

# SURVEYOR

California

Summer 2011

Issue #166



## FOUR YEAR DEGREE DEBATE



### Surveying Education or Educated Surveyors? That's the Question...

Article by Tony Cuomo, PLS, page 12

### "Goldie Locks" and (3 out of 4) Barely Educated Surveyors

Article by David Paul Johnson, PLS, page 16

### Degree or no Degree... that is the Question!

Article by Jerald P. "Jerry" Miller, PLS, page 22

### Revisiting the Four Year Surveying Degree Requirement Debate

Article by James K. Crossfield, L.S., Ph.D., page 26

### Enhancing the Quality of Our Profession Through Education

Article by Allan Ng, PLS, MSCE, page 28

### PLUS Educational Requirements for PLS Licensure Across the United States

Article by Ian Wilson, PLS page 32



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# Surveyor *California*

The quarterly 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 Licensed Land Surveyors in the State of California as well as 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."

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## Inside This Issue:

### Features:

#### The 4 Year Degree Debate

##### Surveying Education or Educated Surveyors? That's the Question...

By: Tony Cuomo, PLS .....12

##### "Goldie Locks" and (3 out of 4) Barely Educated Surveyors

By: David Paul Johnson, PLS .....16

##### Degree or No Degree...That is the Question!

By: Jerald P. "Jerry" Miller, PLS .....22

##### Revisiting the Four Year Surveying Degree Requirement Debate

By: James K. Crossfield, PLS, Ph.D. ....26

##### Enhancing the Quality of Our Profession Through Education

By: Allan Ng, PLS, MSCE. ....28

##### Educational Requirements for PLS Licensure Across the United States

By: Ian Wilson, PLS. ....32

##### What About You? Personal Risk Management-Part II -Homeowners and Auto

By: Richard Hertzberg, CPCU, ARM .....34

##### Positioning Using GPS and CORS Part 2

By: Robert Reese, PLS and Tom Mastin, PLS .....36

##### SMA Expert Q&A

By: Michael P. Durkee, Esq. ....42

## Departments:

From the Editor .....6

Letters to the Editor .....8

Kids Korner .....9

President's Message .....10

Geography Quiz .....15

Photo of the Year Entries .....21

Postcards .....30

Index of Advertisers .....30

Welcome New CLSA Members .....41

Crossword Puzzle .....44

Sustaining Members .....46

## On The Cover:

Surveying Students from Cal Poly Pomona, CSU Fresno and Santa Rosa Junior College



By: John P. Wilusz, PLS, PE - Editor

John works in the Delta Levees Program at the California Department of Water Resources in Sacramento, CA.

## From the Editor



### CLSA Wins Top NSPS Journalism Awards

In May the National Society of Professional Surveyors (NSPS) announced the winners of the 2011 Excellence in Professional Journalism Contest. The California Land Surveyors Association won first place in three categories: State Affiliate of the Year, State Association Magazine of the Year and State Association Website of the Year. Contest entries were judged by the Excellence in Journalism Judging Committee. The committee is comprised of four members drawn from the NSPS Board of Governors and is chaired by the editor of the *ACSM Bulletin*. State society magazines were judged on the focus and quality of their content, readability, overall publication design, page layout, and ratio of advertising versus contributed content. Websites were evaluated on the quality of their content, effectiveness in delivering content, and ease of locating information.

This is the fourth consecutive year the NSPS awarded first place to *The California Surveyor* in the professional journalism contest. As before many hands contributed to our success. In particular I would like to recognize the executive leadership of Dorothy Calegari, the administrative support of Crissy Willson, the graphic artistry of Tony Monaco, the award-winning content from our contributing writers and photographers, and editorial assistance from Paul Brown, Scott Martin, and Rob McMillan. Many others helped in ways both large and small and my sincere thanks to all.

#### Book Review: Thoreau the Land Surveyor, by Patrick Chura

The 19<sup>th</sup> century writer Henry David Thoreau is best remembered for being the author of *Walden*. In reading Thoreau *The Land Surveyor* by Patrick Chura I learned that he was also a professional land surveyor for much of his adult life.

#### A Self-Educated Surveyor

Henry David Thoreau lived in a shack on Walden Pond south of Concord, Massachusetts from 1845 to 1847. While there he wrote extensively and recorded his thoughts on everything from Greek mythology to squirrels. Many of his essays consist of philosophical meditations on the natural world. He loved the woods and his writing shows a keen appreciation of nature and a talent for describing it well. But writing isn't the only thing Henry did to busy himself during his two years at Walden. It was there he taught himself how to survey land. Although a graduate of Harvard he, like many surveyors even today, entered the profession without the benefit of formal education in land surveying. There is some indication he associated himself with a local surveyor twenty-five years his senior, but other than that he was apparently self-trained. According to Chura, Henry made a list "...of books and articles he had read or intend-

ed to read to prepare himself for the work."

The aspiring surveyor developed field skills by surveying and mapping Walden Pond. He ran baselines across the frozen pond during the winter and measured angles using a compass while set up on the ice. When the weather warmed and the ice was gone he made soundings of the pond from a raft. He presented his work on a map that appeared in the first edition of *Walden* in 1854. The book includes a copy of it so you can see for yourself that Henry Thoreau was a competent draftsman.

#### Goes Professional

The most obvious link between Thoreau's writing and his surveying had to do with money. After leaving Walden Pond he self-published *A Week on the Concord and Merrimack Rivers*. He anticipated the book would be warmly received and so had one thousand copies printed and shipped to his mother's house. Sales were flat and the writer went into debt. His career as a surveyor was on. His first paid job was marking a lot for his friend Ralph Waldo Emerson. For that he received one dollar. By 1850 things had improved to where he could afford a 15-inch surveying compass. The compass was manufactured by the C.G. King Company of Boston and it survives today on display in the Concord public library. Based on the following advertisement it seems he put it to good use.

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*Areas warranted accurate within almost any degree of exactness, and the variation of the compass given so that the lines can be run again. Apply to Henry D. Thoreau.*

Thoreau calculated magnetic declination, "the variation of the compass," by personally observing Polaris to determine astronomic north. To observe Polaris he used a Rube Goldberg-type arrangement the author

*Continued on next page*

describes as having consisted of a plumb bob, a range pole, a candle, and a bucket, among other things. I had trouble following the explanation of how it all worked but the point was well taken. He used the best methods he could afford to ensure his work was precise, accurate, and reliable. For that he was in demand from clients whose priority was getting the job done right.

One example the author gives involved a boundary dispute between the towns of Concord and Acton. At the heart of the disagreement was a lack of understanding that magnetic variation changes over time. During a perambulation of town boundaries, representatives from the two jurisdictions were confused as to why the lines marked on the ground did not agree with their land descriptions. The confusion turned into an argument and so the parties hired Henry Thoreau to sort things out. He did so by explaining the concept of magnetic declination in language they could understand. A Concord selectman later remarked, "Thoreau understood his business thoroughly and settled the boundary question so that peace was declared."

### Continuing Education and the Coast Survey

An important part of Thoreau's continuing education consisted of reading the annual reports of the Superintendent of the U.S. Coast Survey. He purchased the reports each year from 1850 to 1858, and studied them for techniques to incorporate into his own work. For example, his soundings at Walden Pond were inspired by the Coast Survey. The U.S. Coast Survey was authorized by Congress in 1807 and began work in 1816. One of its primary missions was to accurately map the nation's coasts and harbors to reduce the incidence of shipwrecks. But there was much more to it than that. In Thoreau's day the U.S. Coast Survey was one of the nation's preeminent scientific institutions. Its scientists did ground breaking work in many fields including geodesy, geology, botany, marine biology, climatology and astronomy. In fact the list goes on. The reports of the Superintendent contained the latest scientific thinking in the world, and Henry's interest in them demonstrated his genuine desire for continual self-improvement.

Not only did Thoreau study the reports – he actively sought the company of scientists who published work in them. In 1847 Henry met with Benjamin Peirce, who later went on to become Superintendent, to discuss astronomical discoveries and explore volunteer opportunities. He met with another Coast Survey scientist, William Cranch Bond, on a number of occasions to learn more about terrestrial magnetism.

### Henry David Thoreau – Abolitionist

Even before the Civil War tore the country apart, the debate over slavery was loud and often violent. Half the country thought slavery was God-blessed and the other half thought it was an abomination. Henry and his family were active abolitionists. His mother provided safe haven to fugitive slaves in her boarding house in Concord.

Thoreau met fellow abolitionist John Brown on several occasions, the first being in 1857 when Brown came to Concord during a fund-raising tour of New England. Brown passed the hat while he lectured on his crusade to stop the spread of slavery into the western states. John Brown was a government surveyor. He reportedly used his trade as cover to spy on the enemy. Armed with weapons both purchased and stolen, he and his rag tag militia did their part to put "bleeding" Kansas into the national psyche. John Brown's violent ways alienated many, even among those sympathetic to the cause, but Henry David Thoreau defended him. "In Defense of Captain John Brown" was Thoreau's most widely distributed essay during his lifetime.

### A Man of Contradictions

Thoreau died of tuberculosis at the age of 44 in 1862. His life was short but active and the vocational choices he made led to some interest-

ing contradictions. As a land surveyor he marked boundaries that helped lay the foundation of civil society. Yet, as a writer, he advocated civil disobedience when he disagreed with the government. He helped his land-owning clients defend their property rights and yet he himself lived as a squatter at Walden. Last but not least, in surveying the land he abetted the obliteration of the thing he loved – the untamed wilderness.

*Thoreau the Land Surveyor* is a scholarly, well researched account of an iconic writer's life as a land surveyor. Given the nature of Thoreau's notoriety, and the fact that Patrick Chura is an English professor, it's not surprising that much of the book is devoted to a detailed analysis of Thoreau's various writings, both published and not. Readers who share the author's passion for Henry David Thoreau will not be disappointed. As for me what I enjoyed most were the book's insights into the life and work of a quirky yet inspired 19<sup>th</sup> century surveyor. ■

### Correction Notice

The event described in the article "Girl Scout Survey Merit Badge Event" in California Surveyor Issue #165 was sponsored by the Channel Islands Chapter, not the Riverside/San Bernardino Chapter. The Riverside/San Bernardino Chapter provided logistical support for the event.

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# Letters to the Editor

## Regarding utility relocation in the right-of-way acquisition process.

Dear Editor:

As a partnering proponent of the public and utility sectors it was with great interest that I read "The Right-of-Way Acquisition Process" by Ms. Teri Kahlen, PLS in the Spring 2011 edition of California Surveyor. It is telling that a two page article contains only one sentence discussing utility relocation. In my years of experience in utility relocation that is about the same amount of attention given to the actual process. Yes, "Utility relocation is a significant factor in the construction of a project, and early coordination is important in keeping the project on schedule." Too often though I have heard the public sector define "Right-of-Way as we're **Right** now get out of the **Way!** Understanding that it is often said with a smile and/or "tongue-in-cheek," it still represents a mindset.

Both the public sector and the utility sector provide essential public service and, in most cases, are the sole providers of those essential services. Caltrans Right of Way Manual states in Section 13.03.01.05 that "Utilities, like highways, are essential service for users and cannot be severed for a lack of an alternate replacement location." It is my opinion that because both the public sector and utility sector provide essential public service, each sector has a duty and obligation to serve us, the public. I call it taking care of the "People's Business." I unequivocally support financial liability based upon superiority of land rights however, since you and I both fund each sector it is equally important that each sector conduct the People's Business in the most cooperative and cost-efficient manner possible. It doesn't really matter to me based upon superiority of land rights, which sector pays, as you and I are the funders of both. We pay either way. What is intolerable to me, and hopefully to you as well, is when the sectors refuse to cooperate with transparency and accountability.

That's right! When a project is completed with cooperative and transparent conduct it will, in most instances, be delivered on time and within budget. Now, that's something worth paying for. However, without effective partnering and cooperation there will most certainly be project delays and/or cost overruns. Guess who pays for all these extra and needless costs? In my experience two of the leading causes of public project delays are the lack of sufficient project R/W and utility relocation. It is fortunate that both sectors have employees in the field that can perform magic (finding insufficient existing R/W for infrastructure improvements without trespassing). However, it is not uncommon when utilities are involved that additional project R/W acquisition is necessary after the planning and design process. Why? Because not all project R/W acquisition needs are identified in a timely manner.

For example, a local public agency (LPA) plans and designs a street improvement project and utilities were originally installed in the public R/W. In this scenario the utility will, in most cases, pay for utility relocation to accommodate the project. The LPA assumes this and plans the project without utility involvement. After project planning and design including R/W acquisition, the utility is notified and ordered to relocate its facilities with no place to go within the public R/W. Consider the existing state process in which state approval of the utility Relocation Plan is an end line product. As a result utility easement needs are not identified during the earlier window of Caltrans R/W acquisition process.

Additional acquisition of project R/W, after lead agency project planning and design, to accommodate other affected providers of essential public service, will most likely delay the project. If private landowners are unwilling to grant the necessary additional R/W, the lengthy process of condemnation may be necessary. If the utility sector can demonstrate that it took timely and reasonable action when notified, it should be able to defeat claims of delay. Imagine the same private landowner having their real property condemned twice for the same project.

Alternatively, the public sector is often frustrated by the lack of planning efforts for public improvement projects by the utility sector which is, in my

opinion, unacceptable. The utility sector has a duty and obligation, when installing its facilities in the public R/W, to conduct the People's Business in the most cooperative and cost-efficient manner possible. I also challenge the utility sector to participate in locate and mark for project design purposes, to ensure the early identification of its underground infrastructure also known as Subsurface Utility Engineering. The locating and marking of utility facilities during public sector project planning and design provides the best opportunity for timely identification of utility project needs. This often results in the avoidance or mitigation of costly relocation of utility facilities to the extent possible. I encourage both sectors to partner in R/W acquisition when utilities are involved early in the planning and design process to ensure sufficient project R/W is acquired to accommodate the People's Business. I expect both sectors to conduct the People's Business with transparency and cooperation to achieve the most cost effective and timely project delivery. No, as a tax payer and utility consumer, I actually demand it as you should too as the funder of both sectors.

BOB GRIMM, PLS  
Paradise, CA

## Regarding the debate over the need for continuing education and a degree requirement for licensure.

Dear Editor:

I may have done a great disservice to our profession, focusing on what education does not and cannot do. I disregarded what education does and can do for our profession. Because I do not have a degree in surveying, I held myself out as proof that a formal education in surveying is not necessary to achieve licensure. I've pointed to my first time passes of California, Nevada and Colorado PLS exams as proof that a surveying degree is not necessary. I've objected to Continuing education because there is no proof that it reduces complaints against surveyors. I have come to realize that my conclusions may be incorrect. My focus should have been on what both education and continuing education can do for us as individuals, as a profession, and to protect the public.

My education as a chemist taught me how to learn. The process of studying for a degree helps develop an understanding of what it is to learn and study. Regardless of the degree, post-secondary education is exposure to learning. Completion of a degree program in any subject is an accomplishment of significant worth. Learning how to learn is extremely valuable. I have been fortunate enough to have been mentored by many surveyors. They each gave me insights and shared knowledge in discussions that are on a par with graduate level seminars. The education that these gentlemen have given me helped me develop a solid understanding of professional ethics, geodesy, law, logic, photogrammetry, boundary principles, surveying craft and thought processes required of professional land surveyors. My own natural curiosity and love of surveying has led me to build a large library of surveying texts and to devour each of them. While I used to consider this to be the norm for professional land surveyors, I now know, unfortunately, it is not.

