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## CALIFORNIA

ISSUE #190  
FALL 2019







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### Central Office

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

### California Surveyor Editors

**Paul Mabry – Editor**  
paul@landsurveylaw.com

**David Kendall – Associate Editor**  
dzsipo@gmail.com

### California Surveyor Designer

**John Berkowitz**  
john@caladmanagement.com

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# SURVEYOR CALIFORNIA

ISSUE #190  
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# VISION 2020 FOCUS ON THE FUTURE

## APLS-CLSA-NALS Tri-State Conference March 28-31, 2020 » Luxor Hotel » Las Vegas, NV

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

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

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



# PRESIDENT'S MESSAGE

**Annette Hovorka**  
**CLSA 2019 President**

## How Is Your Hive?

In late summer and fall, worker bees labor long hours, collecting enough nectar to feed and maintain the colony throughout the winter. (according to *Phys.org*). It is not so different for us. Our hives are beginning a busy season as well.

September is election time! Time to choose our leaders and representatives for next year. As the new officers begin their preparation for the coming year, those of us nearing the end of our terms will help them by finishing up the blocks that will become the foundation for the next year's work.

Accomplishments this year have been wonderful to watch unfold. As your president, I could not be prouder of the manifestations of your efforts to be kind to one another and work together to accomplish goals. The buzz is great, and I admonish you to keep going.

Like the beehive, there remains for us some important work to be done. Here are just some of the highlights;

1. It is time to send Chapter contributions to scholarships to the Foundation to allow for sufficient time to let the students know what scholarships will be available when they apply later this year.

2. Send the new officer lists to Central Office. Preparations need to begin for updates to our 2020 documents.

3. The Executive Committee is hard at work on a strategic plan to move forward. Send your ideas for goals to me. I am expecting to submit a final draft to the Board of Directors at the February 2020 meeting.

4. The Association budget was developed and approved by the Board of Directors at the November 2019 board meeting. It is likely that Chapters are doing the same

"Thank you" does not begin to express my gratitude for the many helps along the way this year. Every effort, no matter how big or small, has made this year extraordinary for me. I will have formal recognitions in February, but there are a couple of efforts that I would like to recognize now.

Kim Oreno, our executive director and the staff at CAMS is the support that cleans up the details and make the organization function smoothly. Kim and the team put the "R" in responsiveness for our organization. They are truly the central hub to communication between the association and the public, as well as between

members and leadership. Our meetings, virtual and in-person, are a product of a great deal of behind-the-scenes work by them. They step up every day with positive outlooks and experience-based suggestions that propel us forward.

As part of that team, Tricia Schrum, our accountant, does a mountain of work for us. She wends her way through the numbers to deliver products that we trust and allow the organization to make good decisions with confidence.

One effort I would like to give a shout out to is the effort put forth by many on SB 556. It was an all hands effort with some remarkable efforts by Mike Butcher (Legislative Chair), Dave Woolley (Coalition Chair) and Mike Belote (Legislative Advocate). From a last-minute plane ride to Sacramento to attend a meeting in person to many hours of watching, talking, and listening to efforts that these and other members made, a favorable outcome was achieved. Were this not accomplished, you can rest assured that repercussions would have been felt throughout our profession.

Again, there are many, many more thanks to be given. I am sure it will fill volumes.

But, here we are at the end. While this is not my last communication with you as President, it is the beginning of the end. November was my last full board meeting. After all of time I have spent in service to the association, it is bittersweet to be able to see the end so near. As these things go, there always seems to be things left undone. As I know I still have parts to play, it is far from time to say farewell, but I will take this opportunity to wish you well in your professional activities and your personal endeavors. Each and everyone of you have made this year as sweet as honey. 🍯

Annette Hovorka  
CLSA President 2019







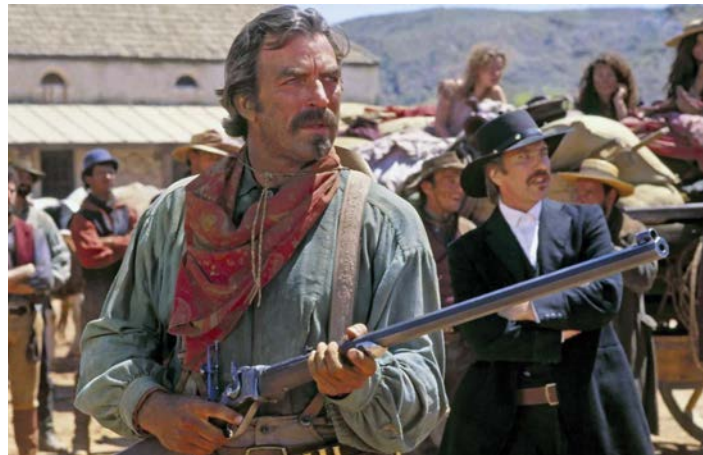
# EDITOR'S MESSAGE



**Paul Mabry**  
*California Surveyor Editor*

In one of my favorite movies, *Quigley Down Under*, Tom Selleck's character is approached by the protagonist after displaying remarkable marksmanship with a specially modified rifle. Tom Selleck is asked by Alan Rickman whether he (Selleck) is equally skilled with a handgun. To which Mr. Selleck replies, "I never had much use for one." As those of you familiar with the movie will recall, this leads to a fatal underestimation of Mr. Selleck's abilities a later in the story.

As I glanced through the list of articles in this issue of the magazine, it struck me that professional surveyors are an even more diversely skilled group of people. In this issue, we have articles dealing with technical problems with drone remote sensing that almost daily evolve and technical revisions to reference datums that haven't changed in the prior thirty plus years. We have an article that invites us to look into how present technology could payoff in future land boundary locating if we are willing to invest in the vision. And, we are reminded that investing in oneself (professionally) is both timely and timeless. Then, we have updates from two attorneys dealing with vastly different areas of the law impacting our businesses. A reminder that



business taxation is not always fair and equitable and a summary on some of the impacts that the housing crisis declaration may have as related to land divisions and land planning. We also are reminded that business can be improved by better writing (and other) skills and that skilled writers are needed to implement an underutilized aspect of law in self-policing the profession.

Assuming for the sake of argument that we are all equally skilled, qualified and experienced in each of these various topics, how many of our clients would recognize that we possess those skills? I dare say that public perception of land surveyors often falls far short of our actual talents and abilities. Sometimes that can work to our advantage. Like Mr. Selleck in an unfair showdown, we can occasionally surprise our "adversaries" with

a skill for which we may have little use, but are still capable of using effectively. Now, I'm not advocating that you practice up on your short gun or even that we should resort to adversarial tactics. I am advocating that we practice our professional talents – even if those talents may sometimes seem to be little valued or used.

So, as you read through this issue, perhaps you'll be reminded of an area of practice that you haven't thought about lately. If so, don't just skip over the topic. Think about rounding out your repertoire of professional abilities. Do you hate meeting with planners and architects? Then spend some time in spite of yourself, reading through the Housing Crisis legislative changes. You might be able to dramatically assist a future client in one of those dreaded meetings

when you recall how these recent changes favor housing (and sometimes, surveyor's work products). Do you resist changing your office workflow to look into how cloud technology might benefit you? How about accounting software or project management processes? Or, what about technical details in mapping production? All of these things may not seem important to a professional – especially an experienced professional who hires others to do these tasks. But that's just the point – an experienced professional knows the future can bring unexpected surprises ("showdowns" anyone?). So, as you read this issue, I hope you are reminded of some of your own hidden talents that the world may not expect you to have.

And as a matter of business, I still need some editorial assistance in the southern part of the state. I'd also like some volunteers willing to interview some of our older surveyors. If you are interested in these or have other suggestions, please contact me at my email listed on the first page. As we go to press, we are also in the midst of another widespread "fire" season. Remember your neighbors and colleagues in this impactful time and if you need help, ask. Your professional "family" is here to assist. 🌐



# LEGISLATIVE REPORT



**Michael Belote**  
CLSA Legislative Advocate

## CLSA-Sponsored Bill Signed

Ever think you might want to be Governor of California? Before you throw your hat in the ring, you might want to ponder the joys of utility-initiated power shutoffs, raging wildfires, and oh, about 1,000 bills which must be signed or vetoed in the 30-day period after commencement of the legislature's fall recess. To say that running the state is a full-time job is a very considerable understatement.

Every year the California Legislature introduces approximately 2,500 new bills, to address problems real or imagined. Governor Newsom just completed the process of signing or vetoing the bills which reached his desk; he vetoed approximately 16% of those bills, roughly the same percentage as his predecessor. Interestingly however, Mr. Newsom signed in the neighborhood of 75 bills vetoed by Governor Brown, demonstrating a clear move to the left. At least two dozen were first in nation proposals, including Medi-Cal for undocumented adults, payment for college athletes, bans on fur sales and plastic bottles in hotels, mandatory arbitration in employment, and many more.

The big issues for 2019 clearly included privacy, independent contractor status after Dynamex, wildfires and energy, and housing. For 2020, with apologies to Peter Noone, the theme will be "second verse, same as

the first." Astonishingly, with implementation of the California Consumer Privacy Act (CCPA) still two months away, a new initiative on the subject is being readied for the November 2020 ballot!

The CCPA is arguably the world's most consumer-protective privacy law, potentially even more far-reaching than the European GDPR model. All companies with more than \$25 million in annual revenues are automatically covered by the law, as are companies who sell personal information of more than 50,000 consumers annually, or those which derive more than half of their revenues from selling information. But even companies not meeting any of these thresholds must be prepared to understand and implement the law, because companies which are "third-party service providers" of covered entities may be directed to delete information they hold if the consumer makes a demand of the covered entity itself.

The proposal for the 2020 general election ballot, if it qualifies, would add new obligations on entities engaging in "targeted," or "behavioral" advertisements. Between the 2018 enactment of CCPA, changes enacted this year, and proposals for next year and beyond, and it is clear that we have squarely entered the "age of data."

