.A. is an affiliate member in A.C.S.M.

You might say it's a matter of attitude in C.L.S.A. When we look at half a glass of water, we say the glass is half full instead of half empty. We like to think positive.

If you are a Land Surveyor and not a member, ask yourself, why not? 🌱

Education Update: New Mexico State University

By Ahmed F. Elaksher, PhD, PS, PE, CP

EDITOR'S NOTE: NMSU recently reached a matriculation agreement with College of the Canyons in Santa Clarita, CA and is working on getting others from different community colleges here in California.

The surveying engineering program at New Mexico State University (NMSU) was established in 1990. The program started with input from the New Mexico Professional Surveyors (NMPS) to fulfill a legislative mandate. In 2016 and with the support of the NMPS, New Mexico State University redesigned the program to meet current and future industry demands, thus creating the new geomatics program. The new program started in Fall 2017. Currently, there is significant interest in the new program as more than 45 students are now enrolled. The new program is currently accredited by the ABET-ANSAC commission. The program offers two distinct paths: 1. from a high school, a student can start at NMSU-DACC, an in-town, two-year college, and physically pursue the degree on campus, 2. transfer students can enroll directly in the upper division courses after their classes have officially transferred. The program has established many articulation agreements with community colleges across the country. Students can enroll in classes through one of two modes: face-to-face or online. In addition, many connections have been established between surveying professionals, as represented in our Industry Advisory Board, and the individuals that work within the surveying program. The program has raised about \$500,000 that helped in building the new program, increasing our

educational resources such as software, equipment, and facilities, developing the online course material, offering classes with more flexibility, and promoting the program through summer camps, school visits, and advertisement. The program won several awards in the last few years. For example, the program won the 2019 NCEES Surveying Grand Education Award (\$25000) and a \$15000 NCEES prize in 2021. Students in the program are offered several scholarships through NMSU, NMPS, and many endowments. In addition, we received over \$90,000 over the last two years from NMBLPEPS to support student scholarships in the program.

Check out the NCEES Award Video at: <https://www.youtube.com/watch?v=Z4GhwNhCdJQ> 🌱



Ahmed F. Elaksher is a Professor & Geomatics Program Coordinator, the New Mexico State University Surveying and Land Information Science (SaLIS) Editor, American Association of Geodetic Surveying Co-Chair of the Technical Committee for the ASCE UESI Surveying & Geomatics 2022 Conference.

Ahmed F. Elaksher, PhD, PS, PE, CP



Fig 1: Receiving the 2019 NCEES Surveying Grand Education Award



Fig 2: 2021 NMSU Surveying Lab Class



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