In re-evaluating my position, I have come to realize that education gives us common ground on which to meet as professionals. Education establishes a technical foundation in math, law, communication, ethics and learning upon which to build. The pursuit of knowledge prepares a common course for us to follow to professional excellence and helps protect the public. Continuing education ensures that the profession is able to grow and change as new technology, judicial thinking and legislative processes work to adapt our art and science to an ever changing world. A formal program of study in land surveying provides a basis for further study. I have not had the benefit of such a curriculum. As a

*Continued on next page*



# Kids Korner

*Do you have a picture of a "junior surveyor" in your family that you would like to share? Send it in and we will put it in the Kids Korner.*



Jimi Pilarski, grandson of Jim Pilarski, PLS, learning the basics of operating the total station.

*Continued from previous page*

consequence, I do not have a measure of what I have learned and what I have not. I have worked hard to build my knowledge of geodesy, boundary and easement law, land descriptions, land title surveys, planning and the land development process. A formal course of study would have provided me with a yard stick against which to measure myself and would have helped me understand both my strengths and my weaknesses. Any course of study establishes a common language used by practitioners. Land surveying, with its own jargon and technical terms is no exception. Although this can be learned informally, the very purpose of the overview courses is to ensure the development of common language and elementary concepts that are built on to further develop knowledge of our art and science. In any discipline, there is a logical thread to processes that go into the practice of the discipline. This builds on elementary concepts and creates specialized knowledge that is the backbone of the discipline. Surveying is no exception. Through broad based formal education we gain exposure to this knowledge and learn to judge our strengths and weaknesses. Judging our competence is much more difficult without formal education.

With the advent of GPS surveying equipment and techniques, the study of geodesy, statistics, measurement theory and error analysis are more important than ever. The mathematics involved in these subjects is far beyond the level of most high school classes. Post-secondary study of spherical geometry, calculus and physics are virtually necessary to achieve a professional level of understanding of these subjects. Those who do not meet this level risk attaining only a technician's understanding of the topics without the ability to make professional level decisions necessary to properly protect the public. The myriad of discussions regarding incorrect procedures and methods required to meet accuracy standards and the lack of understanding of standards of professional care all support this conclusion.

The pace of technological improvements and advances has increased steadily since I was born (1958). Functional lasers weren't constructed until two years after my birth. GPS wasn't even a science fiction item. Today, lasers and satellites are providing us with huge volumes of data. Keeping up with ever

changing methods, techniques and concepts is imperative for the protection of the public as well as our profession. As society changes, so, too, do our laws and the interpretation of those laws. One of the purposes of our court system is to build a written foundation of appellate decisions that help lower courts and shape the opinions they produce. In order to protect the public, we must keep abreast of developments in judicial thinking. It is only through continuing education that we can meet this goal. Although there are some 4200 land surveyors licensed in California, there were only a tenth that number at our annual conference in March. The heads of attendees are getting greyer, my own included. Much of the program from this year could have been interchanged with the program from five years ago. By making continuing education mandatory, the pool of California surveyors who attend such programs would grow from the few hundred who voluntarily increase their knowledge regularly to the 4200 surveyors who would be required to do so. The increase in numbers would stimulate a "cottage industry" of continuing education providers to meet the needs of our profession. A wider range of topics and a larger number of seminars and webinars would be available. Market place economics would have more powerful effect with a market place ten times the size of the current one.

Previously, calls for mandatory education requirements and mandatory continuing education have been met with accusations of "protectionism" and "elitism". Both allegations are absolutely correct. We need to better protect the rights and safety of Californians by establishing minimum levels of education. We must maintain a high level of knowledge and competence through continuing education. The question should not be whether, but how. Those of us who fought to prevent education requirements and continuing education requirements in the past need to reevaluate our conclusions and step to the forefront to shape how we will implement those requirements. The rights and safety of Californians should be our concern. The betterment of our profession should be our aim.

Respectfully,  
Ian Wilson, PLS (CA, NV, CO) ■



By: William R. Hofferber Jr, PLS - President

**Mr. Hofferber** is the Chief of Surveying and Mapping at the Riverside County Flood Control and Water Conservation District. Bill has been involved in land surveying for over 37 years in both the private and public sector where he has worked on hundreds of projects from ALTA surveys, construction, boundary, photogrammetric mapping, and large scale GPS campaigns. He is also an instructor of land surveying courses for Riverside Community College District.

## President's Message

With this issue of the Cal Surveyor dedicated to education I thought it best if I too would address education with my President's message. I would first like to begin with a quote from a past Cal Surveyor magazine: "One baccalaureate program can never supply California's need for professional surveyors. Nor can it furnish the trained technicians to support the professionals. Survey education has reached such an all time low that we could devote our entire effort to improvement and still take many years to catch up. Lack of adequate knowledge is evident at every turn." This quote was taken from an article in the Cal Surveyor "Convention Special Edition" and written by Mr. Chuck Wooldridge, 1973. So here we are 38 years later and we are trying to get by with two baccalaureate programs state-wide, one at Cal State University Fresno and the second at Cal Poly Pomona. Annually these two universities graduate about 30-40 Geomatics Engineering students combined. During this same time period the population of California has grown from 21 million to 37 million. Along with this minimal amount of graduating students you have the fact that many of the pre-1982 Civil Engineers have or will soon be retiring from performing any land surveying functions.

The California Land Surveyors Association (CLSA) has recently received proposals by both of these universities for financial assistance. As we ponder what, if any financial assistance we can provide, as the primary State Association of land sur-

veyors, we must first investigate all of the facts. First, there is a very limited candidate pool of potential professors to draw from, individuals with a PhD in land surveying. Second, there is limited enrollment in both of these programs, and lastly, California is in the worst budget crisis in history.

I believe we must look for ways that we can provide assistance to both of these programs if we expect our profession to survive. I don't have all of the answers on how we can help but I will list a few ideas that I feel might help. One, and probably the most important, is student and public outreach. If we can boost the interest and enrollment in these programs three to five fold over the next decade then there is a much better chance of the programs surviving. Go out to high schools and community colleges and speak to students, sign up to help out at a Trig Star event, let students and parents know what an exciting career awaits in land surveying. Look for local career fairs and get materials from CLSA to take and share with these students. Another way that I feel these university programs will benefit would be the implementation of mandatory professional development requirements for engineers and land surveyors in California. I believe this would encourage many surveyors to choose to enroll in college courses to meet the requirement (others would meet the requirements by attending seminars, workshops, conferences, writing articles, teaching, etc.), thereby requiring more and larger community college programs. If these

associate level programs flourish there would be more students and instructors looking to transfer into higher education. Along with what the Education Foundation is already doing in the way of scholarships, \$33,225 was awarded to Cal Poly Pomona and Cal State University Fresno students in 2011, CLSA can also help out both of these universities through marketing, advertising, by providing guest speakers, and potentially with monetary and equipment donations.

Of course I would like to see 2 or 3 more universities offering a baccalaureate degree in California but to date I do not see the enrollment demand at Cal Poly Pomona or CSUF supporting this expansion. Secondly, I do not see where the professors will come from. While there are some Photogrammetrists and Geodesists with PhDs, there does not seem to be any abundance of land surveyors with a PhD and boundary experience. Finding professors with this expertise is where the true future challenge will lie. As I stated in my last presidents message, I believe that the land surveyor of tomorrow will need a new level of highly skilled, trained, and educated employee to keep up with the technology explosion. I expect it will become more and more difficult to find this level of employee from within the "on the job training" ranks. There are many things that we can do as professionals and members of CLSA to assist with the education needs of our ranks; however, there is one thing that we most definitely cannot do, that is nothing! ■

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By: Tony Cuomo, PLS

**Tony Cuomo, PLS 6042**, is a Senior Survey Project Manager with Johnson-Frank & Associates, Inc., in Anaheim, CA. He is also the President of the Orange County Chapter of the C.L.S.A., and President of Pacific Land Seminars. Tony has been active in the primary and continuing education of land surveyors throughout the western United States since 1990

# Surveying Education or Educated Surveyors? That's the Question...



As Hamlet, the mythical doomed Prince of Denmark, so preciently mused, so must we consider the dark future of our profession. Ladies and gentleman, something is truly rotten in Denmark. Through the decades many of the greatest minds in surveying have attacked this most divisive of issues: What is the role of Formal Education in Surveying? As the world of surveying has evolved, so too has the essence of this question. I no longer believe we should be weighing ourselves down with the 'IF' portion of this issue. More importantly I believe that now is the time to come together with an acknowledgement that Formal Education must play a fundamental portion of the process toward licensure, and also a continuing role in the maintenance of one's license. As an association, we must come together and formulate a comprehensive plan to integrate Formal Education into the practice of Land Surveying. We no longer enjoy the luxury of considering the 'IF'; we must act decisively to implement the 'HOW'. Consider the following statement:

*At the present time the professional status of the land surveyor is the subject of national discussion. Within the next few years the surveyor will be in one of two positions. First, he can have subprofessional standing with low educational requirements and minor areas of practice, or, second, he can bring himself up to the standards of the better professions and assert himself in a larger area of practice. The surveyor cannot afford to stand still. The engineers, land planners and the like are advancing their stature at a rapid pace and if they pass the surveyor too far they will supplant him.....*

Friends, truer words were never spoken. There is only one problem with that statement, and that problem is not a small one. For those of you in the know, the problem is obvious. For the rest of you, the problem with that statement is enormous, profound, and obscene.

Here's the deal: That statement was written by Curtis Brown and published 50 years ago, in 1961.

Fifty. Five – Oh. A half-century ago!

In 1961, Jack Kennedy was president, Elvis Presley was number one on the Billboard charts with "Are You Lonesome Tonight?", telephones were still connected to the wall, and Ernest Hemmingway committed suicide. It was a big year. Seems like a long time ago, doesn't it? It was. Yet, the same issue seems to plague our profession today. What is it about Surveyors? Is it true that we are our own worst enemy? Look at the historical facts, and I think you might agree that the answer to that question is: yes. To quote that great sage, Pogo, "I have met the enemy, and he is us!"

In California, our professional 'status' has been under fire for decades, caused by the fact that we have 'low educational requirements'. And if you do not believe that our status is under attack, just look around:

Looking through a local newspaper recently, I found two adds soliciting to **Engineering** companies to provide subdivision mapping, easement preparation, and right of way services. In case you missed the memo, those fall under the purview of the Professional Land Surveyor. Hmmm...

Look at what is happening at the agency level with the office of City Engineer / City Surveyor and County Engineer / County Surveyor. As the Pre-82 crowd is slowly going the way of the VHS, the agencies are realizing that they are facing a mini-crisis: the potential of possibly actually having to hire a Professional Land Surveyor. What is their solution? Don't look for any positions opening up soon, folks. The answer at the agency level is to hurry up and get the brightest P.E. in the department to pass the PLS exam. Tah Dah!! Problem solved;

A recent R.F.Q. by a city in the greater L.A. area went out for firms to provide surveying services. Of the half a dozen or so firms that were qualified, only one had an L.S. on staff – the rest of the companies were manned by Pre-82 engineers;

Take a look at the national publications – G.I.S., Remote Sensing, Aerial Lidar, and Terrestrial Laser Scanning dominate the

*Continued on next page*

issues month after month. Yes, there are the occasional articles about a bunch of guys dressing up like Lewis & Clark and throwing chaining pins at each other, but those are few and far between.

The reason for most of this is simple, and it is our own fault. By refusing to come together in order to create comprehensive and meaningful legislation that would introduce logical educational standards into the process's of obtaining and maintaining a license to practice Land Surveying in California, we have essentially short-sheeted the future of the entire profession. Like it or not, the times, they are a changin', and the answer is not illusively blowin' in the wind, it has been staring us in the face for years. As Curt Brown also pointed out in his article in 1961, "*The proof of what we are is not what we claim to be. The proof is what others know us to be.*" He concludes that thought with the suggestion that "*We might well ask ourselves, what, on the average do others think of us?*"

I think we all know what sort of answers we would get from that sort of poll, and very few of them would be considered flattering. The dilemma is that, as a profession, we have complained about our standing within the Architectural and Engineering community, but we have done, pathetically, nothing to improve our standing.

The question, then, is how to go about enhancing our standing, how to raise our image, so to speak. We can claim to be whatever we want, but without a quantifiable measure, it is all just empty talk. I believe it comes down to the following thesis: In order to better our profession, we must produce a better caliber of surveyor. In order to do that, we must make the big decisions about educational issues that will pave the way for the coming generations of surveyors, those men and women who are bound to replace us. Our legacy to those future surveyors must be a new structure through which one will obtain, and maintain, a surveying license. This new structure must be more in tune with other professions within our state, and the vast majority of other states.

According to information currently posted on the State C.L.S.A. website, California is one of only 5 states that do not have any sort of educational requirements to sit for or maintain your license to practice Land Surveying. Do the math. Now, I'm not necessarily one to follow the crowd, but California is not participating in the 90-percent majority. We seem happy to be in the 10 percent minority. Some argue that just because everyone is requiring education does not make it right. Remember when your mom used to warn you that you shouldn't do something just because all your friends were doing it? That something was usually a bad something, like staring into the sun, or jumping off a garage roof, or doing heroin. I do not believe the 'just because everyone else is doing it' argument is valid here: we must create a paradigm that will foster some sort of structured, intellectual path toward professionalism.

The heart of the thesis rests on the fact that California does not need more *Surveying Education*, per se. What we do need, however, is more 'educated' surveyors. Remember, my thesis is not that we need better surveyors, but that we need higher quality individuals to become surveyors. Many argue that if there had

been a degree requirement back in (fill in the year of your choice) that (fill in the surveyor's name of your choice) might not have chosen to become a surveyor. Maybe yes, maybe no – either way, **it is an irrelevant claim.** One could also argue that if there **had been** a degree program in place 20 or 25 or 30 years ago, that perhaps we would not be considered the red-headed step-children (no offence to red-headed step-children, please) of the A&E community today. What about that twist?

Should a two or four year degree be a mandatory requirement for licensure? I do not believe so. I believe that condition would be far too exclusionary. I do believe, though, in credit where credit is due. And, if, by my thesis, we are going to attempt to create a better educated surveyor, then there must be substantial reward for a degree. Currently, one of the California requirements to sit for the L.S. exam is a minimum of 6 years experience, with one year each of responsible field and office training, with or without a degree. Let's explore a 'Credit Where Credit is Due' approach. Raise the requirement to 10 years of experience, with two years each of responsible field and office training, but knock off a year each of responsible field and office training if the applicant has a two year degree with an appropriate amount of relevant credits. Knock off another block of required experience for a relevant four year degree, and another chunk if the four year degree is a surveying degree.

What about once one has obtained a license to practice surveying? Section 8708 of the Professional Land Surveyors Act states that "In order to safeguard property and public welfare, no person shall practice land surveying unless appropriately licensed or specifically exempted from licensure under this chapter." We must, however, take into consideration the examination process, passing scores, and passing rates in this portion of the discussion.

It is accepted that the state specific portion of the Land Surveyors examination tests only for minimum competence;

A passing score for recent exams has traditionally been in the 50 percent range;

Percentage wise, very few people pass this exam;

Once the exam is passed, there are no further professional requirements placed on the licensed individual.