With respect to independent contractor, Governor Newsom has now signed AB 5 (Gonzalez), which both codifies the Dynamex decision and provides exemptions from the decision's "ABC" test. AB 5 contains exemptions for architects and engineers, in the design professional arena, but not land surveyors as of yet. Expect to see many more groups seeking exemptions in 2020, including CLSA. And the November 2020 ballot may well contain an initiative on the independent contractor issue, as Uber, Lyft, DoorDash and others have pledged upwards of \$100 million to clarify that gig workers are independent contractors, not employees.

On housing, the legislature has now passed a large number of bills dealing with local zoning, "accessory dwelling units," CEQA, and impact fees, to spur housing construction. But the pace of building is running far behind the stated goals of hundreds of thousands annually. Expect to see many more bills on this subject when the legislature returns in January.

Finally, the issue of wildfires and energy is exploding, both literally and figuratively, in Sacramento. Politicians in the Capitol are acutely aware that Governor Gray Davis was recalled principally over energy; the public has little or no patience when the lights go out.

When PG&E indicates that "public safety power shutoffs" may be the new normal for the next ten years, the governor and legislature say "no way" in the strongest possible terms. This was a huge issue for 2019, and will be even bigger in 2020.

Taxation also will be a major issue for 2020. Initiatives are likely both on higher income tax rates for the wealthy, and a "split roll" proposal to modify Proposition 13 on property taxes. If that wasn't enough, it now appears likely that proposals to extend sales taxes to most services offered on a business-to-business basis will be considered in 2020. Especially if California slides into recession in the near-term, taxation bill be central next year.

And finally finally, CLSA is pleased to announce that Governor Newsom has signed our association-sponsored SB 339 (Jones), relating to surveyors acting as expert witnesses. The bill provides that non-disclosure agreements signed by surveyors acting as experts should not be interpreted to prohibit surveyors from reporting suspected negligence or wrongdoing to BPELSG. CLSA took the position that consumer protection is advanced when surveyors can report to the Board even after executing an NDA, and thankfully the legislature and governor agreed. SB 339 takes effect on January 1, 2020. 🌐



# CENTRAL OFFICE REPORT



**Kim Oreno**  
**CLSA Executive Director**

**H**appy 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.

## 2020 Conference

I'm pleased to report that the 2020 conference will be a joint venture with the Nevada Association of Land Surveyors (NALS) and the Arizona Professional Land Surveyors (APLS). The conference will be held from March 28-31, 2020 at the Luxor Hotel & Casino in Las Vegas, Nevada. Please save the dates on your calendar and plan to join us. The conference committee is already hard at work putting together a great program for you all that will include preconference workshops, a golf tournament and live & silent auctions that will benefit each association's Education Foundations. Details will be e-mailed to everyone soon.

## CLSA Education Foundation Scholarships

The CLSA Education Foundation has received over \$40,000 in scholarship pledges to provide scholarships to students during the first quarter of 2020. Please let land surveying students know of this valuable

opportunity. Details are posted to the CLSA website at [www.californiasurveyors.org/scholarsh.html](http://www.californiasurveyors.org/scholarsh.html). 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](http://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](http://www.ourpromise.org) for details on that program.

## Renew Your CLSA Membership for 2020

Membership dues renewals 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 Board of Registration, 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! —

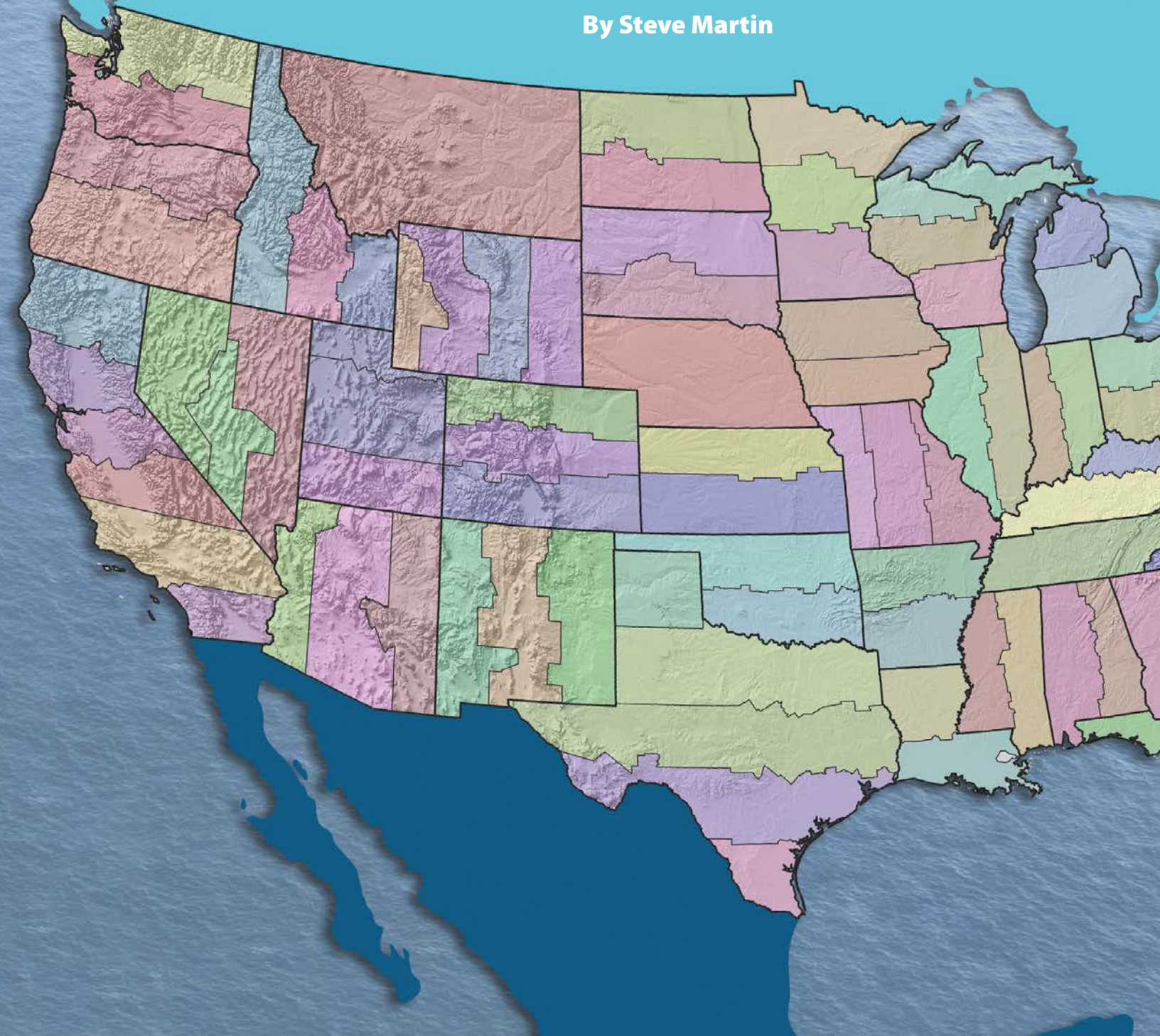
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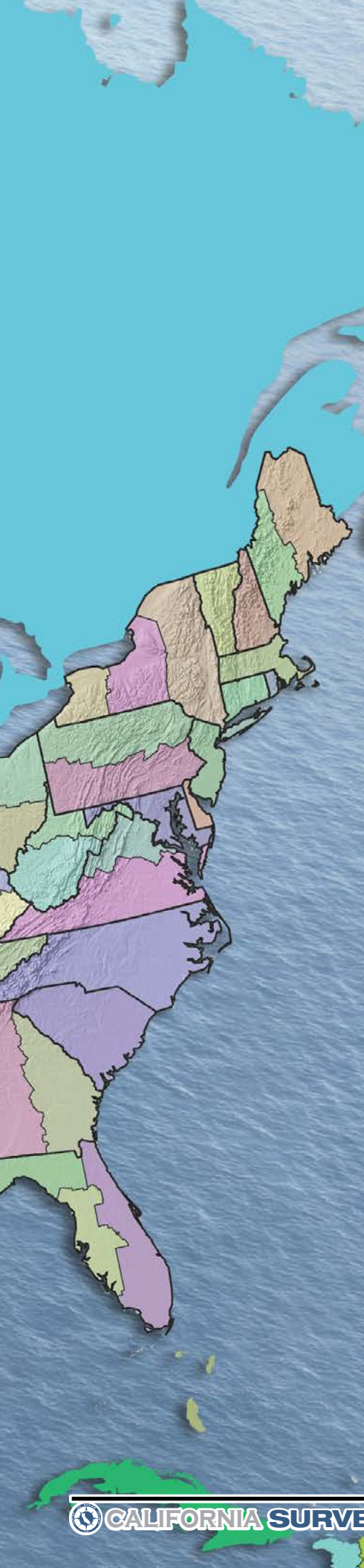
# The State Plane Coordinate System of 2022 (SPCS2022)

An improved SPCS to go along with new geometric and gravimetric datums coming in 2022

By Steve Martin







**T**he National Geodetic Survey (NGS) is gearing up to implement new datums in 2022. The replacement for NAD83 (a reference system – see sidebar) will be called the North American Terrestrial Reference Frame of 2022, or NATRF2022 for short. The replacement for NAVD88 will be called the North American-Pacific Geopotential Datum of 2022 or NAPGD2022.

The primary reasons for updating the legal datums and reference frames is the fact that the NAD83 origin is approximate 2.2 meters offset from the more accurate center of mass of the earth used for the origin of the International Terrestrial Reference Frame (ITRF) and WGS84. Since access to datums today is primarily through use of Global Navigation Satellite Systems (GNSS), and GNSS operates using WGS84 and ITRF (Figure 1). Additionally, NAVD88 has a 0.5 meter offset and a 1 meter coast-to-coast tilt compared to the best global geoid models today (Figure 2).

NGS's plan for NATRF2022 is a transition from the North American plate fixed reference system of NAD83 to a system that accounts for the rotation of the North American tectonic plate, allowing that most surveyors and cartographers are not ready to move to a reference system where every point on the earth has a velocity, such as the ITRF which is used by most geodetic research intuitions today.

If this is the first you have heard of NGS's efforts to modernize the National Spatial Reference System (NSRS), or if you would just like to learn more about the progress

on this effort, visit the NGS website at <https://www.ngs.noaa.gov/> and click on the "Coming in 2022: New Datums" link.

The new geometric reference frame is perhaps more global than what we have historically been used to. The current NAD83 (2011) is evolving to NATRF2022 and CATRF2022 (for the Caribbean Terrestrial Reference System). The current NAD83 (PA11) is evolving to PATRF2022 (for the Pacific Terrestrial Reference System), and the current NAD83 (MA11) is evolving to MATRF2022 (for the Mariana Terrestrial Reference System).

This brings up an interesting possibility in that folks in the southwest part of our state, on the west side of the tectonic plate boundary, could work in a PATRF2022 reference frame, while others to the east and north work in the NATRF2022 reference frame.

NGS is also working on some improved tools to make the transformations between reference frames. To get more information on those tools, review the NGS documents referenced at the end of this article.

*continued on page 8*

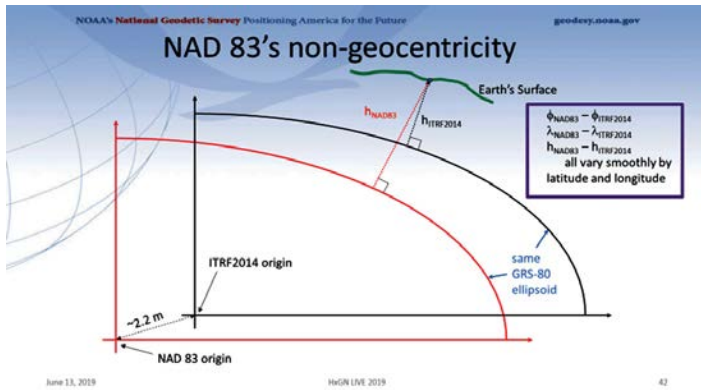


Figure 1

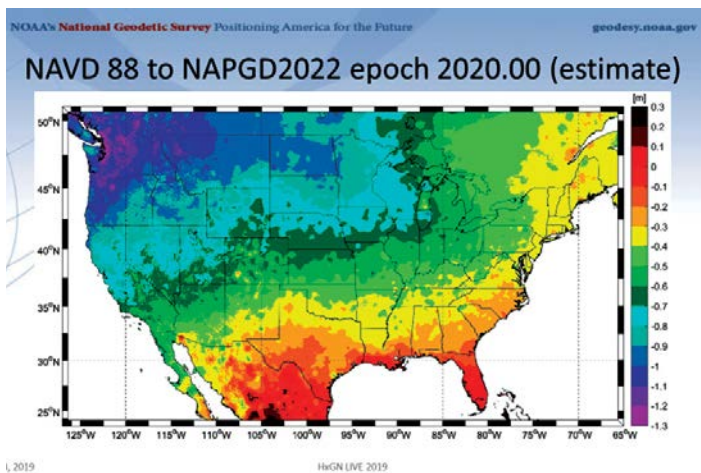


Figure 2

## Datums and Reference Systems Defined

**DATUM** – Any numerical or geometrical quantity or set of such quantities which may serve as a reference or base for other quantities

**HORIZONTAL DATUM** – A reference surface consisting of five quantities: the latitude and longitude of an initial point, the azimuth of a line from this point, and two constants necessary to define a reference ellipsoid. (It forms the basis for computing horizontal coordinates, which takes into consideration Earth’s curvature.)

**REFERENCE SYSTEM** – an abstract collection of principles, fundamental parameters, and specifications for quantities describing the positions of point in space and how these positions vary over time.

**REFERENCE FRAME** – the materialization or realization of a reference system. Traditionally, a reference frame consists of a network

of reference stations on the ground with adopted positional coordinates (and sometimes velocities), which may be used to help determine coordinates for other locations.

NAD 83 is a reference system. NAD 83(1991.35) is just one of many reference frames associated with NAD 83. Modern geometric reference systems (such as NAD 83) are designed to provide a foundation for measuring geodetic latitude, longitude, and ellipsoid height, and how these three quantities vary over time.

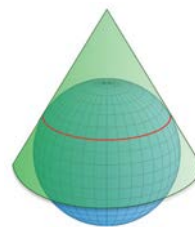
NAD 27 provides a foundation for measuring only geodetic latitude and longitude; therefore, it is considered a horizontal datum.

Other popular geometric reference systems include the World Geodetic System of 1984 (WGS 84) and the International Terrestrial Reference System (ITRS). 🌐

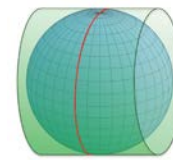
## SPCS2022

In conjunction with the efforts to modernize the datums and reference frames in use in the United States, the NGS is also planning on updating the State Plane Coordinate System (SPCS).

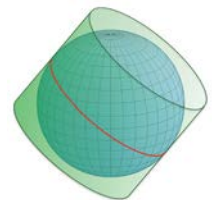
The vision NGS has for an improved SPCS is something that looks much like the existing SPCS, but with adjustments to lessen the combined grid scale factor at ground level (more on that later). The vision also includes allowing for layers of zones, i.e. one statewide zone overlaying the “improved” usual zones and a third possible layer of low distortion projections for States who design their own. NGS’s default, if no input from stakeholders in a State, will be to create the improved zones similar to the existing projections. The 3 types of projections allowed in the SPCS are the Lambert Conformal Conic (LCC) projection like the ones we use here in California, The Transverse Mercator (TM), and the Oblique Mercator (OM). All three of these are conformal projections, which means that lines on Earth intersect at the same angle on a map (shapes are locally preserved), linear distortion is unique at a point (same in every direction), and there is a simple relationship between grid and geodetic azimuth.



Lambert Conformal Conic (LCC)



Transverse Mercator (TM)



Oblique Mercator (OM)

NGS will create a statewide zone layer and a multiple-zone “default” layer for every state. It is up to stakeholders in each state to ask NGS for modifications to the default zones, or to include stakeholder-designed low distortion projections as a third layer. A stakeholder is defined as a State group that formally interfaces with NGS such as State Departments of Transportation, State Cartographers/GIS offices, Professional surveying, engineering or GIS societies, and colleges or universities with geospatial curriculum. Stakeholder input must be unanimous, though not all stakeholders need to provide input. However those who do provide input, must be in agreement, otherwise the default SPCS design will be imposed.

The deadline for requests for SPCS designs, and proposals for designs by contributing partners, is March 31<sup>st</sup>, 2020. If your CLSA Chapter would like to propose that CLSA as a whole make a request or proposal, talk to you Chapter Directors and have them bring it up at the CLSA Board of Directors meeting.

continued on page 9





Back to the proposed default zones. The basic design of the zones will be very similar to what we all know and love. For California, we will still have six Lambert Conformal Conic projection zones covering the same geographic extent. The big difference is that the grid will be adjusted up to minimize the average combined scale factor (also referred to as distortion) at the ground elevation. Population centers may also come into play. Figure 3 shows the current CCS83 (SPCS) Zone 5. Figure 4 shows the preliminary (alternate) SPCS2022 Zone 5 where the combined scale factor is minimized at the average topographic surface and Figure 5 shows the preliminary SPCS2022 Zone 5 which also considers where the population centers are within the zone. Note that the higher distortion (or combined scale factor) falls mostly in the mountains and not in the LA metro area.

Preliminary SPCS2022 default design: California Zone 5

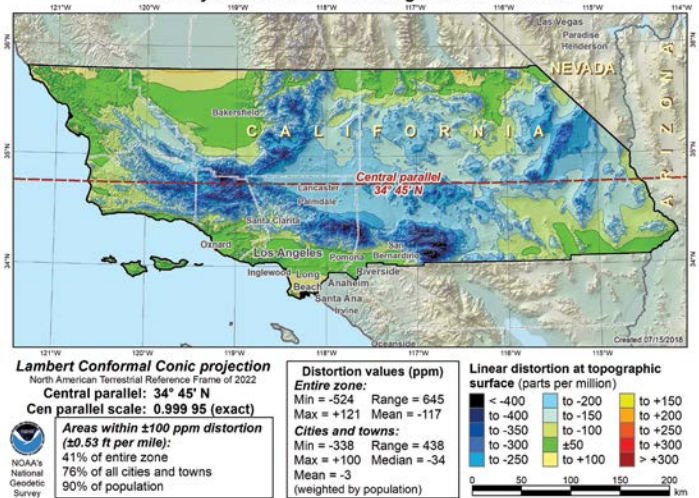


Figure 5

One difference you will notice is that instead of LCC zones defined with two standard parallels, the proposed SPCS2022 LCC zones are defined with one standard parallel. Mathematically any two parallel LCC can be recast as a single parallel LCC. A one parallel LCC is easier to design with respect to topography and having a single parallel provides consistency with TM and OM projections in the number of parameters they use.

The proposed California SPCS2022 materials include a draft of a statewide OM projection. NGS also produced plots of existing UTM zones 10 and 11, not included hereon for brevity and space considerations, which show over 700ppm distortion either in the north or south parts of the state. The general geographic northwest skew of the State does not lend itself to a North-South central meridian of the existing UTM zones. Figure 6 shows this proposed OM projection with 34 degree skew that best fits our state.