Given these facts, the following statement is true: In order to safeguard the public, we are happy with a process in which approximately 30 percent of the people succeed, and those who succeed do so by achieving a passing score of around 50 percent, and the exam is specifically designed to only test for minimum competency. To top it off, we are happy to then say to that individual "Guess what? Welcome to the club! Now that you are in, you are not legally required to learn anything else for the remainder of your career!" Is this truly upholding our covenant to "...safeguard property and public welfare...?" Is a candidate "...appropriately licensed..." through the current process? Personally, I do not believe so.

Many endeavors are required by the state to continue to learn within the contexts of their professions. My accountant needs 80 hours of continuing professional education every two years. I'm o.k. with that – I want him to be on the top of his game because he is advising me about my money. Consider this: If you read an article about an accountant who, by using outdated methods and with a direct disregard to the laws of California, caused his clients to suffer financial damages through his neglect, what would the average reaction be? I think it would be outrage. “How dare he? He misrepresented his clients, and they suffered greatly as a result of his incompetence!” What about an attorney or a physician? It would be all over the news. Yet, there are surveyors throughout the state advising clients on title and boundary issues worth tens of millions of dollars who are committing felony level malpractice, much of which is based on simple ignorance of the laws that govern our practice. It is inconceivable that a person would obtain a professional license, and then not be expected to maintain some sort of continued pursuit of knowledge within their chosen field. A discussion of the many opposing points of view against Continuing Education is necessary at this point:

**“In order to call it ‘Continuing Education’, you had to be educated in the first place.”**

Let us not split hairs here. Semantics are fun when you are arguing with a 12 year old, but let's get real. Whatever you choose to call it, the process of a professional continuing to educate oneself is a valuable tool in maintaining relevance and credibility, not to mention a strong role in serving to protect the public. Do not get hung up on the title, just keep on learning.

**“There are just not enough classes, courses, seminars, workshops, or conferences to go to.”**

Really? Maybe 5 or 10 years ago that *may* have been the case. It's time to wake up, crawl out from under that rock you have been hiding under, and take a look around. There are so many educational opportunities available it would be hard to list them all. For starters, here is a hint: There is this really cool thing called the Internet. It is awesome. Along with the dancing kittens and the alternative adult entertainment sites, there are also many avenues for obtaining *knowledge*. Look into it.

On another tack, if you build it, they will come. I firmly believe that if there were enforceable educational requirements in California, we would see the quality and quantity of these offerings increase both in frequency and in quality.

**“Continuing Education is just a ploy by those who benefit financially by offering continuing education opportunities.”**

This is quite possibly the single most offensive excuse out there. Tell that to the people running their chapter review programs. Run that one by the individuals who work tirelessly for a year to put on a three day state conference. Send it to Rob MacMillan and the members of the Education Committee who have just completed the L.S. Exam Study Guide. This is just a weak excuse, proffered by those who are too lazy to be more creative. I can honestly say that just about every time I have paid to see someone more experienced than I present a topic, I have

walked away from that experience with a new piece of knowledge that altered the way I approach my practice. If I had to plunk down a couple hundred bucks to learn something that enhances the way I approach my profession, it's well worth it.

**“Mandatory continuing education amounts to some sort of reduction of the rights of the individual”**

I am not quite sure I follow this one. In a recent letter to the editor of this publication, the idea was presented that “...allowing the state to impose new, perpetual, compulsory and costly requirements to maintain one's license effectively redefines the meaning of “professional” to that of ‘state agent.’ Leadership of organizations who presume to know better than the individual professional as to how best to conduct their practice and career and who collude with the state to affect conditions on another professional's license abdicate their responsibility to represent the interests of professional Land Surveyors.” I believe those who support this point of view are somehow not clued into the meaning of what it means to be a professional. In his 1961 article, Brown comprises a list of **“Attributes of a Profession”**, which states that essentially, a professional is:

- One who has achieved a superior education in a field of knowledge;
- One who can offer service to the public;
- One who recognizes that the possibility of gaining highest eminence may indeed come without necessarily earning much money;
- One who would offer to provide services to those unable to pay;
- One who can exercise independent judgment and accept the liability as a result of that judgment;
- One who is ethical;
- One who, if fees are charged to those able to pay, those fees are dependent upon knowledge rather than labor or product;

The broad oversight of a professional organization, together with the effective legislation and enforcement of comprehensive rules and regulations, do not represent an abdication of any sort. By choosing to become a member of this profession you have accepted the fact that there are ruling doctrines and precedents. Any effective profession must examine their doctrines and precedents from time to time and, if necessary, evolve those ideals to best serve the public and the members of that profession. In the past, there became a point in time in the evolution of the practice of a certain field where it became apparent that regulation, certification, and licensure was necessary for the protection of the public. Surveying is no different, and what we are suggesting is that “perpetual and compulsory” educational requirements should be considered as the next round of evolutionary progress. If these people do not recognize that, yes, the elected leadership of these professional organizations do in fact have the experience to shape and guide the procedures that we should adhere to, then perhaps those disaffected by this notion should take up modern dance or sculpture.

*Continued on next page*

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**“Continuing Education would be too expensive, take too much time and effort, and result in too much time away from the office”**

Not really. Most of us have devoted more time to maintaining our drivers license than we have maintaining our professional license. Do you follow a sports team? Ever leave the office to catch an early game or spend all day Saturday or Sunday devoted to the ‘Big Game’? If you truly cannot spare a few hours a year to invest in your chosen profession, you have greater issues to solve than arguing about continuing education. Most states have adopted a 30 hour per every two year approach. Kentucky is 8 hours per year. I don’t think this argument holds water simply because the skills you will obtain through the investment of time will pay for themselves in spades. Also, think of the time, effort, and money associated with your push to obtain licensure. In order to pass the LSIT, the National PLS, and the State PLS exams, you bought books (not cheap), took classes (time, effort, and money), studied fairly intensively (effort), and undoubtedly missed a day or two from the office to take the exams. **All this just to go achieve *minimum competency*.**

Perhaps we truly are insane, eh? We have been doing the exact same thing for decades, and we keep expecting a different result. We have done **nothing** to create a different paradigm in which we exist, yet we cannot seem to figure out why, in the words of Rodney Dangerfield, we “just don’t get no respect.” I do not believe the path out of this quagmire is more surveying education. I do believe that a more educated class of surveyors will not only serve to protect the public in the true spirit of the law, but will also serve to elevate what many seem to wish was a true profession into a more solid standing with not only the public, but our A&E colleagues as well. ■

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# Geography Quiz

*Submitted by: Anne Hoppe*

The first recorded ascent to the summit of this mountain was accomplished by a team of land surveyors on the 27th of August, 1820. It is in the Alps and it is the highest mountain of a certain country at 2962 meters and it contains that country's largest glacier. What is the mountain and what is the country?

*Answer on page 43*





FOUR YEAR DEGREE  
DEBATE



By: David Paul Johnson, PLS

David Paul Johnson, PLS has been involved with Continuing Education since 1974.

# "GOLDIE LOCKS" AND (3 OUT OF 4) BARELY EDUCATED SURVEYORS

CLSA Treasurer-Elect, Jay Seymour, PLS, (School of Hard Knocks) wanted to know why I hadn't signed up for the voluntary CLSA (PDP) Professional Development Program. I told Jay since our profession has been talking about a "PDP" for the last 20 years, and I thought by now we should be able to do better than a PDP. I wrote this article to try to offer my perspective on why: although I do believe in some form of continuing education - I do not support a Professional Development "Certificate" Program, and although I do see the value of education - I do not support the idea of "mandating" a 4 year degree in Land Surveying as a requirement to sit for the California LS Exam.

I did not finish my 4 year Degree in Business Administration (quitters never win...); however I did get an AA Degree in Liberal Arts, an AA Degree in Speech Communication, a Certificate in Engineering Technology, and a Certificate in Drafting from a California community college. From my perspective, continuing (your) education will make (your) work experience more productive and (your) life experience more meaningful.

As a "career" Land Surveyor for 30 years, a "professional" Licensed California Land Surveyor for 20 years and a surveying and mapping community college GPS instructor for 10 years, I tend to agree with some people who seem to believe our world would be a better place if all our Land Surveyors began their careers with a 4 year college degree, but all I can is, "I didn't."

Grandpa Johnson would tell you, "Son, You have to row with the oars God gave you!"

## APPLES AND ORANGES

The U.S. Department of Labor "2010 Geospatial Competency Model" (Google it) makes no mention of Professional Development Seminars (think Oranges) on the current ALTA Survey Standards or the new BLM Manual, but the model does identify the following academic competencies: Reading, Writing, Mathematics, Geography, Engineering Science, Communication, Critical Thinking, and Computer Skills (think Apples).

I do tend to agree that a Professional Development Program will help me develop professionally so I can do a better job. However we must stop fooling ourselves into believing that those people with a desk drawer full of Professional Development

Certificates will ever have the same academic standing as those people who have committed to continuing (their) education, and as a result have earned a "real" degree from a "real" college.

My definition of continuing education would have the following two parts: it must include a class, a grade, and a transcript; and it must continue... on towards achieving some definable academic goal, the least of which should be a Certificate of Achievement or Associate's Degree from an accredited community college.

IF our long-term professional goal is to establish a requirement for the LS Exam which includes the right combination of experience and college education, THEN (rather than investing time and money into a meaningless Professional Development Certificate Program), CLSA must commit to supporting true academic (college education) opportunities in order to encourage all our career Land Surveyors to become better educated Licensed California Land Surveyors.

## THE "PRACTICE" OF LAND SURVEYING

But wait just a minute! Part of learning how to "follow in the footsteps of the original surveyor" means you must put on your work boots and go out in the field. Unfortunately, time spent in a college classroom may not be an appropriate "one-to-one" substitute for actual time on a field crew putting points in the ground and recovering boundary monuments under the tutelage of an experienced Licensed Land Surveyor.

Grandpa Johnson would tell you, "Son, if you want to learn how to make an omelet, you're gonna' have to break a few eggs!"

Before it gets too late for a comeback... (rather than assuming a 4 year degree in Land Surveying is the answer to all our problems), we need to take a long hard look at California LAW, what it says in Section 8726 of the LS ACT, in order to figure out the best long-term game plan for the future of our profession.

The next generation of our career Land Surveyors may require more education than ever before, but I still believe that experience in the field will be as important tomorrow as it was yesterday. Maybe Land Surveying is as much a blue-collar trade as it is a

*Continued on next page*



white-collar profession, and maybe we need to embrace our career Land Surveyors in blue jeans and work boots as much as we celebrate those of us who get to show up for work every day in dress shirts and Italian Loafers (with little pom-poms). Maybe the foundation of Land Surveying will always be the right “mix” of education, hard work and experience needed to get the job done right.

On one hand, to be a competent Licensed California Land Surveyor maybe you don't need to be a Rocket Scientist, but on the other hand maybe some of us would be better career Land Surveyors if we “signed up” for a little more college education. I hate to have to say it, but if a high school kid can run circles around you when it comes to computers, or your best professional correspondence is texting “C u at 8... dont b L8” from your “DROID,” maybe you have not reached your full potential yet and continuing (your) education with a couple of community college classes might not be such a bad idea.

Many Licensed Land Surveyors would tell you, “Getting your license is only the beginning!” but I would also suggest what we do is called the “practice” of Land Surveying for a pretty good reason. On one hand, what I have always admired most about the Land Surveying profession is that anyone (and everyone) who is able, can work their way up the ladder; pull it all together and pass a national LSIT Exam along with a California specific LS Exam, earns the right to become a Licensed California Land Surveyor. On the other hand, maybe it would be good to take a fresh look at

the current requirements for our LS Exam candidates, and consider “beefing up” a little on the academics without “watering down” the work experience.

Grandpa Johnson would tell you, “Son, there is just no substitute for experience, and there's always more than one way to get around the barn.”

### NOBODY'S PERFECT

Some people try to connect the lack of a “mandatory” 4 year degree in Land Surveying with a historically low “passing score” on the California LS Exam, but I would suggest we have all taken tough tests before that were graded “on a curve.”

Some people seem to believe: IF someone fails the LS Exam 2 or 3 times, THEN they have proven they are clearly one of “those people” who do not possess enough experience, education, or intelligence to pass the LS Exam, AND “those people” should never be allowed to become a Licensed California Land Surveyor.

Unfortunately, I am one of “those people” who failed the LS Exam three years in a row! Part of the reason I failed my first LS exam was because as a career Land Surveyor working in the field as a Party Chief (even though I brought my HP 41 calculator and extra batteries), I didn't know enough about the Subdivision Map Act to bring it to the LS Exam, or maybe I didn't know enough about the LS Exam to bring the Subdivision Map Act. Either way

Continued on next page



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## **"GOLDIE LOCKS" AND (3 OUT OF 4) BARELY EDUCATED SURVEYORS**

I failed, but I made a commitment to keep taking the LS exam until I got my license in Land Surveying (or died trying).

Grandpa Johnson would tell you, "Son, if you decide to have ham and eggs for breakfast, the Chicken will be involved, but the Pig... is committed."

### **A MANDATORY 4 YEAR DEGREE**

While we all should be able to agree that education can help us become better career Land Surveyors, some people seem to believe this profession will not survive unless all Licensed California Land Surveyors have 4-year degrees.

For the sake of discussion, I am going to "guess-timate" that (from 1980 until 2010) our California 4-year Land Surveying programs have produced about 40 graduate surveyors a year for the last 30 years. This should "total up" to about 1200 California graduate surveyors. If we add in another 10 graduates a year from out-of-state 4-year Land Surveying programs the good news is: over the last 30 years should have produced about 1,500 4-year Land Surveying graduates who are also Licensed California Land Surveyors.

Somehow, IF our California 4-year degree program(s) were to immediately "DOUBLE UP" to 80 graduate surveyors a year, THEN over the next 30 years: assuming these 4-year graduates all stay in California, all stay in Land Surveying, and all pass the LS Exam, when 2040 rolls around we should expect to produce a total of 2400 4-year graduates who have also become Licensed California Land Surveyors. Unfortunately, only (about) 3,000 members of this entire 4-year graduate Licensed California Land Surveyor work force will be younger than 60 years old.

When 2040 gets here, I have to wonder if the Board be "forced" to allow LICENSED "graduate" Civil Engineers and UNLICENSED "graduate" GIS "professionals" to fill the void, or will the 3,000 Licensed Land Surveyors (with 4 year degrees in Land Surveying) be enough to meet the future needs of the people of California.

IF we choose to make a 4 year degree in Land Surveying a "mandatory" requirement to sit for the California LS Exam, THEN we may not be able to produce enough graduate Land Surveyors with 4 year degrees to save us from professional suicide. I am afraid that it might be a fatal mistake if we assume that a "mandatory" 4-year degree is the only way to "save" the Land Surveying profession in California.

Grandpa Johnson would tell you, "Son, if you're gonna' put all your eggs in one basket, please be very careful with that basket!"

### **A VIRTUAL COLLEGE EDUCATION**

It may be hard for some people to imagine, but 30 years ago there was no such thing as "internet porn" or "on-line" education. Today, I can almost guarantee that a virtual college like: Ashford College, California Coast University, Charter Oak College, Jones International University, Madison University, PENN State, or

Thomas Edison College would be willing to partner with CLSA to develop an "off-campus" college degree path for the hundreds of semi-educated career Land Surveyors (just like me) who have already "banked" dozens of unrealized college credits.