Existing SPCS 83 design: California Zone 5

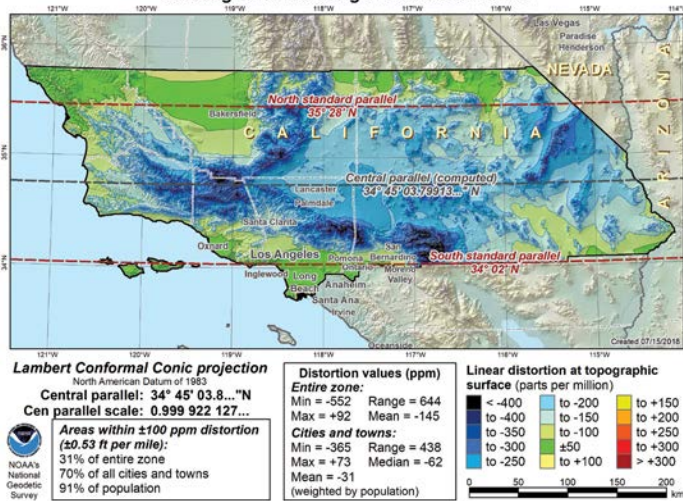


Figure 3

Preliminary SPCS2022 default design: California Zone 5 (alternate)

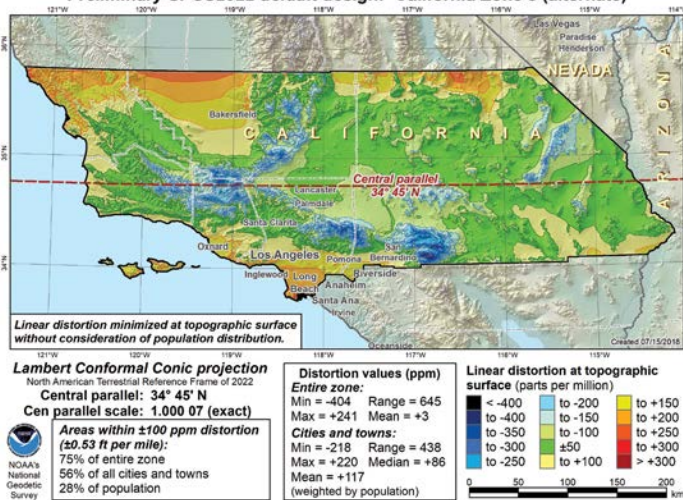


Figure 4

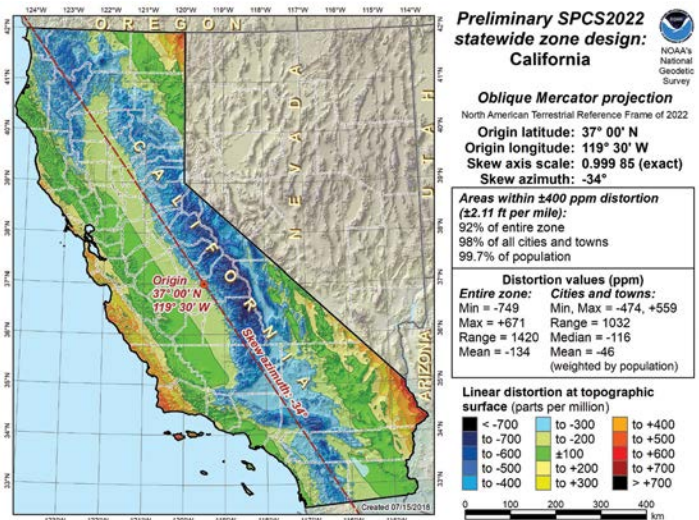


Figure 6

continued on page 10





Figures 7, 8, and 9 illustrate how the proposed SPCS approach will minimize combined grid scale factor (distortion) at ground level. Figure 7 shows the current secant plane LCC projection for SPCS27 and SPCS83. Figure 8 shows the current secant plane LCC projection with the ground to grid factor added in. Figure 9 shows the proposed SPCS2022 approach that minimizes the overall ground to grid combined factor.

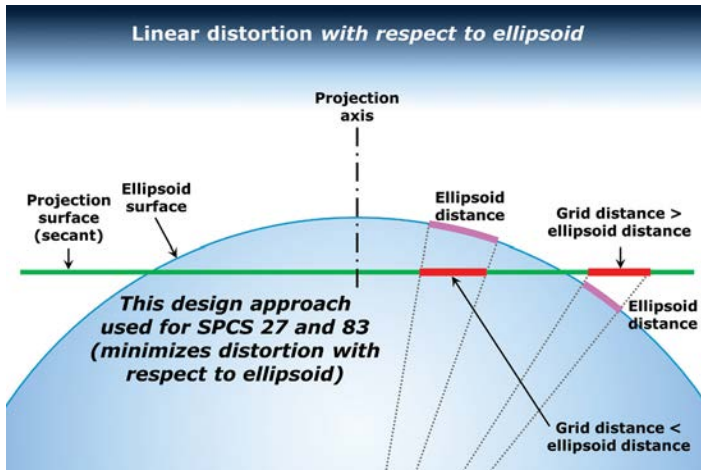


Figure 7

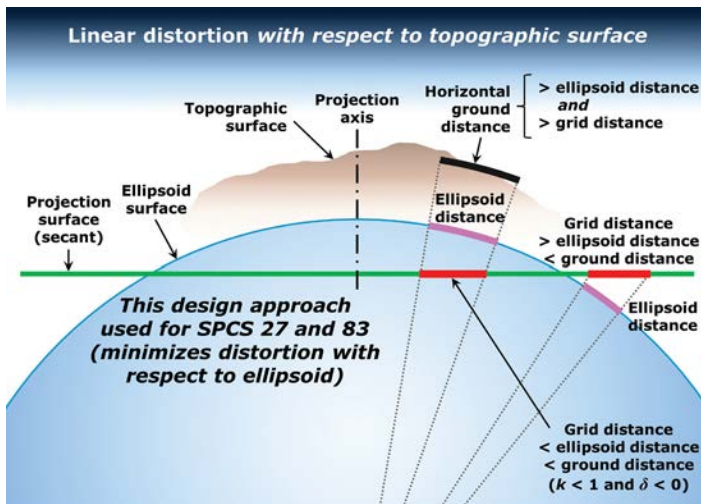


Figure 8

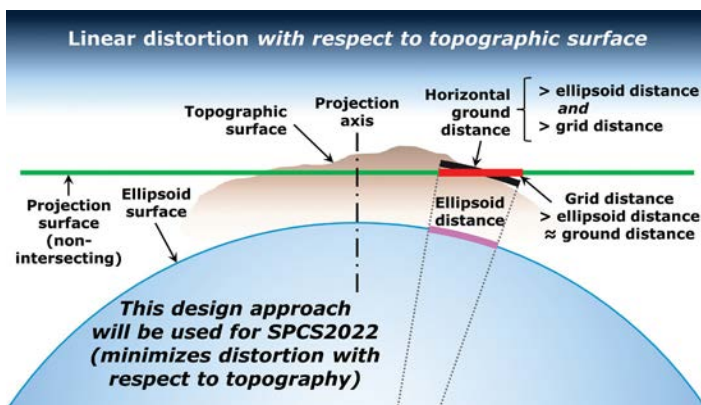


Figure 9

Overall, I believe the NGS has come up with a good plan to update and improve the National Spatial Reference System (NSRS) and the State Plane Coordinate System (SPCS). The SPCS plan allows for input from statewide stakeholders such as CLSA. The default plan is well thought out and will reduce the overall combined scale factor within the zones.

Michael Dennis, the NGS project manager for the SPCS2022 project, has written a detailed paper on "The State Plane Coordinate System – History, Policy, and Future Directions." I learned a little about the History of CCS27 Zone 7 (Los Angeles County) as a result of Mr. Dennis' research, thanks to some input from Jay Satalich, Supervisor, Geospatial Branch of CALTRANS District 7. Zone 7 was added to SPCS27 sometime after the SPCS was first published because "a substantial amount of federal and local funds had already been expended on a cadastral mapping project coordinated to the polyconic system." So the origin coordinates and a central meridian from the central portion of LA DWP's existing polyconic projection were adopted as Zone 7 in SPCS27.

Michael Dennis' paper can be found on the NGS website as NOAA Special Publication NOS NGS 13. See also: NOAA Technical Report NOS NGS 62, Part 1 – Geometric Coordinates in 2022; NOAA Technical Report NOS NGS 64 Blueprint for 2022, Part 2 – Geopotential Coordinates; and NOAA Technical Report NOS NGS67, Part 3 – Working in the Modernized NSRS.

While my brief overview really just brushes the surface, go to the NGS website for more details: <https://www.ngs.noaa.gov/>, click on the "Coming in 2022: New Datums" link; look in the Presentation Library (under "Science & Education") for copies of presentations on NSRS Modernization and SPCS2022; and view the NGS recorded webinars (Science & Education > Webinar Series). NGS Pacific Southwest Regional Geodetic Advisor Dana Caccamise ([dana.caccamise@noaa.gov](mailto:dana.caccamise@noaa.gov)) is a resource for these NGS initiatives, as is California Geodetic Coordinator Scott Martin of CALTRANS ([scott.martin@dot.ca.gov](mailto:scott.martin@dot.ca.gov)). Michael Dennis at NGS is the program manager for the SPCS2022 project Michael Dennis (NGS) ([michael.dennis@noaa.gov](mailto:michael.dennis@noaa.gov)). You are also welcome to contact me at ([steven.martin@ebmud.com](mailto:steven.martin@ebmud.com)).



Steven J. Martin

Steven J. Martin is the Survey Supervisor for the East Bay Municipal Utility District headquartered in Oakland, CA. He has been a Director for CLSA for almost 15 years, a past Chairman of the CLSA Education Foundation, a past member of the CSRC Executive Committee, and the past CLSA-CSRC Liaison.



# Pitfalls of Point Clouds in Drone Surveying ... and How to Avoid Them

By Logan Campbell

*Working in point clouds is difficult for three main reasons. This article will help you avoid these common pitfalls and provide a few tips for successfully integrating point clouds into your drone surveying workflow.*

Ever since the introduction of Light Detection and Ranging (LiDAR), point clouds have been a hot topic of discussion and debate among surveyors. They provide a rich and highly accurate source of data, but their complexity and size cause many firms to struggle when integrating point clouds into their data processing workflow.

Because of the rise in popularity of drone-based photogrammetry, the point cloud discussion has gained momentum. Both LiDAR and non-LiDAR Point clouds are core outputs of photogrammetry; some firms are very familiar with laser scanning technologies and successfully use point cloud data, but many firms struggle and decide therefor not to use point clouds at all, while others wind up using point clouds in a way that takes far too much time, costs too much money, and may actually lead to a lower quality deliverable. I will help you avoid the latter.

Although point clouds from drones are an incredibly rich and valuable source of data, they are often misused. When used properly, point clouds can serve an important role in a well-developed drone surveying system. In this article, we will examine some common point cloud pitfalls, and present ways to avoid them.



## The Benefits and Challenges of Point Clouds

Point clouds are the richest, most complete, and most accurate source of data that comes out of drone photogrammetry. If the photogrammetry step has been processed well, then any bit of information contained in the photos will be represented as accurately as possible in the point cloud. So, if the data is so good, why not use point clouds all the time and for every project?

The problem is that working in point clouds may take a lot of time, and if your drone program isn't saving time and money, then it isn't working effectively. So, if things are taking too long, it probably makes sense to find alternative methods rather than spending a week parsing through a massive point cloud file.

## The Challenges

There are three key challenges that make working in point clouds difficult:

### 1) Too Much Data

The benefit of point clouds is that they capture absolutely everything about a project site. But that is also their downfall. When surveying a project site, surveyors almost never need to know the location of every leaf and every branch on every tree. They don't need to know how many bumps there are on a manhole cover. They don't need to know the exact dimensions of the roof rack strapped to the car parked on the edge of the property. And yet all that data is there. In order to get a clean deliverable, all of that extraneous data needs to be properly cleaned, which can be very time-consuming.

### 2) Unclassified Points

Part of what makes working in point clouds so time-consuming is that, by default, drone point clouds typically aren't classified in any meaningful way. With the advancement of machine learning and artificial intelligence, automated programs are getting better

*continued on page 12*



## Drone Point Clouds – continued from page 11

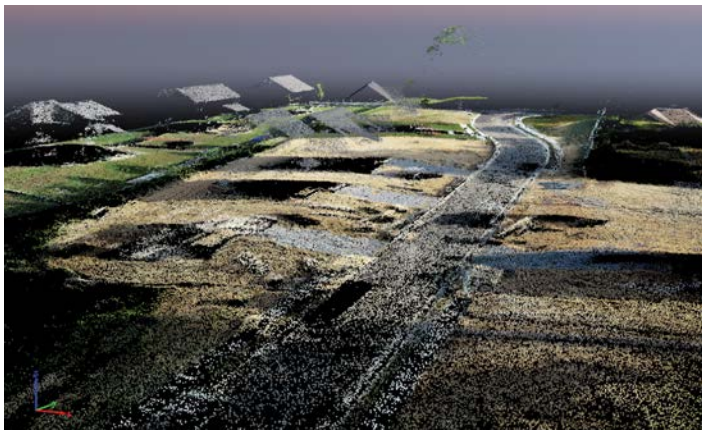
at automatically classifying points as surface, vegetation, objects, buildings, etc., but from my first-hand experience, these algorithms still have quite a ways to go before they can become useful. So, for now, it is up to the surveyor to determine what is what in a point cloud and classify the data in the way they need it, whether that be curb lines, topographic features, buildings, or vegetation.

### 3) Difficult to Manage

Lastly, point clouds are very difficult to manage. The large file size, often over 10GB, can be difficult to transfer, and will usually crash commonly used drafting software programs like Autodesk Civil 3D without extensive modification. So instead, specialized point cloud software is used to extract smaller datasets from the point cloud. However, this software can be extremely expensive and can still be difficult to use for all but the most experienced engineers and design technicians. Put simply, working in a point cloud takes a lot of the right types of hardware, software, and experience.

### Tips for Working in Point Clouds

In spite of these pitfalls, working in a point cloud is not only possible but if done correctly, can be a rewarding addition to an aerial surveying program. Here are a few tips we have found over the years that help when you need to work in point clouds.



### Extract Selected Data

When working in a point cloud, you should go in knowing what data you need to extract, and then extract only that. A common mistake is to try and get everything, and it winds up being a time killer. Being brutally selective about what data you are trying to extract will help to save a huge amount of time.

### Don't force a square peg into a round hole

Or rather, don't try to work with a point cloud in a program that isn't designed for it. A common mistake that we see is when people delete 90% or more of points to make the point cloud smaller so it will work in familiar applications like Civil 3D. This is a process we call "Dumb Decimation," and it results in losing 90% of the accuracy! Important features, like utilities, fire hydrants, signage, and curbs often disappear entirely in this method, and what is

left is of lower quality than it was before. When working in point clouds, use a program designed to work with point clouds, and only ever use the full resolution file.

### Know the limitations of photogrammetry-based point clouds

Photogrammetry based point clouds may be the richest source of data from photogrammetry, but that doesn't make it perfect. While LiDAR often can penetrate at least some vegetation, the point clouds that come out of photogrammetry still generally map the tops of vegetation. This means the top of tall grass, and the tops of trees when present. No amount of point cloud editing will create points where they don't exist. Be aware of these limitations going in and set your expectations accordingly.

### If it isn't working, use something else

Point clouds are not the solution to every problem. If you find yourself spending too much time working in a point cloud, and you just aren't getting the data you need, don't be afraid to collect more data in the field or on the ground, and use that to supplement your drone data. Also, don't be afraid to abandon point clouds entirely and use an alternative method of extracting data from drone photogrammetry.

*continued on page 13*

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## Alternatives to Point Clouds

If point clouds aren't working for you, don't give up hope! There is a huge amount of value to be had from drone photogrammetry, and not all of it comes from the point cloud. Here are a few other methods that can be successful in certain circumstances.

### Orthophoto Drafting

One of the simplest ways to get valuable data out of drone photogrammetry is heads up digitizing from the orthophoto. This has the benefit of being extremely easy, very intuitive, and very accurate – at least for XY coordinates. The obvious, massive downside to this is that the resulting data is not going to have any elevation data associated with it, so the applications are limited accordingly.

### 2.5D Modeling

2.5D modeling comes from combining a raster DSM file with the orthophoto, both of which are typically standard outputs of any decent photogrammetry software. By combining these into a 2.5D surface model, it is a lot easier to extract individual points and polylines from a surface than it is to

work in a point cloud. The downside is that, because the model is only 2.5D, it is impossible to "look under" any eaves, trees, overhangs, or equipment to the surface below. But while the point cloud typically has richer data than the 2.5D model, the time savings may more than makes up for the slight loss in data quality.

### Hire an Outside Expert

Many people make a career out of working in large 3D digital datasets. That experience combined with specialized computer hardware and software, means that specialists are often able to extract pertinent data from a point cloud faster, cheaper, and more reliably and predictably than other professionals who lack this focus on 3D data. Companies like Aerotas specialize in this type of work and can help you get the best data in the most efficient manner possible.

### Using Point Clouds for Drone Surveying

Point clouds are a mixed blessing for many people. Their richness and accuracy have enabled surveyors to collect and analyze data that was never before possible. But

they have also turned into a massive time sink, costing hundreds of hours that could have been spent better on other projects. The best way to use point clouds in drone surveying is to make sure that you use them selectively. Point clouds are not a magic bullet that solve every problem, so only use them when you know they can add value. Also, be sure to use point clouds as part of a mixed workflow. Combining point cloud data with orthophoto data, 2.5D data, and good old-fashioned field surveying typically leads to the best end results. 🌱



**Logan Campbell**

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

# The 59<sup>th</sup> Annual Geomatics Engineering Conference through Fresno State is underway!

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If you need a place to stay while in town, we have a room block with the DoubleTree available to book here: <https://doubletree.hilton.com/en/dt/groups/personalized/F/FATCCDT-FSG-20200123/index.jhtml>

Similar to past years, the conference will run all day Friday and half day Saturday. Friday night will feature a full course dinner, live auction, bulldog race, and scholarships and more! We will also have a raffle and silent auction. We are hoping for a great conference this year with some excellent speakers and topics. We will keep you updated on who is speaking and exhibiting as the months go on. For those interested in exhibiting at our conference to network and meet students, please contact Joey Ceja-Rosales at [exhibits.gmeconf@gmail.com](mailto:exhibits.gmeconf@gmail.com).