I am proud to report Don Woolley, PLS, (BA, Management) CLSA, San Diego, Past President just got his "off-campus" degree from an accredited "on-line" college and therefore, I would like to nominate him to spearhead this important (but yet to be created) "on-line" education task force.

### **A COMMUNITY COLLEGE EDUCATION**

I would suggest for every (1) full-time student enrolled in our 4-year California Land Surveying program(s), there are at least 3 part-time students enrolled in our local Land Surveying community college programs. I believe 2 years of transferable college credit from a statewide network of regional CLSA supported community college Land Surveying programs would ultimately put more students into the seats of our 4-year degree Land Surveying program(s).

I would also suggest that community college classes have provided the academic foundation for (3 out of 4) three quarters of the Licensed Land Surveyors in California, and I believe community colleges are the most effective way to provide the most Land Surveying "Career Technical Education" as possible, to as many "career Land Surveyors" as possible. I might still be trying to pass the California LS Exam if it was not for the following "night class" community college instructors: Paul Cuomo, PLS, (Hard Knocks), John Pavlik, PLS, (BS, Management), Maurice Bowar, PLS, (BS, Mathematics), Jeremy Evans, PLS, (BS, Geography), Billy Martin, PLS, (BS, Surveying) and Mitch Duryea, PLS, (BS, Surveying).

IF our profession wants to have a chance to compete for today's "best and brightest" future professionals, THEN I believe in addition to contributing money to our 4-year degree program(s), CLSA must make a significant financial commitment to also support and expand our local community college Land Surveying programs.

IF our long term goal is to replenish the "rank and file" of our aging profession, and encourage our career Land Surveyors to commit to becoming better educated on their way to becoming better educated Licensed California Land Surveyors, THEN I believe we must take a fresh look at our local community college Land Surveying programs and what CLSA can do to make the future of Land Surveying more: promising, rewarding, desirable, profitable, and... (please insert your own motivational word here).

Grandpa Johnson would tell you, "Son, if 3 out of 4 people tell you that you are growing a tail, you don't have to believe them - but at least turn around and take a look!"

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## THE NUMBERS DON'T LIE AND BUMBLE BEES CAN'T FLY

Once again, I am going to “guess-timate” there are no more than 6,000 Licensed California Land Surveyors still alive and kicking, excluding the pre-1982 Registered Civil Engineers (now approaching 60 years old) who are also authorized to “practice” Land Surveying.

For the sake of discussion, I will wager only (the first quarter) 1,500 of ALL Licensed California Land Surveyors have completed a 4-year degree in some variation of Land Surveying, or Civil Engineering. Most likely, (the second quarter) 1,500 of us have finished a 4-year degree in anything from Architecture to Zoology, (but not Land Surveying). Generally, (the third quarter) 1,500 of us have at least finished a community college AA/AS degree, and finally I would suggest (the last quarter) 1,500 of all Licensed Land Surveyors have taken at least one college class in something. My “quick and dirty” scientific study leads me to conclude that (3 out of 4) three quarters of all California Licensed Land Surveyors do not have a 4 year degree in Land Surveying.

From my perspective as one of the (3 out of 4) Licensed California Land Surveyors who do not have their 4 year degree in Land Surveying, the proposed “mandatory” 4 year degree requirement hailed by some people as the ONLY way to “save” our profession, begs for an answer to the following question:

IF (3 out of 4) three quarters of all Licensed California Land Surveyors have the professional experience and the fundamental “academic” prowess necessary to be able to “practice” Land Surveying in California (without a 4 year degree in Land Surveying), THEN why do some people continue to “profess” that California Licensed Land Surveyors will “die-off like the Dinosaurs” if we don’t require all candidates to have a “mandatory” 4 year degree in Land Surveying in order to sit for the California LS Exam?

## BACK TO THE FUTURE

From my perspective as a Licensed California Land Surveyor for the last 20 years, our biggest professional “cross to bear” is the lack of “public” knowledge regarding the LAW as it relates to the “practice” of Licensed Land Surveying - not our own lack of public education on how to do our job as a Licensed California Land Surveyor.

Over the last 20 years I have come to believe the Board of Registration does not exist to protect my profession or advance my personal career as a Licensed California Land Surveyor. I have come to understand “my” Board of Registration exists to protect the people of California on an “individual” case by case basis; ONLY WHEN – an “individual” violates California LAW under Section 8726 of the LS ACT. Once again, from my perspective as a Licensed California Land Surveyor for the last 20 years (unfortunately for our

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# "GOLDIE LOCKS" AND (3 OUT OF 4) BARELY EDUCATED SURVEYORS

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profession), the "public" does not seem to understand what it means to "practice" Land Surveying in California.

20 years ago when I was a Licensed Land Surveyor, I can remember when a LICENSED Realtor encouraged me (to undercut my fellow LICENSED Professional Land Surveyors) so I could "win" a \$2,000 lot survey (think liability) on an ocean view lot worth \$2,000,000. I asked this LICENSED Realtor how often Realtors sold \$2,000,000 ocean view lots for a flat-rate (not-to-exceed \$2,000) paycheck instead of a 3% (\$60,000) commission fee? (It got very, very quiet).

25 years ago when I was a Party Chief, I can remember when grade checkers would run their rough grades with a "hand-level" off the survey stakes (station coordinates and elevations) I put in the ground for them. Today, on a \$10,000,000 housing development, instead of paying a LICENSED Land Surveyor \$100,000 to provide lot lines and grade stakes, it seems some "individual" LICENSED Grading Contractors would rather pay \$10,000 "up front" for the project control coordinates so they can run their own "GPS Machine Control Guidance Systems."

30 years ago I can remember when I was a Head Chainman for a civil engineering company that located all the manholes (coordinates and elevations for rims and flow lines) as part of a city-wide "Utility Survey." Today, instead of paying for (GPS state plane coordinate) positional data to be collected under the responsible charge of a LICENSED California Land Surveyor, it seems some "individual" UNLICENSED GIS "professionals" want to perform their own "GIS Data Collection" with their own "Real-time GPS Mapping Equipment."

In California, a Barber is "licensed" to practice cutting other peoples' hair by a State Board - not by a state college. That's the LAW. As one "individual" who has been Licensed by California to survey other peoples' land for over 20 years, I believe it is a poor argument for someone to suggest: IF an unlicensed "individual" chooses to not abide by the law, (think Section 8726 of the California LS Act), THEN somehow I am responsible because... I need to get a 4 year degree in Land Surveying.

Last year: a "licensed" doctor operated on my friend with a "robot" instead of a scalpel, our "licensed" dentist showed me a digital image of my wife's root canal instead of an x-ray, and our "licensed" tax attorney did our taxes with a computer program while we watched on our own monitor.

IF Licensed California Land Surveyors are going to survive the next 30 years of advancements in technology, THEN I believe we need to get a game plan so we can band together on what we have in common, not what makes us different.

Considering more than 100 years ago Land Surveyors were setting a pile of rocks in the dirt to mark (the position of) a boundary corner: I would suggest rather than arguing with each other about RTK and +/- .03' on a 3 inch brass cap, or blindly committing ourselves to a Professional Development "Certificate" Program, or pumping hundreds of thousands of dollars into a 4 year Land Surveying degree "Magic Bullet," maybe right now

would be a good time to start working with each other to develop solutions to the challenges we all face (before our profession slips into a coma and we can never recover from).

I have capitalized Land Surveyor about 1000 times in this article on purpose because I heard a rumor that the National Society of Professional Surveyors recently voted to endorse a "mandatory" 4-year degree in Land Surveying as a requirement for licensure, and apparently the NSPS also voted to take the LAND out of LAND SURVEYOR. I have to ask why taking "Land" away from "Surveyor" will help the "public" better understand how a Licensed California Land Surveyor will survey their land.

Over the last 30 years of my career as a Land Surveyor, one thing that has become very clear to me is this: the only people who really understand the value of what we do for a living and care about the future of our profession, are other Land Surveyors. I hate to have to say it, but if you are not an ACTIVE MEMBER of your local chapter of CLSA (the California LAND SURVEYORS Association), maybe right now would be a good time to start getting involved.

Grandpa Johnson would say, "Son, she may not be the best dancer - but she is the only girl in town."

## IT'S NOT OVER - UNTIL IT'S OVER

In closing, although I do not support the idea of "mandating" a 4 year degree in Land Surveying as a requirement to sit for the California LS Exam, I do believe that continuing (your) education at an accredited college will help make your work experience more productive and your life experience more meaningful. I expect the minimum education and experience requirements for the LS Exam will always be a subject for heated debate, however I will bet each of you a dollar we will soon see a multiple-choice California State LS Exam. I will bet each of you another dollar this new LS Exam will (eventually) be tailored to favor the success of the "politically correct" Licensed California Land Surveyor of the future, with a BS degree in: Land Surveying, Civil Engineering, or some hybrid variation of GIS "Geo-science."

30 years ago, working my way up the ladder of a survey crew helped me learn how to plan my work and accept responsibility for my part of what needed to be accomplished as part of a team. I still believe the right amount of on-the-job field experience creates a solid foundation for learning how to be a better decision maker, a better team leader, a better career surveyor, and a better Licensed California Land Surveyor.

I am grateful God gave me the opportunity to become Licensed California Land Surveyor # 6172, but I don't think I will have enough "daylight" left to finish up my 4 year degree in Land Surveying. It won't be long before I will be an old man stuck in a wheel chair, silently gazing out a little window at some nursing home. Some of my fondest memories will be experiences from my career as a Land Surveyor.

Grandpa Johnson would tell you, "Son, the opera is not over until the fat lady sings - but if you listen hard enough, I bet you can hear her warming up backstage." ■

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Space Launch Complex 3 on Vandenberg AFB. Pictured are James Walsh, LSIT and Justin Height, PLS.  
Submitted by: Justin Height, PLS.



Tim Case, PLS hard at work near Clovis, CA.  
Submitted by: Tim Case, PLS



## FOUR YEAR DEGREE DEBATE



By: Jerald P. "Jerry" Miller, PLS

*Jerry Miller has been the program coordinator for the Civil and Surveying Technology program at Santa Rosa Junior College since 1993. He is a graduate of California State University, Fresno, with a Bachelor of Science degree in Surveying and Photogrammetry. Jerry is also the Vice Chair of the Northern California Section, ACSM, and is an active member of the Sonoma County Chapter, CLSA. He is a frequent guest speaker for many professional engineering and surveying societies and organizations. Those fortunate enough to participate in his presentations, courses or PLS exam workshops enjoy his upbeat and humorous style.*

# Degree or No Degree... That is the Question!

The topic of a degree requirement for licensure has been debated, argued, discussed and written about *ad nauseam!* For as long as I can remember, the pro-degree and no-degree camps have defended their ideals with the fervor of a pro-life/pro-choice debate. Each has ample ammo, weapons and troops to support their beliefs and principles regarding this issue. I have been a long standing member of the "fence straddlers" on this issue. I have looked at both sides of the argument. I've listened intently to each "debater's" bait, and I'm willing to bite! I believe we should have a degree requirement for licensure, emphasis on "A" degree.

First of all, I should preface my remarks with the fact that I am one of those licensed professionals with a Bachelors degree in Surveying and Photogrammetry from *the Fresno State University* and I make my living as a full-time instructor at a California community college teaching Civil Engineering, Surveying and Geospatial Technology. Don't for a minute think that I'm feathering my bed being an educator and by requiring a degree it will help secure my employment. I fought for *the other team* for a long time. I was one of the few educators that said it wasn't necessary to have a degree to sit for licensure. Ours was a learned profession and one needed just as much practical experience as educational knowledge in obtaining one's "numbers!" However, I do think it is time for the profession to join the other 45 states and require a degree for licensure. Once again my emphasis is on "A" degree.

I have done some research on states that have a degree requirement. Many require a degree in Surveying or Geomatics to sit for the licensing exam. Some require a four-year degree in Surveying, Geomatics or a related discipline. Some differentiate between two-year and four-year degrees. No matter two or four-year degree, each have a number of years of responsible charge experience added in order to sit for licensing examination.

I was particularly intrigued with Connecticut's degree requirements. The board of registration for the "Constitution State" has classified their applicants based on type of education, degree and experience. Depending on your classification that determines the amount of responsible charge one must have to qualify to sit for licensure examination. They have requirements for graduate degree, four-year degree, two-year degree, education without the degree and even no education. All have a "sliding" scale for responsible charge experience in addition to the degree. I like this idea of a sliding scale for responsible charge experience. In fact

this idea of multiple options to licensure is exactly why I changed over to *the degree requiring side of the fence*. I'd like to expand on Connecticut's requirements. I firmly believe that the state of California should require all applicants to have a college degree in order to sit for the PLS exam. We are professionals and by the definition of professional, a degree should be required. Wikipedia has the following definition for a professional:

A **professional** is a member of a vocation founded upon specialized educational training. The word professional traditionally means a person who has **obtained a degree in a professional field**. In western nations, such as the United States, the term commonly describes **highly educated**, mostly salaried workers, who enjoy considerable work autonomy, a comfortable salary, and are commonly engaged in creative and intellectually challenging work. Less technically, it may also refer to a person having impressive competence in a particular activity.

In *Evidence and Procedures for Boundary Location*, the authors list the attributes of a professional. Two essential attributes are; "*Superior and distinct education in a field of knowledge and seeking continued education to maintain professional competency.*" This only furthers my point that a college education is an essential requirement for licensure.

California should adopt a classification system similar to Connecticut's. Require a four year degree and apply a sliding scale of responsible charge experience depending on the degree. Maybe something along these lines:

Degree	Major / Responsible Charge Experience	
Bachelors	Surveying/Geomatics	2 years
Bachelors	Engineering related discipline	3 years
Bachelors	Science Related discipline	4 years
Bachelors	Non-Science discipline	5 years
Associates	Surveying/Geomatics	4 years
Associates	Engineering related discipline	5 years
Associates	Science Related discipline	6 years
Associates	Non-Science discipline	7 years

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What I'm proposing is to require "A" college degree. Not just in Surveying or Geomatics, but any college degree. There are distinct benefits to those people who possess a college degree. The benefits of a college degree versus no college degree were discussed in an article by the University of Maryland, University College.

*"The best reason to go to college is to learn more about the world you live in. Getting a college degree is a career necessity in today's business world. Your career advancement should be easier because some job promotions require a college degree.*

*A college education will help you develop your skills in reasoning, tolerance, reflection, and communication. These skills will help you resolve the conflicts and solve crisis that come up in the course of a personal or professional life. A college education will also help you understand other people's viewpoints, and learn how to disagree sensibly.*

*A satisfied life depends upon the rational resolution of conflicts and crises. Of course, these critical skills can be developed without going to college, but the college environment has proven to be a good place to practice, learn and polish skills that will last you a lifetime."*

Wouldn't any of these benefits make for a better professional? Our professional image is only defined by what others perceive it to be. Look at any reference to professional. Doctors, Lawyers,

Engineers come up ALL the time when describing professionals. What do these professions have that we do not? Advanced education, a degree! They too are learned professions but more often than not, a college degree is mandatory for their licensure. Look around our own profession. We have colleagues from every walk of life. The educational accomplishments of our colleagues are a patch work quilt of disciplines. We have colleagues with degrees in business, mathematics, geography, geology, humanities, history, forestry, agriculture, law, computer science, engineering, **and** surveying. Two-year degrees, four-year degrees, master's degrees, EdD. and even the occasional PhD. We come from many different backgrounds with varied training and experiences. Did having these degrees make them better surveyors? That's debatable. However, you can't argue with the fact that a person gains additional knowledge, skills and abilities through the breadth of learning a college degree confers.

The profession of Surveying/Geomatics has changed. What we do and how we operate today is much different than our predecessors. We can (and should) look to the professionals in other countries around the world. All require degrees for licensure. We do so much more than measure things really accurately! We're not the "rope stretchers" of lore. Our profession has changed and will continue to change. Technological advances alone will continue to move us in different directions. Professional Surveyors in some European countries also have the added responsibility of land appraisal. What a novel idea! Who better to appraise the land than the person locating, describing and platting it?

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We need to look at what we do and how we serve the public. We complain about different professions “chipping away” at areas we traditionally held. I say hop on board or get out of the way! Let’s look at the world of mapping? Everyone wants information that is geographically located! Where am I? How do I get there? What will I find when I get there? What will happen if...? All these questions are presently being answered by people other than surveyors. Other people are gathering the data and preparing the information and we’re standing by watching. Why? Surveyors have tended to look the other way, thumb their nose’s at those doing this work. How many times have you heard, “my license won’t allow me to work like *they* do, it’s out of our purview, *they* don’t know what they’re doing, and besides we’re the only ones that can make maps!” Really?

The last part of this discussion and what really got me thinking about the degree requirement issue was with the Surveying/Geomatics degree. What is a Surveying/Geomatics degree? What is critical curriculum for a degree in Surveying/Geomatics? I’ll go one step further and state that Surveying/Geomatics may be sliding farther away from Engineering and more into an Earth and Space Science discipline. We’re aligned with engineering primarily because of our measurement capabilities. All the other “stuff” is barely engineering related. Let’s take a look at the Bachelor of Science degree in Geomatics Engineering.

***You need 129 semester units to gain a degree in Geomatics Engineering. Here are the typical courses required:***

#### **First Semester**

English requirement  
Humanities requirement  
Introduction to Geomatics Engineering  
Engineering Surveying w/Lab  
Computer-Aided Mapping (2 units)  
Mathematical Analysis I – Calculus I

#### **Second Semester**

Communications  
Municipal Surveying w/Lab  
Microcomputers in Engineering  
Mathematical Analysis II – Calculus II  
Physics - Mechanics and Wave Motion w/Lab

#### **Third Semester**

History Requirement  
Route and Construction Surveying  
Chemistry -Intro General Chemistry  
Mathematical Analysis III – Calculus III  
Physics - Electricity and Magnetism

#### **Fourth Semester**

Life Sciences Requirement  
Adjustment Computations  
Land Surveying  
Engineering Science  
Physics - Light and Modern Physics  
Philosophy

#### **Fifth Semester**

American Government Requirement  
Social Science Requirement  
Stereo-Photogrammetry  
Advanced Adjustment Computations  
Boundary Control and Legal Principles  
Introduction to GIS

#### **Sixth Semester**

Geodetic Surveying  
Geodesy  
Analytical Photogrammetry  
Digital Mapping  
Political Science - International Politics

#### **Seventh Semester**

Satellite Geodesy  
Physical Geology  
Two Major Requirement Technical Courses

#### **Eighth Semester**

Subdivision Design  
Senior Project  
Project Design  
Philosophy - Contemporary Conflicts of Morals  
Two Major Requirement Technical Courses

***You need 60 +/- semester units to receive an associate’s degree in Surveying Technology. Here are the typical courses required:***

#### **First Semester**

Basic Drafting  
Intro to AutoCAD  
College Algebra  
Introduction to Plane Surveying w/Lab  
Non-technical Skills for Technicians  
English Requirement

#### **Second Semester**

Introduction to GIS w/Lab  
Trigonometry  
Plane Surveying Applications w/Lab  
Introduction to Civil Engineering CAD  
Global Perspective Requirement

#### **Third Semester 3**

Route Surveying & Design w/Lab  
Introduction to GPS w/Lab  
Evidence & Procedures for Boundary Determination  
Natural Sciences Requirement  
Social & Behavior Sciences Requirement

#### **Fourth Semester 4**

Advanced GPS Applications w/Lab  
Boundary Control & Legal Principles  
Discipline Elective  
American Cultures Requirement  
Humanities Requirements

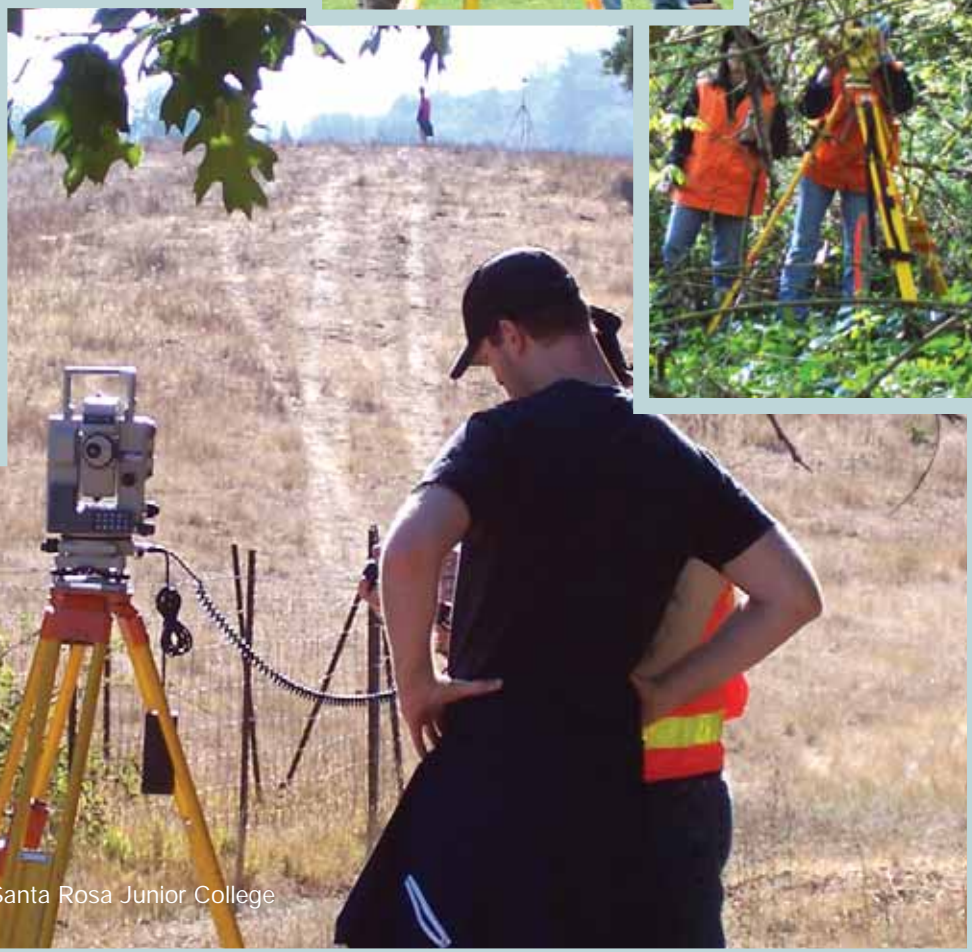
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After looking at these two options, what would you change? What is critical curriculum for a degree in Surveying/Geomatics? Where are the courses in statistics, contract law, business, forestry, real estate, urban and regional planning? What about cartography, programming, remote sensing, and graphics? If we add those courses what do we take out? Sit down for a minute and write down what skill set you utilize when performing your job? How does it fit in with what we are currently offering?

California is gifted to have 10 universities, 23 state universities, 112 community colleges and just as many private institutions spread north to south and east to west. You don't have to look far to find an educational institution near you. Granted not all have four year degrees in Surveying/Geomatics. But all offer a course of study that would benefit the profession. Now is the time to hop on board with the rest of the US and require "A" degree. Let's be proactive for once in our existence instead of reactive! Let's develop standards and requirements that meet the needs of our profession. I truly believe the grass is greener on my side of the fence. "A" college degree is a necessary requirement for licensing our future professionals.



Surveying Students from Santa Rosa Junior College



*Dr. Crossfield has completed 27 years at Fresno State. He coordinated the Geomatics Engineering Program for twenty years and served as department chair for seven years during that span. He served as an EAC-ABET Team chair for six years, President of AAGS for one year, President of NCS-ACSM for two years and currently serves as a board member of the Surveying and Geomatics Educators Society (SaGES).*

# Revisiting the Four Year Surveying Degree Requirement Debate

## INTRODUCTION

California State University, Fresno held its most recent Commencement on Saturday May 22, 2011, marking the 100<sup>th</sup> year for the institution. This also marked the 40<sup>th</sup> graduating class for the nation's first 4-year surveying degree program. Slightly more than seven hundred Surveying and Photogrammetry, Surveying Engineering and Geomatics Engineering students have completed their degree at Fresno. More than 90% of graduates (most of whom obtain a professional license) work in the surveying and mapping industry in the private, public or utility sector, mostly in California. Almost every graduate obtains full time employment after graduation, even in the worst recession since the Great Depression. More than fifty graduates have entered advanced degree programs. Many have gone on to teach surveying and mapping in a number of meaningful ways at a wide array of venues. The program at Fresno State continues to positively impact the surveying and mapping profession in California. But, does this mean that a 4-year degree should be mandatory before licensure? The following paragraphs will discuss The Person, The Worst Case Scenario, The Education, The Employer and The Profession. Finally, a strong recommendation is presented.

## THE PERSON

A typical argument against the mandatory four year degree goes as follows: "I'm 35 years old with a spouse and kids and a house payment to make. I can't go to Fresno." I suggest that this person used a convenient excuse. This person is lost to formal education until or unless their attitude changes. But there is an opposite side to every issue. The enthusiastic, motivated and energetic people that could make up our discipline needs always find a way to make things happen.

Consider Danny Gregory with a wife and four children, moving from Riverside, enrolling in and graduating from Fresno State and going on the lead the surveying team at

CAL FIRE. Kyle Snow closed his surveying business in Lancaster, moved to Fresno for his degree and then moved on to Ohio State for his graduate work. Kyle now develops GPS Software. Barbara Littell came from Montana after military duty, enrolled, graduated and went on to reset the South Pole using GPS and later become President of the American Association of Geodetic Surveying. Chris Curtis, came to Fresno from Arcata via Japan with a wife and two children to get his degree. He now owns his own firm in Sacramento. Dave Biswanger, after twenty years tending bar in Monterey, came to Fresno to chair the Conference, excel in his studies and start his Masters degree. Carl Magagnosc graduated from the program to a job with the BLM, after essentially commuting from Santa Barbara for almost three years. Two current students (from Glendale and Orange County) commute to Fresno on Amtrack. They all found a way to get it done. These are the kind of people that employers should hire, because they do not make excuses, but rather take the initiative, finding a way to succeed.

## THE WORST CASE SCENARIO

A surveyor has agreed to serve as an expert witness in the courtroom for the defendant in a property boundary dispute. The judge, prosecution and defense attorneys, and opposing expert witness all graduated from college with degrees connected to their respective careers. Upon taking the stand, the surveyor is asked by the opposing attorney, "What are your educational credentials?" The surveyor responds that he briefly attended Cherry Vale Community College for one and a half semesters, but quit to start work with his current employer, ACME Surveying. The Judge, both attorneys and almost everyone else in the courtroom, immediately realize that this surveyor does not measure up professionally. They laugh inwardly to themselves and know that the surveyor has little credibility. The case is lost. But it doesn't have to end that way.

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## THE EDUCATION

Currently, one hundred and twenty nine semester units comprise our degree program of study. Half are program specific. The coursework (with many laboratories) prepares each graduate for the work environment. Consider the extensive array of sequential boundary surveying courses: Municipal Surveying (GME 16), Land Surveying (GME 50), Boundary Control and Legal Principles (GME 151), property descriptions (GME 152), Advanced Boundary (GME 153) and Subdivision Design (GME 159). The GME 50 course is unique in that the students get to practice PLSS layout and resurvey (in the foothills near Fresno) using a (1:10) scale model township. Nobody else in the United States gets this kind of realistic field experience in school. The Geodetic component is substantial. Here seniors design and conduct GPS network observations, process the data and learn precisely how to achieve specified accuracy standards. Calculus and computer software coursework enables the students to understand how the error budget of a precise measurement system develops. Many graduates know how to fix and/or write software. This skill set really helps an organization lucky enough to get such a qualified graduate. Finally, a comprehensive array of student organizations, the Conference and the Fore Sight! Magazine provides serious leadership opportunities for most students. Their enhanced leadership skills become an instant asset for their employer. Graduates are prepared to work in a wide variety of venues, having been enabled for success. Surveying and mapping workers who do not get a degree miss these essential subjects and experiences and thus are less prepared to help lead us into the future.

## THE EMPLOYER

New hires without academic experience may be cheaper at first, from an employer perspective. But how long is that learning curve and how productive is a person who initially has little or no depth in the subject?

However, let's consider an alternate perspective where we consider how to motivate, enable and empower the person just hired. The employer would better serve the new employee by requiring them to have a four year degree. Now the employee has immediate potential, a shorter training period is required and that employee will likely enhance the competitive edge for that organization very quickly. Usually if you want the best you have to get the best. Odds are that the only way to regularly get the best new talent is to hire a new or recent graduate. Of course there is more to it than that. Hiring students during the summer and winter breaks provides the employer an opportunity to evaluate the worker and the employee a chance to evaluate the organization. This approach works well when implemented.

## THE PROFESSION

Beginning over 25 years ago, many prominent surveyors in ACSM began energetic work to create NSPS and to restructure the parent organization. Concurrently, an effort

by NSPS and many state affiliates to embrace the word "Profession" grew. The way in which this was done was to make sure that the word "Profession" was used extensively in organizational literature and media. I do **NOT** believe that the effort was designed to effectively numb the outsider into believing that the appellation must be true. Rather, there must be more to "Profession" than that. The Longman Dictionary of Contemporary English (9<sup>th</sup> Edition) provides the following definition for Profession: "A form of employment, especially one that is possible only for an educated person and after training . . . is respected by society as honorable."

There are many more aspects to a profession than just the word "Profession." Other groups demonstrate their professional nature in many of the following ways:

- Membership in professional organizations at one or more levels
- Regularly attending meetings and conferences at one or more levels
- Regularly read peer reviewed professional journals in addition to trade magazines
- Periodically publish journal and/or magazine articles about practical and theoretical activities thereby helping the profession to grow and prosper
- Guide younger workers
- Pay for organizational membership out of your own pocket, even if your employer does not pay for this, because it's the right thing to do,
- Consider the health and welfare of the public as your primary responsibility
- Embrace mandatory continuing education
- Embrace a mandatory 4-year degree in surveying for licensure to be enforced four years, i.e. after the law is enacted.

When the items listed above describe the individual and collective membership of CLSA, we will have a land surveying profession in this state. Until then, "Profession," is just a word. A mandatory four year degree in surveying is the only way to ensure that our discipline has a chance of becoming a true profession in the eyes of everyone else.