We are also accepting speakers at this time, please contact Felicia Perez for more information and to book your spot at [exhibits.gmeconf@gmail.com](mailto:exhibits.gmeconf@gmail.com)

Scholarships and any donations/equipment can be donated by contacting Jesus Garcia or Justin Yelton at [gmescholarships@gmail.com](mailto:gmescholarships@gmail.com)

**Thank you all for your generous support over the years.  
We are looking forward to a great conference and hope to see you there!**

# An Introduction to Radio Frequency Identification for Land Surveyors



*An Interview with Mike Klonsinski, President of Berntsen International, by Paul Mabry, Editor of the California Surveyor*

**Paul:** *Mike, thank you for helping us understand the potential of RFID technology for land surveyors and the general public. Let's step into the imaginary future to understand this a little better. Pretend we are visiting the site of an ALTA/ACSM survey 50 years from now. This is a site where we previously set the monuments using Berntsen RFID-enabled DEEP1 magnets.*

*So, we travel by hovercraft to the site, a former strip mall. We view our heads-up dashboard display to see where the markers are supposed to be. And, from our aerial view, we can visually identify two of the ten monuments displayed on our screen by zooming in on the iconic Berntsen bronze cap – still looking good after a half century.*



*Next, we deploy our drone outfitted with GNSS, a magnetic locator and RFID transceiver to hover over each monument coordinates to confirm the existing monuments and search for any missing monuments. The drone pauses mid-air a foot above the ground where it picks up the strongest magnetic signal and triggers the RFID read at eight of the monument points including the two visible monuments.*

*At each point, the RFID read triggers access to the cloud metadata now displayed on*

*our dashboard including the original 1877 survey notes. With this confirmation, we are confident that we are in the right place to check into the found monuments and re-set the missing monuments. The junior surveyor is sent out of the hovercraft to start the work*

*However, there are still two anomalies... one of the visible monuments does not appear to be in the location indicated by the records and a second location offers no magnetic signal or RFID read at all. We suspect in the first case that a past landowner illegally moved or tried to reset a monument and that the second case was simply complete destruction of all physical marking. While annoying, we've greatly reduced the amount of actual physical survey work.*

*This would be quite an improvement over the process that land surveyors currently employ. How realistic is my scenario? Is this concept something that Berntsen can currently provide?*

**Mike:** *Well, that's quite a vision – but it's probably not surprising to you and your readers that this scenario is closer to reality than science fiction. We can't do the hovercraft yet, but the marking technology and locating process you described is available today. We've combined magnetic locating, RFID and cloud-based GIS technology into one simple solution. We've even successfully field-tested drones for reading RFID underground markers!*

**Paul:** *Let's now dive into a few of the details. RFID technology, meaning radio frequency identification, is used in many exciting ways in our world today. It is used to mark*

*the finish line of track and field events, to deter shoplifting, and to check out books at the library. This technology has been used to identify buried public infrastructure for several years now as well. What has changed to allow this technology to be applied to identifying survey monuments?*

**Mike:** RFID chips are small, passive, durable and – as you pointed out – being used in all types of applications. As RFID use has grown, the technology has improved as their costs have decreased. Perhaps the most important feature of RFID is that it provides a unique identifier for virtually any item, regardless of industry or application. Conceivably, RFID could be used as the serial number for the Internet of Things – RFID could easily become the pin that tracks all types of products, pets and even people. It's a technology with many possibilities and many implications.



**Paul:** *That is both scary and exciting! I'm sure there's more we haven't even thought of.*

*So, let's talk about the range of RFID devices. RFID sensing is dependent upon the strength of the radio signal emitted from the transceiver. And, the FCC currently limits the power and strength of radio transmitters.*

*continued on page 15*





*This effectively limits the range of RFID signals. Furthermore, when placed underground, the radio waves are even less effective. However isn't it true (theoretically at least) that an RFID tag could be located at a considerable distance from the transmitter assuming the transmitter was powerful enough to energize the RFID and the receiver was sensitive enough to pick up the return broadcast?*

**Mike:** Well ... there are still limits to the laws of physics. The performance depends on the wavelength of the radio frequency – but nevertheless, your premise is largely correct.

You might think of RFID as analogous to the laser distance transmitters used by surveyors to measure distance with their total stations. In the case of RFID, the radio wave is a much longer radio wavelength and is encoded with information from the RFID chip. We've used a UHF RFID transceiver to read RFID markers below ground to depths of four feet. Magnets can be precisely located at an even greater depth. *[Editor note: Ultra-high frequency RFID is the primary RF in use today].*

One of the biggest advantages to using RFID or magnets – or both in combination as we do – is that the technology is passive. Magnets and ruggedized RFID markers can perform for hundreds of years without need for any energy support. In your initial example, the RFID tag should work fine after 50 years.

**Paul:** *With this in mind, what are the practical considerations of the hardware and software that Berntsen currently offers?*

**Mike:** Well, let's break that answer into two parts, the hardware parts and the software component.

For the hardware portion, we've patented combining a DEEP1 magnet + RFID chip in a ruggedized module. This durable marker is physically buried below disturbance level, either on or beside a conventional survey monument, or underground utility asset. The magnet in the marker is located with a



traditional magnetic locator and the RFID tag is read with a standard RFID reader.

We then 'connect' the RFID tag through our software. The InfraMarker software on the iOS or Android mobile device reads the RFID tag information and supplements that information with metadata associated with that tag ID stored in the cloud. It's a way to marry the power of GIS and the cloud with the need for physical verification in the field.

**Paul:** *Why would you need both? If GPS positioning is so precise, then why wouldn't future surveyors or locators just use their connected devices to travel to the correct spot and in-field markers become obsolete?*

**Mike:** There's a number of answers to that question.

First, we are still a long way away from a place where we are going to bet our work – or our lives – completely on the map coordinates displayed in an app.

Second, satellite positioning alone has challenges due to the movement of the

earth's tectonic plates or regional land shifts that occur due to other natural and man-made forces.

Finally, and perhaps most important, we believe that it's a "both-and" question – not an "either-or" question.

Accurate and fast locating is most reliable when positioning technology is coupled with on-the-ground physical verification. A good example of this is used every day in popular ride-sharing apps. Potential passengers verify the driver's face and the car's make and license plate against the information on the app before entering the vehicle. It's real world verification of virtual reality. Few people would jump into a car simply because the blue dot on their phone map stopped in front of them.

**Paul:** *So at this point, surveyors should regard RFID technology as an enhancement to the abilities of current magnetic locating which have been used for many years?*

**Mike:** Yes, that's correct. RFID technology does

*continued on page 16*



not replace the usefulness of magnetic locating, but it

(1) enhances the information that can be associated at the buried monuments and

(2) it provides the trigger that opens up all of the associated cloud-stored data for that point.

**Paul:** *Wow, I imagine this would be unbelievably valuable for any government enterprise tasked with preserving and maintaining a large number of monument assets. Can you describe the Deep1 magnetic marker with the enhanced RFID capabilities for surveyors who aren't familiar with the existing DEEP1?*

**Mike:** DEEP1 magnets were developed by Berntsen many years ago as a means to locate survey monuments that had been broken or buried. We take a small but powerful magnet encased in plastic and bury it

with or in the survey monument. These magnets are easily and precisely located with a magnetic locator. Magnets will last thousands of years and are universal in application. We are exploring those for use as a great underground utility locating tool because the magnets are utility agnostic (can be used for fiber, water, gas or any other asset).

**Paul:** *Thanks for this information Mike, it has been a real pleasure to learn about this technology. So, last question: Is this a feasible option for the typical land surveyor or is this more suited to large enterprises or public corporations?*

**Mike:** The best use option is for public entities such as municipalities, DOTs or enterprises such as campuses or other large landowners who are responsible for managing Right of Ways or large tracts of land. Those are the groups that would realize the greatest cost and safety benefits from using RFID.

However, the typical land surveyor is well equipped to incorporate this technology into their daily operations too. 🌐



Mike Klonsinski is President of Berntsen International, Inc. Berntsen is the nation's leading provider of high quality survey marking products.

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# Better Writing for Increased Profits

*How to write proposals that increase efficiency, improve projects and boost profit margins using proper tools for land surveyors.*

**By Fred Dyste**

## How Digital Is Changing Proposal Writing

For land surveying projects, the proposal writing process can be daunting, time consuming and inefficient. However, there is an upside: The more proposals you submit, the more work you get!

Obviously, each proposal needs to be thoroughly researched and well written. But often, clunky spreadsheets and word document software are used to create and revise proposals. Then revisions are made by e-mailing versions to various team members to check or add information. Does this sound like you? This approach can lead to a lot of confusion because multiple versions ensue and the 'master' version can get lost or fail to reach the client.

As partial solution, consider moving your proposal building and editing online, using free tools like Google Docs or relatively inexpensive ones like Microsoft OneDrive. You could also consider Enterprise Resource Planning (ERP) software or preferably an industry specific software like Qfactor. Each of these software programs allow you to create, edit and store your proposals (and other documents) online. They also allow for 'version control' or the ability to track changes, so everyone involved can jointly access and collaborate. This allows for greater flexibility, while eliminating the time consuming tasks of using multiple separate programs, confused e-mail

threads and duplicated information across software programs. Plus, everyone in your organization always has immediate access to the latest documents without tracking down e-mail attachments.

## The Right Software Saves Time

While it takes time to prepare a solid proposal, you happily invest that time because it prevents headaches down the line. A clear thoughtful proposal means later clarity on what you and your client have agreed to.

Some companies invest in stand-alone proposal software or an ERP system that has add-on quote and proposal features. The beauty of this type of software is seen in its ability to reuse content that you've already created somewhere else, streamlining the process.

Something to consider if you think an ERP software is for you, is that ERP implementation usually takes a significant amount of time and resources. If you're considering this route, then it's best to select an experienced consultant team to research your needs, issue a request for proposal and qualify up to three companies for consideration. Once a software is selected, expect that most of your company personnel will be involved in implementing it enterprise wide. This process can take months, if not a year or

more and will require significant capital investment.

Or, if you want to improve without making the leap into an ERP, you can use either Google Docs or Microsoft OneDrive. In these software programs you can save templates for future reuse, share templates and documents across your organization, revise and control your proposals, and save and archive all of your documents. This is a big improvement over desktop software and paper files.

More and more surveyors are turning to industry specific software programs such as Qfactor for Land Surveyors. Industry specific software offers the advantage of being designed with your business in mind, similar to how AutoCAD software is designed around drafters.

Taking the time to research, test, and decide on which software to use, and then training your employees on how to use it can seem like a bigger headache than soldiering on with manual entry. But, sooner or later the benefits of making a change outweigh the difficulties. So, no matter when you make that decision, make sure when it happens that you incorporate these minimums:

- Make sure you select 1 to 3 software programs that can handle your scope

*continued on page 19*





of services, deliverables and cost estimates.

- Make sure the software programs can ‘talk’ or integrate to one another, so you can reuse information and not have to duplicate it over and over.
- Make sure the software can save to a central repository that others in your company can access.