## THE CONCLUSION

We await a fresh influx of new students dedicated to a professional career managing all aspects of the Global Geospatial Infrastructure. Our exceptional academic staff members provide a rigorous land surveying, geodetic, imaging and mapping curriculum designed to prepare tomorrow's surveyor today. The future is ours if we are willing to embrace it. ■



FOUR YEAR DEGREE  
**DEBATE**



By: Allan Ng, PLS, MSCE

*Allan is a full time lecturer in civil engineering department for Cal Poly Pomona since 2009, responsible for geospatial engineering classes such as elementary and advance surveying, geodesy and GPS, CAD and engineering economics. He has been involved in the undergraduate admission for the past 2 years. Allan has been involved in the CLSA since 2005; he is currently the faculty advisor of Cal Poly Pomona CLSA student chapter and LA chapter website chair. He graduated with MSCE in Geomatics from Purdue University and is licensed to survey in California.*

## Enhancing the Quality of Our Profession Through Education

According to the California Board for Professional Engineers, Land Surveyors, and Geologists, the professional land surveying exam is a test for candidates to demonstrate minimum competency. As a new licensee (since 2008) myself, I am not an expert in all tested areas, yet competent in subjects that I practice and teach, as well as acquiring new knowledge every day. Therefore, I define the discussion topic as “How can we help examinees pass the professional land surveying exam, without degrading the quality of our profession.”

As a Land Surveyor and educator in the state of California, I have to agree, the 4-year surveyor degree requirement alone will not be the answer to improve quality of our future surveyors. It will involve industry’s cooperation to make candidates qualifying experience worthwhile and applicable in the exam. Hence, I strongly recommend candidates should hold a 4-year surveying degree from any ABET accredited surveying and geomatics engineering program, before one is eligible for the professional land surveyor exam. It will provide two distinct advantages for those taking the PLS exam: complementary knowledge to land surveying and test preparation skills.

The current PLS exam application doesn’t request references to define the area of practice where the examinee has gained experience. Instead, it is an honor system for candidate to report their “qualifying experience,” supposedly a broad understanding of land surveying. However, this is sometimes not an achievable option. For example a land surveying company might utilize GPS to set photogrammetric controls, but not necessarily be doing photogrammetry due to cost-effective reasons and other constraints. Therefore,

*Continued on next page*

Surveying Students at Cal Poly Pomona

the Land Surveyor in Training (LSIT) might be ready for one topic of the exam, but weak on others. Most surveyors will enroll in a review course to “refresh” their knowledge for the exam. However, if candidates in a review course are learning theories like photogrammetry, error analysis, geodesy, GPS and GIS for the first time, I doubt the effectiveness of such a “review.” Although the PLS exam is testing for minimum competency, our future surveyors should possess a broad knowledge within the field of land surveying, and then may become an expert in specific areas (e.g. water boundary, GPS and geodesy, construction surveying or 3D scanning and modeling, etc). Such knowledge is also important for outreach and publicity. I totally agree with Greg Sebourn’s article<sup>i</sup>. One of the top priorities is to change our public image from “guy behind the tripod in the street” to a professional specializing in “detailed study or inspection, as by gathering information through observations, measurements in the field, questionnaires, or research of legal instruments, and data analysis in the support of planning, designing, and establishing of property boundaries.”<sup>ii</sup> “This is where a 4-year surveying degree will be beneficial to the industry, besides general education, a wide spectrum of surveying courses are taught in an ABET accredited institution, such as:

- **Computer-aided drafting**
- **Plane and route surveying**
- **Survey computation and adjustment**
- **Photogrammetry**
- **GIS**
- **State plane coordinate system**
- **Geodesy and GPS**
- **3D mapping and modeling**
- **Boundary and legal principles**
- **Public land survey system**
- **Subdivision Design**

Exposure to such curriculum will not guarantee passing of the PLS exam, but it will provide a solid background to prepare students for the profession. After theories have been understood in a classroom environment, work experience will then complement and reinforce the education.

When students are going through a 4-year surveying curriculum, not only will they learn selected major topics, but the rigorous program of study and class scheduling will nurture their time management skills, studying and test taking strategies. Two ideas usually come to my mind when discussing test preparation. First, how to study and organize reference materials. Often you see examinees hauling boxes of reference materials to the test center, which is not feasible for referencing in the given time. A method I

learnt during school was to focus on the quality, not quantity, of my reference material. For the PLS exam, I brought only three reference books to the test, Brown's Boundary Control and Legal Principles; Manual of Surveying Instructions, 1973 and most importantly, the manual from review classes. I became familiar with all references and labeled with post-it tags, thus knowing exactly where to locate what I needed. Second, identifying the “low hanging fruit.” With the limited test time for each exam, the examinee has to understand the objective – pass the exam! One tactic I learnt from school is to scan the exam, answer questions that I am confident about and skip questions that I am not. I sincerely hope this is what everyone is doing. I have heard too many stories about not having enough time to finish because he or she was stuck in one or few question(s). NCEES exams are standardized multiple choices test, giving about 4 minutes per question; therefore it requires training and discipline to implement this approach. Time management, studying and test taking strategies are the second most important factors, other than knowledge of the test subject, and a college degree is the best way to gain such skill.

A bachelor degree should groom students with the right attitude facing the evolving world. Understanding the diploma validates one’s ability to discover and apply materials in a classroom setting, yet learning is a lifelong motivation. A bachelor degree in any major might provide a platform for test preparation skills, but the key to succeed is the knowledge one acquired from educational and practical experience. Therefore any 4-year degree will be inferior to a surveying degree, but it should still provide some qualifying value when the discussion is passing the PLS exam.

In closing, I would like reiterate a mandatory 4-year surveying and geomatics engineering requirement will not be the sole solution for higher passing rate or better surveying practice, in fact civil engineering licensure doesn’t require a 4-year degree for taking the exam<sup>iii</sup>, but it will be a big first step toward the right direction. Mentors (supervisors) should commit to providing a breadth of “qualifying experience,” fostering our future surveyors. Realizing I am asking employers to facilitate a lot while trying to make a profit, but if we don’t have a vision to advance our profession, someone else might intervene. I believe our job is to promote technical competency and social responsibility at the highest standards of the profession. The last thing I want to see is having non-competent civil engineers and surveyors practice land surveying, like case studies we found on the board’s accusations & disciplinary decisions<sup>iv</sup>. ■

<sup>i</sup> California Surveyor 165, A New Approach, page 20-22

<sup>ii</sup> Land surveying definition per American Congress on Surveying & Mapping

<sup>iii</sup> 2011 Board Rules (16 CCR §§424)

<sup>iv</sup> [http://www.pels.ca.gov/consumers/acc-disc\\_list.shtml](http://www.pels.ca.gov/consumers/acc-disc_list.shtml) , Accusations & Disciplinary Decisions, California board for professional engineers, land surveyors, and geologists



# Postcards



"A Surveyor's Picnic." Submitted by Anne Hoppe, PLS.

## Index To Advertisers

Allen Precision Equipment	17
Berntsen International, Inc	19
California Property Specialists, Inc.	15
California Surveying & Drafting	48
Cartwright Aerial Surveys, Inc	40
Central Coast Aerial Mapping, Inc.	23
Engineering Supply Company	35
First American Data Tree	31
Leica Geosystems Solutions Center	2/ 39
Lewis & Lewis	30
Office Depot (Member Benefit)	4
Reese Water & Land Surveying	41
Santiago Canyon College	7
Sokkia	11
Subdivision Map Act Seminar	33
Total Merchant Savings (Member Benefit)	45
Trimble	3
Tri State Photogrammetry, Ltd	43
Vista International	21

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## FOUR YEAR DEGREE DEBATE



By: Ian Wilson, PLS

**Ian Wilson, PLS** is the Director of Survey for Cardno WRG, Inc. in Roseville, CA. He started surveying in 1988 in Southern California and is now enjoying life in Northern California. He is licensed in California and Nevada and has specialized in boundary, topographic and Land Title surveys. His expert witness practice in boundary and easement issues is growing. Ian has been a member of CLSA since 1988.

# Educational Requirements for PLS Licensure Across the United States

The following table lists educational requirements for licensure (and requirements for continuing education) across the United States. The information was gathered from websites of state licensing boards and is presented here to facilitate discussion regarding educational requirements for California. Many states have tiered systems that reduce qualifying experience requirements for candidates who have successfully completed two and four year degree programs. Some states have specific course requirements for those who have not completed a degree in land surveying or geomatics. Most states require some level of continuing education for land surveyors. While many states allow licensees to determine the classes and seminars taken, some allow units provided only by pre-approved vendors in specific courses. The average level of CE units is 12.5 units per year. This varies greatly as the standard deviation is over 3 units/year. The length of the renewal period averages 1.8 years ± 0.4 years. The maximum length is 3 years, in New York. ■

State	Degree Requirement	Experience (# of Years)				Continuing Education				Notes
		Survey	Non-Survey	Two-Year	None	REQ	Period	Units	Units/Year	
AL	YES	4	8	N	N	YES	1	15	15	
AK	TIERED	3	4	6	N	YES	2	30	15	
AR	TIERED	2	2	4	6	YES	1	15	15	
AZ	TIERED	4	-	6	8	NO				
CA	NO	-	-	-	-	NO				
CO	TIERED	2	4	6	10	NO				ABOUT TO CHANGE
CT	TIERED	3	3	6	N	NO				
DE	TIERED	0	2	2	5.5	YES	2	24	12	
FL	TIERED	4	6	N	N	YES	2	24	12	BOARD APPROVES PROVIDERS & REQUIRES ROSTERS FOR VERIFICATION
GA	TIERED	3		6	8	YES	2	15	7.5	SUBJECT REQUIREMENTS
HI	TIERED	3		7	11	YES				
ID	TIERED	4	4	N	N	YES	2	30	15	
IL		4	4	N	N	YES	2	20	10	COURSE REQUIREMENTS
IN	TIERED	4	4	6	8	YES	2	24	12	
IA	NO					YES	2	30	15	COURSE REQUIREMENTS
KS	TIERED	4	8	8	8	YES	2	30	15	
KY	TIERED	3	4	N	N	YES	1	8	8	COURSE REQUIREMENTS
LA						YES				
ME	TIERED	2	2	4	9	YES	2	32	16	
MD	TIERED	2			12	YES	2	24	12	
MA	TIERED	3	8	N	12	YES	2			
MI	YES	4	N	N	N	YES				
MN	TIERED	6000hrs	7120hrs	N	N	YES	2	24	12	
MS	TIERED	4	6	7	12	YES	1	12	12	
MO	NO	20	20	20	20	YES	2	20	10	COURSE REQUIREMENTS
MT	TIERED	3	4	6	10	YES	2	30	15	
NE	TIERED	6	8	8	N	YES	2	30	15	
NV	YES	4	N	N	N	YES	2	30	15	
NH	NO	6	6	6	6	YES	2	30	15	
NJ	YES	3	N	N	N	YES	2	36	18	
NM	TIERED	4	8	N	N	YES	2	30	15	
NY	TIERED	4	-	6	8	YES	3	24	8	
NC	TIERED	2	-	4	7	YES	1	15	15	
ND	TIERED	4	-	-	8	YES	2	30	15	COURSE REQUIREMENTS
OH	YES	4	-	-	-	YES	1	15	15	
OK	TIERED	4	6	6	9	YES	2	30	15	
OR		4	-	-	-	YES	2	30	15	
PA	TIERED	4/0	-	4/0	4/6	YES	2	24	12	
RI	TIERED	4/0	-	4/2	4/4	YES	2	20	10	
SC						YES	2	30	15	
SD	TIERED	8	8	9	11	YES	2	30	15	
TN	TIERED	2	2		10	YES	2	15	7.5	
TX						YES	1	12	12	
UT	YES	4	-	-	-	YES	2	24	12	
VT	TIERED	2	3		4	YES	2	10	5	
VA						YES	2	16	8	
WA	TIERED	4	-	6	8	YES	2	15	7.5	
WV	TIERED	6	7	7.5	8	YES	1	8	8	SPECIFIC REQUIREMENTS FOR COURSE WORK IN ANY FOUR YEAR PERIOD
WI	TIERED	2		4	10	YES	2	20	10	
WY	TIERED	3	4	-	-	YES	2	30	15	
						Average	1.8	22.9	12.5	
						SD	0.4	7.6	3.1	



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- Certificates of Compliance, Lot Line Adjustments, Contiguity, Remainder Parcels
- Exemptions and Exceptions under the Map Act
- Life of Tentative Map
- Getting the most out of Vested Rights (including Vesting Maps, Development Agreements and Common Law Vesting)
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- Creative mapping approaches
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## RISK MANAGEMENT FOR LAND SURVEYORS

# What About You?

## Personal Risk Management-Part II-Homeowners and Auto

As promised in my last article (California Surveyor Spring 2011), here's some detailed information you can use when reviewing and analyzing your homeowners and personal auto insurance coverage.

Remember this: Cheap or inadequate insurance is not necessarily cost-effective in the long run, especially when you have a claim. This also applies to your business insurance. Buy quality.

### Homeowners Coverage

This is like a business package for your home. But remember most homeowners policies do not cover your business exposure (some companies might give you a special endorsement for business, but you have to ask) so you'll probably need a business package policy if you work from your home.

Homeowner coverage includes real property including dwelling and additional structures, personal property, personal liability, and workers compensation for domestic help and babysitters.

You need to make sure you have adequate replacement coverage for your dwelling. A proper valuation is needed using cost per square foot. Your personal property including computers, jewelry, silverware, guns, antiques etc. has limitations so you probably need to schedule them with higher limits. Ordinance and law coverage that covers building codes may be limited.

Things like earthquake and flood are not covered, so you'll need separate policies if you want this coverage. Boats, trailers, and other recreational vehicles may not be covered.

So what is covered? A lot. But you have to read your policy to find out.

Companies use different policy forms

and endorsements. HO3 provides replacement cost for your dwelling and actual cash value (depreciated cost) for your personal property and HO5 gives you replacement cost for real and personal property.

Like your business insurance policy, some homeowners policies are better than others.

Be sure to get discounts like earthquake retrofits, new home, alarms, fire extinguishers, and multi-policy.

### Personal Automobile Coverage

Limits, Limits, Limits. - Most people do not have high enough limits on their auto insurance. \$15/30,000?? Imagine hitting a Ferrari or a school bus full of children. You should have at least \$500,000 or \$1million and an umbrella on top of that in this modern, high-cost, litigious society we live in and pray you never have an accident.

So what else should you think about for your auto insurance besides higher limits?

Higher deductible can reduce your premiums. If you buy your auto insurance from the same company that writes your homeowners policy, you should get a good discount-up to 15-20%. Save a little money by deleting physical damage from older vehicles that don't have high value.

Buy rental reimbursement and towing coverage unless you are a member of an auto club like Triple A. Be sure to tell your insurer or broker about any special sound or telephone equipment that needs to be insured along with custom equipment. Report all drivers, auto use and miles driven. In other words, paint an accurate picture so if you have an accident, you'll get a favorable claim settlement. Remember, your vehicle claim will be settled at actual cash value, so you'll probably be disap-

pointed anyway unless you bought replacement or lease or loan gap coverage for your new vehicle. Report any antique or classic autos you own, along with recreational vehicles and trailers. Because there are so many unlicensed and illegal drivers on our California highways, be sure to buy uninsured and underinsured motorists coverage. You need non-owned auto exposure for yourself and others. If you drive to Mexico you'll need a separate policy.

Get all the discounts you can, like good student, senior, safe driving, etc.. Avoid speeding tickets and other traffic violations that increase your insurance premiums.

### Umbrellas

This is a policy that sits over your homeowners and auto policy and provides higher limits up to \$1 or \$2 million or more. Buy one. ■

### Zurich Stops Writing Professional Liability for Firms Under \$5 Million Revenue

Zurich has withdrawn from the error and omission (E&O) market for Land Surveying and Engineering firms with revenues under \$5 million. If you are insured by Zurich, under the CLSA program you will be getting a letter indicating they will not be renewing your coverage.

There is no need to worry. The CLSA insurance program through Vista International Insurance Brokers has access to many top rated and competitive markets writing Professional Liability (E&O) coverage for CLSA members.

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# Positioning Using GPS and CORS Part 2

*In Part I we discussed CGPS stations and what types of GPS survey may benefit from using CGPS stations. In this Part II we discuss how to process your GPS data with CGPS data, using online services.*

## A WORD (OR TWO) ABOUT USING ONLINE POSITION PROCESSING UTILITIES

Online processing certainly is quick and easy and you don't have to participate in any analysis of just how good your GPS observations are - and therein lies a problem. Understanding the models used, the results, reference frame(s) and epoch(s) for the positions that are magically emailed to you will serve you well.

The more you know, the better off you are when it comes to someone else (or no one else) doing your GPS processing for you. The purpose of this article is to make you aware these tools exist and an introduction on how to use them if you choose to do so. It is up to you, the surveyor, to determine if these are right for your application and project needs.

## PART II – USING ONLINE CORS PROCESSING UTILITIES

There are a number of services that provide the ability to compute a position based on the receiver data files you submit. These services vary in the method for processing, the datum and epoch options and the final report. They all return the information via email and usually take less than 10 minutes to provide a result, depending on number of submittals in the queue. This article is going to discuss the details of processing for three of these on-line programs, OPUS, CSRS-PPP, and SCOUT.

It is not the intent or scope of this series to discuss concepts of datums, GPS vector solutions, geodesy, or error theory.

*Note: All the following instructions are based on using a Microsoft Windows™ operating system. If you are using a MAC or UNIX system, you must know the equivalent command structure in your operating system.*

## METHOD A - OPUS (NGS "ONLINE POSITIONING USER SERVICE")

The current version of OPUS determines the position of a single point with data from a dual frequency receiver. NGS, as of this writing, has created a beta version "OPUS-Projects" option, which will allow solutions using multiple stations over multiple days. OPUS is not the only online positioning service, but it is the one most likely used by surveyors in the U.S. It is limited to using only NGS CORS sites, and they may be a significant distance away from your receiver (50km or more). It claims potential centimeter (0.03 ft) accuracies at the one-sigma (s) level, under ideal conditions. California Department of Transportation (Caltrans) has indicated that OPUS does not meet their specifications for GPS surveys.

OPUS currently has two processing options: OPUS-RS (Rapid Static) for time spans of 15 minutes to 2 hours and OPUS-S (STATIC) for 2 hours to 48

hours. OPUS-RS uses three to nine CORS but no more than 250 km from your site for its solution. In addition your site must be no more than 50 km outside of the boundary created by the exterior CORS. This means some areas in the U.S. cannot use OPUS-RS, but that is not a problem in California. OPUS-S uses the three best CORS stations, based on distance from your site, common satellite visibility and sufficient data for the time period. OPUS uses meters for all measurement values, including the values you must provide, with the exception of latitude and longitude which units are degrees, minutes and seconds.

### STEP 1 - Be prepared

Before you get on line have the necessary information ready for processing:

- Make sure your GPS observation files are in RINEX format as covered in Part I of this article
- Know your antenna type or model from NGS Antenna Calibration list
- Know your antenna height in meters

*Note: The antenna model and antenna height do not have to be embedded in the RINEX file as the prompts later override the RINEX data header information.*

### STEP 2 - Start OPUS

To start OPUS, go to the NGS website and select OPUS from the list on the left side or go directly to <http://www.ngs.noaa.gov/OPUS/>.

The screenshot shows the OPUS web interface. At the top, it says 'Tie your GPS observation to the National Spatial Reference System. What is OPUS? FAQs'. Below this is an empty text input field. A red asterisk indicates a required field: '\* Email address - your solution will be sent here.' Below the email field is a 'Browse...' button. Another red asterisk indicates a required field: '\* Data file of dual-frequency GPS observations. sample'. Below the data file field is a dropdown menu currently set to 'NONE' with the text 'no antenna selected'. A red asterisk indicates a required field: '\* Antenna type - choosing wrong may degrade your accuracy.' Below the dropdown is a text input field with '0.0' and the text 'meters above your mark.' Another red asterisk indicates a required field: '\* Antenna height of your antenna's reference point.' Below the height field is an 'Options' button with the text 'to customize your solution.' At the bottom, there are two buttons: 'Upload to Rapid-Static' (for data > 15 min. < 2 hrs.) and 'Upload to Static' (for data > 2 hrs. < 48 hrs.). A red asterisk at the bottom indicates a required field: '\* required fields We may use your data for internal evaluations of OPUS use, accuracy, or related research.'

Figure 1. OPUS Opening Screen

*Continued on next page*

### STEP 3 - Enter the data OPUS requires

- a. Enter in your email address. The results are emailed to you, so it is critical that this address is correct.
- b. Attach your RINEX data file. BROWSE to your GPS observations file in RINEX format on your computer or server.
- c. Enter your antenna type. Antenna type has a pull down list showing all the antennas on the NGS calibration list. If your antenna is not on the list, you are out of luck, as each antenna has different APC offsets (both horizontal and vertical) and different "dynamic" offsets dependent on elevation of a particular satellite.
- d. Add your antenna height. Enter in your vertical antenna height from the mark to the ARP in meters.

### STEP 4 - Select the process method

- a. Choose a processor. If your observation time was less than two hours you will select "Upload to RAPID STATIC". If it was two hours or longer you will select "Upload to STATIC". Once you select the method, your RINEX observation file will be uploaded and you will be presented with a summary sheet, showing what was submitted. Just sit back, imagine the Jeopardy theme song playing while you wait for the magical position to be emailed to you.

*Note: The OPUS Options button allows for overrides on default selections, such as which State Plane Zone, CORS sites to use or exclude, or which geoid model to use. An extended output can be selected, but for general practice you do not need the extended output, with the exception of getting state plane coordinate values in feet at the end of the report. A profile can be set up, so that your email address will implement selected options as a default.*

### STEP 5 - Review the results

There are two possible responses when you receive the email from OPUS. The first is a FAILED PROCESS, the second is a SUCCESSFUL PROCESS. Usually an email will return within 10 minutes, although an almost immediate email usually indicates the process failed. The reason for failure will be shown, however, the reasons are not always clear.

Response A: FAILED PROCESS. There can be a number of reasons for a failed process (or so we have been told). A common one is impatience. OPUS indicates a solution may be found using an rapid or ultra-rapid ephemeris in as little as two hours after the data were collected. Experience shows that waiting at least overnight is advised as the verified orbits (precise ephemeris) for the satellites take longer to compute and is not immediately available.

Sometimes your uploaded file format may be the problem. If you submitted your proprietary observation files, converting to RINEX may solve the problem.

Sometimes your RINEX files may be corrupted and you just will not get a solution.

If you do not get an email response, try reprocessing and verify your email. Part III of this article covers processing CCGPS RINEX data yourself.

Response B: SUCCESSFUL PROCESS. The results sheet for RAPID STATIC and STATIC submittals will be a little different, however, the basic information is the same. Currently, the results show positions (latitude & longitude and Earth Centered Earth Fixed coordinates) on two datums: NAD 83 (CORS96 Adjustment) with an epoch of 2002.00; and ITRF00 with an epoch

date the same as that of the survey. In addition, UTM coordinates and State Plane Coordinates are provided (in meters). The State Plane Coordinates are based on the NAD83 CORS96 values. The RAPID STATIC report will provide standard deviations for each value, while the STATIC report will provide peak to peak errors.

*Peak to peak* error shown on the OPUS-S report is the difference in the solution from each of the three CORS used to determine the position of your receiver. This is a direct indicator of the potential error in your solution.

The *standard deviation* error shown on the OPUS-RS report is the statistical results of the simultaneous solution used to determine the position. Generally these standard deviation values are "optimistic" meaning they make your survey look better than it really is.

For more information on the process OPUS uses and the accuracies that can be achieved using OPUS the authors suggest the following articles:

T. Soler, P. Michalak, N.D. Weston, R.A. Snay & R.H. Foote (2006). "Accuracy of OPUS solutions for 1- to 4-h observing sessions." *GPS Solutions*, Vol.10, No. 1: 45-55.

Martin, D. (2007). "Geodetic connections. OPUS Rapid Static." *The American Surveyor*, Vol.4, No.3: 44, 46-48

## METHOD B - PPP (CANADIAN SPATIAL REFERENCE SYSTEM "PRECISE POINT POSITIONING")

You ask, Why would anyone in California would care about using a Canadian on-line service? Good question. We are sure the question does not stem from a bias toward Canadians, but more from a concern about the distance from Canada and its control system. We include PPP to make the reader aware of what services are available. Also this service uses CGPS sites other than CORS for its solution. One particular advantage may be confirmation of results from OPUS or other online processing utilities.

The process that PPP uses to establish the positions suggests at least one hour of observation data, but it will accept 30 minutes of data.

### STEP 1 - Be prepared

Before you get online, have the necessary information ready for processing:

- a. Make sure your GPS observation files are in RINEX format
- b. Know your antenna type or model from the IGS antenna list

*Note: According to the user manual documentation, PPP uses an antenna model naming convention from the International GNSS Service (IGS) that may differ from, or not include models from, the NGS antenna calibration list. Be aware of this and the resultant changes to ellipsoidal heights if your antenna is not supported by PPP. If your summary file does not list the model you embedded in your RINEX file, it will not know the offset from the Antenna Reference Point (ARP) to the Antenna Phase Center (APC).*

- c. Know your antenna height in meters

*Note: PPP only accepts RINEX data. You must have the information under b. and c. above embedded in your RINEX file. Any other offsets embedded in the RINEX file header are ignored. Since data in RINEX files are field delineated, be careful not to put data in fields that will interfere with reading the RINEX file properly.*

Continued on next page

OBSERVATION DATA					G (GPS)		RINEX VERSION / TYPE	
2	RINEXDLL.DLL V2.60	BRAE			17 - DEC - 10	08:10	PGM / RUN BY / DATE	
	For Testing Purposes Only						COMMENT	
0001							MARKER NAME	
0001							MARKER NUMBER	
BRAE128		BRAE					OBSERVER / AGENCY	
ZEuro0345678		ASHTECH UZ-12		ZC10		0A13*6C	REC # / TYPE / VERS	
01234		NOV702 3.00					ANT # / TYPE	
	-2657703.4791	-4482342.0091		3665546.2482			APPROX POSITION XYZ	
	2.0878	0.0000		0.0000			ANTENNA: DELTA H/E/N	
1	0						WAVELENGTH FACT L1/2	
3	L1	C1		D1			# / TYPES OF OBSERV	
	5.0000						INTERVAL	
							LEAP SECONDS	
2010	11	22		23	44	0.000000	GPS	TIME OF FIRST OBS
2010	11	23		0	41	30.000000	GPS	TIME OF LAST OBS

Figure 2. Typical RINEX header information

### STEP 2 - Start PPP

To start PPP, go to the CSRS website and select PPP from the list on the left side or go directly to [http://198.103.48.76/online\\_data\\_e.php](http://198.103.48.76/online_data_e.php). You will be required to set up an account, (no cost involved but you will have to wait a few minutes to get an email).

Once you log on, select "CSRS – Precise Point Positioning"

### STEP 3 - Enter the data PPP requires

- Browse to your RINEX file under the "Choose File"
- Select Static Mode of processing
- Select your datum option:
  - NAD83 with Canadian Spatial Reference System (CSRS) adjustment
  - ITRF2005, with the epoch being the date of the survey

*Note: Processing using the CSRS NAD83 is not recommended, as this is a local Canadian reference frame with little meaning for continental U.S (CONUS) GPS data. The latitude, longitude and ellipsoid heights in the ITRF reference frame, however, are global and have a more useful application in California.*

- Confirm your email address to which results will be sent
- Click on "START" to upload the file and start the processing

*Note: Processing with PPP is easy and very quick, but you are limited in your options and must have your RINEX file set up correctly.*

### STEP 4 - Review the results

This process seems to return the solution the quickest of all the on line services discussed. The email will have several items in it:

- A link to a zip file containing all the various data files.
- Basic position information including the position and standard deviation of the point.
- A link to the summary file in pdf format.
- A link to a zip file containing the observation residuals and satellite azimuth and elevation data.

*Note: The detailed processing results will be deleted after 24 hours from the CSRS web server. Also, a user manual is available at*

*<http://198.103.48.76/userguide/pdf/howtouse.pdf>. CSRS also has a downloadable program called "PPP Direct" that will automate much of the processing, allowing you to just drag and drop the RINEX files you need uploaded. It is available by clicking on the "GSD Software Request GO!" button just above the PPP button on the website.*

## METHOD C - SCOUT (SCRIPPS COORDINATE UPDATE TOOL)

This online program can be accessed through the California Spatial Reference Center (CSRC) <http://csrc.ucsd.edu/>. Clearly, much time was spent coming up with the acronym, and you can decide if they should have spent some of that time on the interface. Again, you must use RINEX observation files. The advantage with SCOUT is it uses CGPS stations which in California generally will give you sites closer to your receiver.

### STEP1 - Be prepared

Before you get online, have the necessary information ready for processing:

- Make sure your GPS observation files are in RINEX format on an FTP site, if you have access to one. If not, see Step 2.
- Know your GPS receiver type
- Know your antenna type or model from IGS antenna list
- Know your antenna height in meters

### STEP 2 - Upload your file onto the SOPAC FTP site (if you do not have your own ftp site)

If you do not have your own FTP site, you need to load your RINEX file onto the SOPAC FTP site one of two ways.

- If you have an FTP program, you can use that to upload the files. There are several programs available as freeware.
- If you don't have a dedicated FTP program, you can use Internet Explorer 8 (using Windows XP or later). Using IE8, do the following:
  - Open Internet Explorer
  - Log onto the SOPAC FTP site at <ftp://geopub.ucsd.edu>
  - Under the "View" dropdown menu, select "Open FTP site in Windows Explorer"
  - This will open a Windows Explorer window showing the folders
  - Under the Windows Explorer "File" dropdown menu, select "Log on As"
  - Username is "scout"; password is "coordgen". This will automatically display the correct folder but you will see no files in it.
  - Copy and paste your file into this window.

### STEP 3 - Start SCOUT

Again SCOUT can be accessed through CSRC site, by going to the Data Portal and under utilities you will find a link to it, or in can be accessed directly at <http://csrc.ucsd.edu/cgi-bin/SCOUT.cgi>.