### Scope of Services

A key part of any proposal writing template is the scope of services. The scope of services is critical because it is where you spell out exactly what work you are going to do and, in some cases, what you aren’t going to do. Without these inclusions and exclusions saved in a template, these are often left as verbal discussions with a client and don’t make their way into the final proposal.

It’s helpful to keep a list of all of them handy so you can copy and paste (or click and include) as needed. It’s important to include minor details that may seem obvious to you because they help clients understand the costs of the project. For example, it’s second nature to you to start with a title search, but a client might not necessarily be aware that that is an important prerequisite of a land surveying project.

Recalling and saving details like this can be time consuming. But, if you are able to incrementally add these into your proposal building software, you’ll receive all the benefits without investing any single large amount of time.

### Deliverables

Deliverables are another example of what is often left out of proposals. For example, will there be stakes marking their property; a copy of the title documents you collected; do they get CAD digital files, hard copies, or both?

These are important to specify up front and in writing because costs add up when a client wants more printouts of the title history than you anticipated. This type of detail also helps when the client wants

something more or different because you can point back to the proposal and explain what and why there are additional costs.

### Cost Estimating Can Be Time Consuming

Once the project description and deliverables are added to your document templates, then the estimating starts. This can be a very time-consuming part of the process because you want accurate numbers, not approximations that vary depending on who in the company is making the estimate.

But, once you’ve invested the time to properly estimate deliverables, it is helpful to have software that can save your processes to use on the next project. If you’re using proposal building software or industry specific software, then check what specific tools are available for capturing this type of information.



However you do it, saving a standard template and process for estimating will streamline your proposal writing. It also allows you to quickly pull those past jobs up for reuse. Just make sure at least annually to update the numbers in your template. If you’re not using a comprehensive software program, then as you build templates, consider adding folders that are dedicated to specific phases or organizing directories by project type.

### Proposal Follow-up Call

Proposal writing will be more successful if you make a follow-up phone call after you submit it. Does the software program you use today to keep track of small reminders like this? Research has shown that success rates for business proposals increases by 20% with just one follow up call. Making

calls can be tough, but remember, the call isn’t about selling anything, it’s about having a conversation and starting a relationship. While Google and Microsoft have calendars where you can schedule reminders, a better software solution will have this feature built in and sync with other features. Ideally, you would receive a task reminder with a link to the client contact information and the proposal you prepared and details on when it was sent and delivered. No more searching through files or shuffling papers during the call.

### You Won the Project, Now What?

Better proposal writing = winning more contracts. But, that equates to managing more projects. This is where the real value of a ‘connected’ system pays off. I’ve explained the importance of using software that’s online and using software that avoids duplication. But now that the project changes staff from marketing and business development to project management – is your software still helpful?

Software programs in this transition, must be ‘talking’ to each other, they must be closely integrated. If not, staff will enter the same data over and over, eating up time and potentially introducing new errors to catch. This time and cost expense are compounded by the number of employees, clients and projects one has. Add in projects that are halted periodically and employee turnover and you have ample room for errors and cost overruns.

Connected software on the other hand will assist in the transitions and make data flow smoothly and more efficiently. Examples of benefits in well integrated software include tools that assign tasks, track hours, track resources, gather documents, and prepare billing.

For project management and tracking, land surveyors need to integrate time tracking, accounting, task assignment, and document organizing. The software should also migrate information you entered in

*continued on page 20*



## Business Writing – continued from page 19

the proposal stage into the accounting software and project management tools without anyone having to re-enter it.

Time tracking is an important process since time entry mistakes cost businesses significant revenue – especially in service industries like land surveying that track billable hours for multiple clients. Relying on paper time sheets and manual data entry is slow and unreliable and is unable to generate on the fly reports and projections on project budget or profitability.

There are a variety of time entry software applications available to allow a team to enter data from anywhere, even in the field. The key to accurate time tracking is to make it easy, convenient and habitual. Companies have devised all kinds of ways to get their employees to track time. Some use incentives like drawings with cash prizes while other resort to punitive measures like withholding paychecks. Research has shown however that the best way to get people to track their time is to make it easy and to remind them regularly. Investing in a time tracking app like eBility allows people to use their phones so they can track time while out in the field but also maintains the ability to integrate with other software used in project management. Other vendors with on-the-go apps include Quickbooks and Timecamp. Remember however, that whatever software solution is selected, it has to work together with all of the office software to provide a complete business solution. Just as ERP software and industry specific software tie together all the various aspects of proposal building, choosing the right software for project management will also tie together the various aspects of managing and billing for a project.

### Project Close-out

Lastly, don't overlook a methodical close-out process. If done thoughtfully, a completed project is an indispensable tool for future profitability. Past projects should be indexed in multiple ways including by project type and location. In this way, research can quickly look up information to support the next proposal writing task. Past projects are also great learning tools.

Was your client happy? Why or why not? Use unhappy client experiences to improve office processes or fill in training gaps. Was a project over budget? Use your financial software to identify where your money was made or lost and then integrate that information into your project planning and budgeting. Firms have a financial advantage if they know better than their competitors where their financial strengths lie. And don't forget to share your knowledge. Have regular wrap up meetings to share your insights with staff so that they also understand where the business does well and where it needs improvement.

### In Summary

Over the past generation, land surveying has become increasingly high tech with robots, remote sensing and satellite positioning. But, many of the business aspects of the land survey business languish in obsolete practices and procedures.

Tools like spreadsheets, or paper and pencil are good, but only as they integrate with a larger ecosystem of software and processes adding value or reducing risk to your business. Two key elements in the survey business are proposal writing and project management. Using software that's accessible online will absolutely increase efficiencies and improve collaboration. And using software that's connected and integrated with other software will improve business processes, save time and reduce human error. The task of selecting software may seem overwhelming, but whether you're a large company or individual business owner, such an investment will result in happier employees, clients and owners. Investing in the right office software will ultimately allow you more time to do what you love: surveying land. ☺



**Fred Dyste**  
Obispo, CA.

Fred Dyste is the founder of BizWatt, LLC and the developer of Qfactor for Surveyors, a proposal writing and project management software developed for the land surveying industry. BizWatt is located in San Luis



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# Certificates of Merit in Negligence Actions Against Professional Licensees – Why Your Opinion Should Be Heard

By Tony Nettleman

**B**eing a Professional Land Surveyor is challenging and rewarding. No other profession embraces the past and future quite the same as surveying. For example, surveyors spend much of their time reading, researching, and cataloging history. Old maps, plats, deeds, patents, and field notes create a special connection between the past and present. But then, after the research is done, surveyors use emerging technology that was until recently science fiction – like laser scanning and semi-autonomous drones. And for better or worse, we are assumed to be competent in all domains, past and present.

Since land surveyors have these unique skills, and are licensed and regulated in their respective states, the Public often assumes that “all land surveyors are created equal.” However, this assumption is faulty and the expectation that every surveyor will perform equally well is false. Unfortunately, there are always a few surveyors in every locale who regularly fall below minimum standards of practice. Other surveyors may simply make mistakes that are not caught. And furthermore, even competent surveyors may be sued by their clients or third parties simply because of the litigious society in which we live. In each of these circumstances, there are legal remedies and related to such legal remedies is an often overlooked provision of California law that requires input from well qualified professionals.

In about half the states, before a property owner (“plaintiff”) can file a civil suit against a professional surveyor, the plaintiff must obtain a certificate of merit. The purpose of the certificate of merit is to limit or eliminate frivolous lawsuits against professional licensees such as land surveyors, doctors, nurses, engineers and architects. Basically, before a professional can be sued, another experienced and similarly licensed professional [i.e. licensed surveyor] must produce a report explaining that the defendant-surveyor acted negligently. Therefore, if you are qualified in your area of professional expertise – by education, experience, or a combination of both – why not assist the public in raising the standard of practice by authoring these much needed reports?

A certificate of merit is essentially an expert report by a land surveyor that (1) describes the standard of care owed by a hypothetical Professional Surveyor to his client(s) based on state statutory law, state case law, and land surveying texts, (2) explains what work the current Surveyor-Defendant did for the client and the methods used to complete such survey, and (3) provides an expert opinion as to whether the surveyor-defendant was professionally negligent.

In California, the state’s code of Civil Procedure Sec. 411.35 sets forth the requirements of a certificate of merit.

*(a) In every action, including a cross-complaint for damages or indemnity, arising out of the professional negligence of a person holding a valid ... land surveyor’s license issued pursuant to Chapter 15 (commencing with Section 8700) of Division 3 of the Business and Professions Code on or before the date of service of the complaint or cross-complaint on any defendant or cross-defendant, the attorney for the plaintiff or cross-complainant shall file and serve the certificate specified by subdivision (b).*

Subdivision (b)(1) elaborates:

*That the attorney has reviewed the facts of the case, that the attorney has consulted with and received an opinion from at least one ... land surveyor who is licensed to practice and practices in this state or any other state, or who teaches at an accredited college or university and is licensed to practice in this state or any other state, in the same discipline as the defendant or cross-defendant and who the attorney reasonably believes is knowledgeable in the relevant issues involved in the particular action, and that the attorney has concluded on the basis of this review and consultation that there is reasonable and meritorious cause for the filing of this action. The person consulted may not be a party to the litigation. The*

*continued on page 22*



## Certificates of Merit – continued from page 21

*person consulted shall render his or her opinion that the named defendant or cross-defendant was negligent or was not negligent in the performance of the applicable professional services.*

Some of you will feel that passing judgment on a fellow land surveyor is unpleasant. And, I agree, it no doubt may be. What gives another surveyor the right to critique the work of a fellow professional? On the other hand, is it right that dishonest professionals should cause harm without being held accountable? Who is better situated to know the difference between a common mistake in surveying and a deliberate or willful act or omission that causes easily foreseeable harm? Surely not the client who paid for a surveyor's services. And likewise the attorneys to the case are by definition biased in favor of their client and often know nothing about professional land surveying. I hope it is evident how necessary an unbiased and knowledgeable

surveyor is to a suit alleging negligence against another professional licensee.

Rather than take sides in a matter, I prefer instead to assist the parties and the court. My philosophy is to set a benchmark standard based on the combined statutory law, state case law, and land surveying texts. Then, instead of comparing the current surveyor to what I would have done personally, I compare that surveyor against the sources. This provides for a fair, objective certificate of merit and hopefully assists in dismissing any frivolous cases while helping to hold accountable those professionals who fall below the standard of care rightfully expected of them by the public.

So, if you believe you have what it takes to serve as a knowledgeable, objective, fair reviewer of another surveyor's work, I highly recommend authoring these types of reports. Besides being another source

of income, there are yet other benefits. You will learn from other's mistakes and improve your own practice. And, you will open your mind to other types of surveyors and surveying work. ☺



**Tony Nettleman**

Tony Nettleman is a Land Surveying Engineer and Attorney. He holds a BS, MS and PhD in geomatics and a law degree. Tony teaches, lectures and publishes widely on matters relating to land surveying. Tony can be contacted through [www.CNettleman.net](http://www.CNettleman.net).



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# Disproportionate Business License Tax Updated – The Gig Economy

By Alan Linch



**H**ave you encountered a local government body overtaxing you for a business license even though you only provide a small percentage of services in that jurisdiction? If so, you are not the only California land surveyor or other professional dealing with this unfair practice. In fact, current economics are pushing local governments to attempt to collect taxes even as the workforce expands into new and increasingly mobile platforms.

California Business and Professions Code Chapter 16000 has long stated that “[a]ny legislative body, including the legislative body of a charter city, that fixes the rate of license fees pursuant to this subdivision upon a business operating both within and outside the legislative body’s taxing jurisdiction, shall levy the license fee so that the measure of the fee fairly reflects that proportion of the activity actually carried on within the taxing jurisdiction.” This law has been in place since 1990 to address this exact inequity.

However, as the California gig economy has evolved in recent years, professional service providers and other businesses are more mobile and more easily hired to perform services across the state. In particular, California land surveyors often engage in intercity business and encounter this abusive and arguably illegal practice with some regularity. For example, some cities levy a full license tax if an employee or solo professional works in a city seven or more days in any one year, even if the business

has no office or other presence in that location. Such onerous requirements may impact any potentially mobile business, from a land surveyor to an Uber driver.

Another trend in many California jurisdictions is establishing annual business license tax minimums. Some minimums have graduated thresholds based on prior year gross receipts within a particular jurisdictional area, while others compare the ratio of work performed in a location to overall business income irrespective of location. Regardless, this approach enables disproportionate and unconstitutional multiple burden taxation on various transactions. Rather than treating small amounts of business activity as de minimis or calculating exact activity ratios, jurisdictions deploying this tactic may instead be using these minimum tax levels to unfairly discriminate against mobile businesses. Further, any attempts to link these minimums to overall business size are inappropriate and not in compliance with existing law.

Here are a few practical tips if you encounter or have encountered this situation:

- Raise the issue with the local government body engaged in this practice. They should be aware that you have the facts, the law, and the political will on your side.
- Report any local government attempts to disproportionately tax your business

licenses to your local CSLA chapter. Your chapter can be a resource for gathering and documenting these issues.

- Maintain a record of any e-mails or other documentation you send to or receive from any local governing body relating to this issue.
- If you pursue a challenge, there is strength in numbers. If possible, identify other impacted companies and/or individual professionals to illustrate the broad impacts on intercity business.

This issue is not new unfortunately. Indeed, land surveyors have encountered disproportionate taxation challenges for many years. But technology and mobility have broadened the potential impacts to include many more workers than ever before. That’s good news in that there are more allies in this debate. The gig economy’s prevalence and broadening influence should only strengthen land surveyors’ efforts to combat this unfair practice. 🌱



**Alan Linch**

Alan serves as Counsel in Hanson Bridgett’s Real Estate and Environment practice, specializing in municipal regulatory and land use matters throughout California. He previously worked at the U.S. Department of Justice and U.S. Environmental Protection Agency.



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# California Declares a Housing Emergency

By Neil Sorensen



**T**he California Legislature passed and the Governor has signed SB 330, the “Housing Crisis Act of 2019,” declaring that there is a “Statewide Housing Emergency” in effect in California until the year 2025. The new law suspends certain restrictions on the development of new housing statewide and imposes strict statewide permit processing requirements on local governments. In declaring a statewide emergency, the Legislature found that the housing crisis is so bad that:

- California ranks 49 out of the 50 states in housing units per capita.
- California has an unmet need of 2,000,000 housing units and needs to build 180,000 units per year to keep up with the current population growth.
- The housing crisis cost \$140 billion a year in lost economic output.

The Housing Crisis Act of 2019 amends or adds to the state’s planning and zoning laws (Govt. Code Sections 65000-66035) but also applies to applications for subdivisions. The Act includes the following changes to existing law and/or new provisions:

- Creates a new “preliminary application” process with a limited list of specific

items that a city/county can require for a complete application. (Govt. Code Sections 65941.1 and 65589.5).

- Mandates that a project is only subject to the policies in effect when a preliminary application is deemed complete (Govt. Code Section 65589.5). This is a big change in the law because it pre-dates the current vesting afforded by a vesting tentative subdivision map.
- Reduces the timeframes for acting on housing development applications including subdivisions (Govt. Code Section 65950).
- Limits the number of public hearings that can be held to a maximum of five – includes public workshops but not appeals (Govt. Code Section 65905.5).
- Prevents cities and counties from denying an application except where the application fails to meet “objective standards” which are defined as “involving no personal or subjective judgment by a public official” and are based on “verifiable external criterion knowable by both the applicant and public official.” (Govt. Code Section 65589.5)

- Adds new provision for urbanized areas that prohibit a city/county or the electorate (by initiative) from: (1) changing the General Plan, zoning or lot size standards on a parcel to allow for less intensive use or a reduced density; (2) imposing a moratorium on housing development; (3) imposing new design standards that weren’t in effect when the legislation takes effect; and (4) imposing limits on the number of permits issued (Govt. Code Section 66300).

This legislation is new and it will take some time for local governments, planners and surveyors to review and determine exactly what it means and whether it will produce more housing. However, it is clear that the Legislature is tired of local governments dragging their feet in approving sufficient housing for state residents. 🗳️



**Neil Sorensen**

Neil Sorensen is an attorney located in Marin County. He specializes in land use, real estate, environmental law, estate planning and trusts, and associated litigation. He is rated AV® Peer Review Rated by Martindale-Hubbell (the highest rating given to lawyers).



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# Invest in Yourself

By Robert McMillan



I was having dinner recently with a friend who is a pilot for a major airline. He mentioned that his twenty-ish nephews see him as someone who “has it made” professionally as well as financially. And why wouldn’t they? He not only has a great job with a major airline, a big house and a new car, but he is the consummate professional pilot.

But my friend explained, “those guys were just little kids when I was struggling to make ends meet.” He laughed when he related that they were not old enough to understand that the ramen noodles he subsisted on back then were not his dinner of choice every night for months on end. The nephews had no grasp of the literally thousands of hours of study, and the tens of thousands of dollars he spent on classes, seminars, flight training and examinations to hone his expertise and excel in the profession. Or, the determination it took to obtain the advanced licenses and certifications that qualified him for even his first airline pilot job.

So, why am I talking about commercial flying to professional land surveyors? I’m not. Mostly, I’m targeting the individual technicians and land surveyors in training (LSITs) that work for the licensed professionals. And I’m not talking to them about flying. I’m talking to them about investing in themselves. LSITs are truly in a great situation. Think about it. They are (relatively) young, in a great high demand

career field, have the opportunity to become future professional land surveyors, and the (almost) guaranteed upward mobility to move into leadership positions within their organizations.

And yet, too often I hear, “I don’t have time for that. I get off work an hour before the meeting starts.” Or, “I’d go to the Chapter meeting if my employer would pay for the dinner.” Sometimes I even hear that technicians wish to be paid overtime to attend professional events. Seriously? The old saying goes, “It takes money to make money.” But I prefer to think that as it takes investment to reap reward. That investment could be money, but it could also be hard work, dedication or simply one’s time and energy. If you have more time or energy to spare than money, consider making an investment.

Remember, the opportunity to become licensed or promoted isn’t likely just going to drop in one’s lap. We all have to earn it. So, take steps to show some initiative. Dedicate yourself to pursuing a goal, and becoming a true professional. All it takes is thoughtful investment. Find a mentor; talk with your supervisor or manager. Look into less well known benefits that may be available to you. Perhaps the company you work for has a tuition assistance program. Or, your employer may be willing to pay for your CLSA dues, or workshops or even conferences. Granted, in many companies, paying for a professional

society membership may be a benefit to employees, but it doesn’t do much good unless the employees engage and leverage that membership.

Chances are, the more you invest in yourself, the more your employer and your colleagues will invest in you. Their investment may not be financial investment, but a willingness to take a gamble on someone they see as a rising star. It could be assigning you more responsibility or letting you take on new roles. However they invest in you, be sure you return the favor with effort and appreciation. Learn everything – be more valuable – improve profitability – reduce liability. These are reciprocal investments that will pay off for you and your colleagues in the profession.

And finally, even if it seems that no one else is investing in you, invest in yourself. The law of investing never fails in the long run: The return will be AFTER you invest, MORE than you invest and WHAT you invest. Show us who you are! Invest in yourself. 🌟



Robert McMillan is with the California Department of Transportation, and is the 2019 Secretary of the California Land Surveyors Association.

Robert McMillan



CALIFORNIA LAND SURVEYORS ASSOCIATION

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