*Continued on page 40*



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Figure 3. SCOUT web page

**STEP 4 - Enter the data SCOUT requires**

1. Enter in your email address. This is how you get your results so make sure it is correct.
2. Do one of the following to upload your file:
  - a. Enter in your FTP site address and the observation file name
  - b. Use the pull down menu to find the file you copied over to the SOPAC FTP site under STEP 2 above. It should be close to the top of the list
  - c. If you don't see the file use F5 to refresh the window. If you refresh the window you will have to enter in your email address again
3. Click on the Submit button
4. A status page will come up. In the boxes provided at the bottom of the status page, use the lists provided to enter your:
  - a. GPS Receiver type
  - b. Antenna Type
 

*Note: As with PPP, SCOUT uses an antenna model naming convention from the International GNSS Service (IGS) that may differ from, or not include models from, the NGS antenna calibration list. Be aware of this and the resultant changes to ellipsoidal heights if your antenna is not supported by SCOUT. If your summary file does not list the model you embedded in your RINEX file, it will not know the offset from the Antenna Reference Point (ARP) to the Antenna Phase Center (APC).*
  - c. Antenna height in meters
5. Click "Submit" again. In a few seconds, a second status page will come up showing the submittal results and your SCOUT job number.

**STEP 5 - Review the results**

The results usually take about five minutes to be emailed back. The position is determined on the ITRF2005 datum with the same epoch as that of the day of the survey. It also projects those coordinates onto WGS84 and shows them as decimal degrees. It also provides the standard deviation for the solution. Again the standard deviations generally are optimistic. Using a program like NGS' Horizontal Time Dependent Position (HTDP) will convert

an ITRF2005 position to a NAD83 epoch of your choosing. It also provides you a link to a map showing you the CGPS stations used for the solution.

**COMPARING SOLUTIONS USING ON-LINE PROCESSING**

Just to see how the processing varies between the on-line processors, a single RINEX data file was run through each of the programs. The file had approximately 3 hours of data. All of the solutions came back with no major issues in processing. In the area where the test was done, 1 second of latitude is approximately 101 feet (31m) and 1 second of longitude is 83 feet (25m), which may give you a better sense of magnitude of the variations.


**NOTES:**

*Latitudes and Longitudes values are shown to the precision returned by the service. CSRS-PPP and SCOUT datum was ITRF05 and epoch 2010.632. OPUS datum was ITRF00, epoch 2010.632. Using NGS's HTDP to convert the OPUS value to ITRF05, epoch 2010.632*

*Accuracy for OPUS is indicating Peak to Peak Values, accuracies for the other two solutions is standard deviation.*


*The authors wish to thank Rob McMillan, PLS, for his review of both the technical and grammatical correctness. Rob, next time we see you, we owe you an Orange Julian. ■*

Coming up in California Surveyor issue # 167: PART III – DO IT YOURSELF CORS/CGPS PROCESSING



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*Michael P. Durkee, a partner in the Walnut Creek office of Allen Matkins, represents developers, public agencies and interest groups in all aspects of land use law. Mike is the principal author of Map Act Navigator (1997-2011), and co-author of Ballot Box Navigator (Solano Press 2003), and Land-Use Initiatives and Referenda in California (Solano Press 1990, 1991). 415.273.7455  
mdurkee@allenmatkins.com*

# Q&A SMA Expert

## Question

**Sometimes it is confusing whether a parcel map or a tentative/final map is required. Would you please explain the applicable rules? I would also appreciate a refresher on subdivisions where the Map Act does not apply.**

## Discussion

**The following are some important basic concepts that help with the determination of whether a parcel map or tentative/final map is required:**

**Rule of Contiguity.** Generally, a subdivision creating five or more lots requires a tentative and final map, whereas the creation of four or fewer lots requires a parcel map. Gov't Code §§ 66426, 66428. However, sometimes the "accounting" of the number of parcels created over time is not easy. Suppose a subdivider purchases two contiguous lots and seeks to subdivide one of those lots into four new lots. What kind of map is required? A parcel map, because four new lots are created (the original 2 legal lots are not counted). Ten years later, that same subdivider seeks to subdivide the other contiguous lot into two new lots. What kind of map is required? Tentative/final map, because the original lots were held in common ownership, and therefore the original subdivision of 4 is counted against the later lots split of 2 on contiguous property. In other words, two new lots are contiguous to the previous four lots, and therefore are added to and counted with those original four lots for a total of six lots. The later-in-time lot split would be effectuated by a tentative/final map! (Bright v. Board of Supervisors, 66 Cal.App.3d 191 (1977).)

**Timing.** This contiguity principle is further illustrated by the "timing" case of Bright v. Board of Supervisors case cited above, where a subdivider owned two adjacent parcels. He owned the first parcel as separate property. He owned the second property with his wife as joint tenants. In 1971, the owner transferred a portion of the second property to his wife as her separate parcel. In 1973, he applied for a tentative parcel map proposing to divide the first property into four lots. The court held that the 1971 division and the 1973 division had to be counted together for purposes of determining whether a parcel map or a tentative and final map would be required. Thus, six parcels were created. The fact that the second division occurred later in time did not matter to the court. As long as the same subdivider causes the division, the passage of time does not change the fact that five or more parcels are created.

**Quartering.** Another tricky issue is "quartering." Successive divisions of property will not be counted together in ascertaining the total number of parcels created if the divisions are by independent action of successive and different owners. 61 Ops. Cal. Atty. Gen. 114 (1978). Successive divisions of a property into four or fewer parcels by successive owners is sometimes referred to as quartering. The first owner divides the property into four parcels; then a subsequent owner divides one of those parcels into four parcels; then a subsequent owner divides one of those parcels into four parcels; and so on. The key question is whether the previous divider has a relationship with the subsequent divider. If there is a relationship – for example, if the two parties are business associates, one is the agent of the other, or they are friends – then successive divisions that total five or more parcels may require a tentative and final map.

**Conveyances to/from a Governmental Agency.** First, all conveyances to or from a governmental agency are not subject to the Map Act. Gov't Code § 66428(a)(2). Second, if one of the lots created by a subdivision is conveyed to a governmental agency, then that lot is not counted for purposes of determining which map is required. Gov't Code § 66426.5. Say, for example, a subdivider creates five new lots, but conveys one to the city for use as a park. What kind of map? A parcel map, because the lot conveyed to the city is not counted, meaning that four lots were created.

**Remainder Parcels.** Remainder parcels also are not counted for purposes of determining which map is required, as long as the parcel is designated as such and is not being subdivided for sale, lease or financing. Gov't Code § 66424.6. Cities and counties often express concern that this policy for remainders will lead to unregulated development on the remainder parcel, but the city/county may require a subdivider to construct improvements or pay fees associated with improvements when a permit or other approval is issued for the development of the remainder parcel. Moreover, although the remainder parcel may be sold without any requirement of filing a parcel or final map, the city/county may require a conditional certificate of compliance.

In addition to being able to determine whether a parcel map or a tentative/final map is required, it is important to know whether the Map Act even applies. The following is a list of circumstances where the determination of whether the Map Act applies can be difficult:

*Continued on next page*

**Reference to Assessor's Parcels.** Assessor Parcel Numbers (APN) are used for the purpose of administrative convenience only and may not be relied upon as compliance with the Map Act for sale purposes where the real property had been assigned two numbers. 62 Ops.Cal.Atty.Gen. 147 (1979). Where a unit of land has been subdivided in compliance with the Map Act and three contiguous lots of that subdivision are retained by the subdivider, the fact that the three lots have been combined as one APN does not merge the lots; a new parcel map is not required before any of the lots can be conveyed. 59 Ops.Cal.Atty.Gen. 581 (1979).

**Gift Deeds.** Gift deed conveyances violate the Map Act when transfers are made for the purpose of immediate or future sale, lease or finance by or for their children because the gift deed had sought to circumvent the Map Act. *Pescosolido v. Smith*, 142 Cal. App. 3d 964 (1983).

**Financing.** The act of creating several deeds of trust upon different (lesser) portions of a legal parcel or unit of land constitutes a division of land within the meaning of a "subdivision" under the Map Act. 58 Ops.Cal.Atty.Gen. 408 (1975).

**Tax Sales.** Map Act and subdivision ordinances enacted pursuant to the Act do not apply to a tax collector's sale of a portion of a tax-deeded parcel pursuant to Rev. and Tax Code § 3691. 64 Ops.Cal.Atty.Gen. 814 (1981).

**Public Schools.** The University of California is exempt from the Map Act when it constructs for-sale-on-campus homes as part of a program to provide faculty housing. 75 Ops.Cal.Atty.Gen. 98 (1992).

**Certain Easements.** A non-exclusive easement granting an adjacent landowner the right to construct and use a garage on his neighbor's parcel does not constitute a subdivision of land because it merely created the right to use a portion of the property in a restricted manner, but did not divide real property into units that create possessory interests in land. *Blackmore v. Powell*, 150 Cal.App.4th 1593 (2007).

The determination of whether the Subdivision Map Act applies to a particular subdivision or, if it is a subdivision, whether a parcel map or tentative/final map is required, can be more difficult than it seems. An awareness of the applicable rules will better assist the practitioner when faced with these situations. ■

*Answer to Geography Quiz on page 15:  
Zugspitze in the State of Bavaria, Germany*

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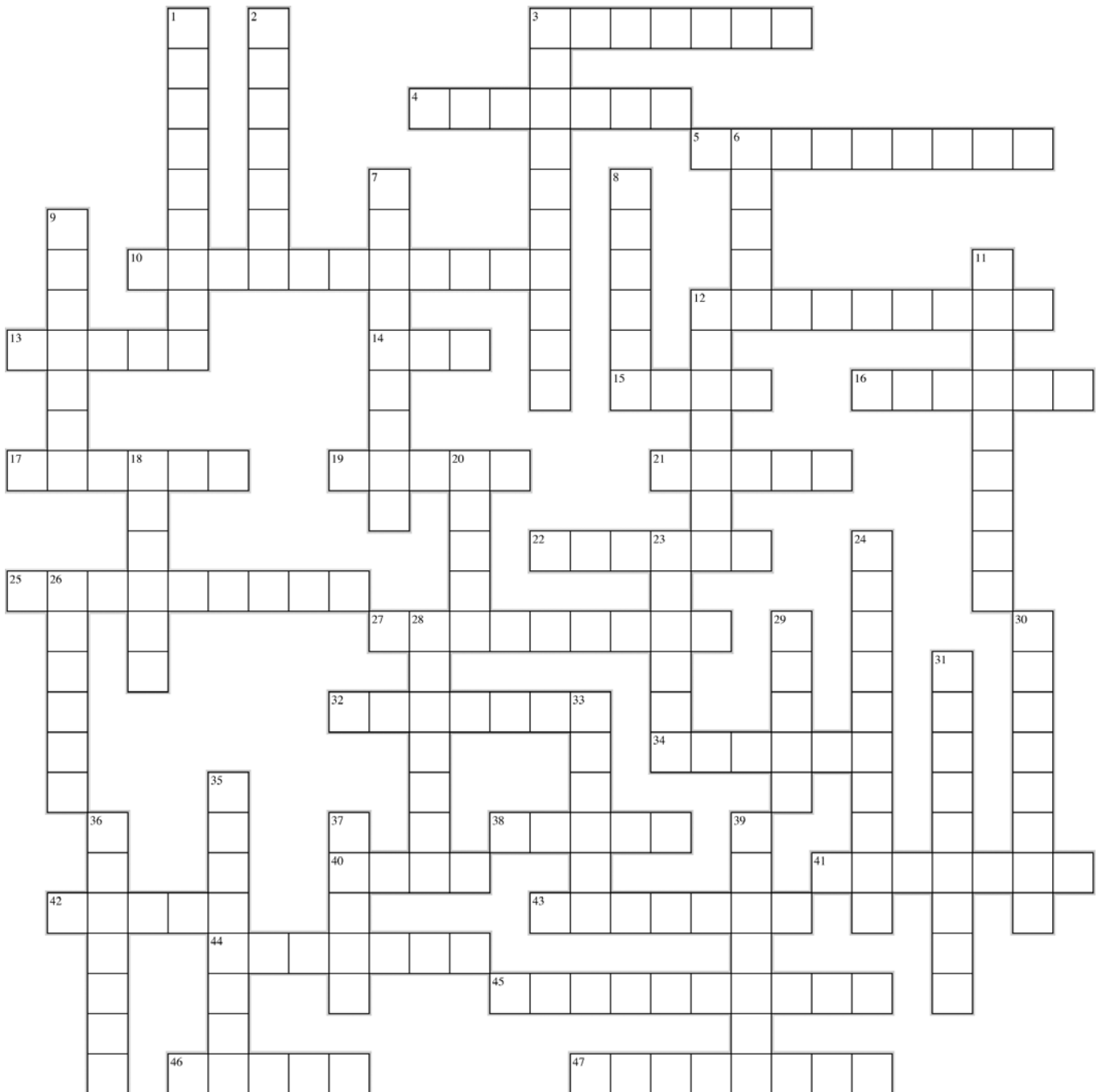
# Crossword Puzzle

By: Ian Wilson, PLS

*Ian Wilson, PLS is the Director of Survey for Cardno WRG, Inc. in Roseville, CA. He started surveying in 1988 in Southern California and is now enjoying life in Northern California. Ian enjoys hearing from fellow members about the crossword puzzle and is always looking for clue ideas and input. He is licensed in California and Nevada and has specialized in boundary, topographic and Land Title surveys. His expert witness practice in boundary and easement issues is growing. Ian has been a member of CLSA since 1988.*

## CLSA Crossword Puzzle #19

If you have an idea for a puzzle theme or a clue you would like to include in an upcoming puzzle, email to [clsa@californiasurveyors.org](mailto:clsa@californiasurveyors.org)



## Across

3. HUSBANDS INHERITANCE
4. IRREGULAR REMAINDER
5. UNKNOWN
10. ENROLL IN COLLEGE
12. DEGREE OF REFINEMENT
13. ? POINT AVERAGE
14. SQUARE STAKE
15. FOURTH OF AN ACRE
16. INSTRUCTOR AT SANTA ROSA JC
17. PURCHASER
19. LEAD WEIGHT
21. COURSE OF STUDY IN UNIVERSITY
22. CURVING AWAY
25. OPENING
27. EXCAVATION
32. LOSS IN VALUE
34. A "CURT" SMALL CIRCLE
38. LASER RADAR
40. 39.37 EQUALS ONE
41. FORMAL REGULATION
42. 5,000 VARAS SQUARE
43. LIST OF CLASSES AT A COLLEGE
44. MARKED CROSS
45. SYNONYMOUS WITH FRESNO STATE
46. MARK ON A TRUNK
47. CONTEST

## Down

1. UNDERGRADUATE ACADEMIC DEGREE
2. MISTAKE
3. PLACE WHERE STREAMS MEET
6. ONE EQUALS 39.37
7. WITHIN 22.5 DEGREES OF SOUTH
8. MORE RECENT
9. PROPORTION
11. RENDER PARALLEL
12. PROVE A WILL
18. ACADEMIC RANK CONFERED BY EXAMINATION
20. SECONDARY COURSE OF STUDY
23. AGAINST
24. EDUCATIONAL INSTITUTION WITH MULTIPLE SCHOOLS
26. LOCATION OF SECOND CALIFORNIA SURVEY PROGRAM
28. EPHEMERIS
29. GIFT
30. COMPLETE A COURSE OF LEARNING
31. GRADUAL RECESSION
33. ABOUT 607 FEET
35. DURABLE ITEM
36. CHANNEL BETWEEN STATES
37. ONE TO NINE
39. LAND GRANT UNIVERSITY WITH A DISTANCE LEARNING SURVEY PROGRAM

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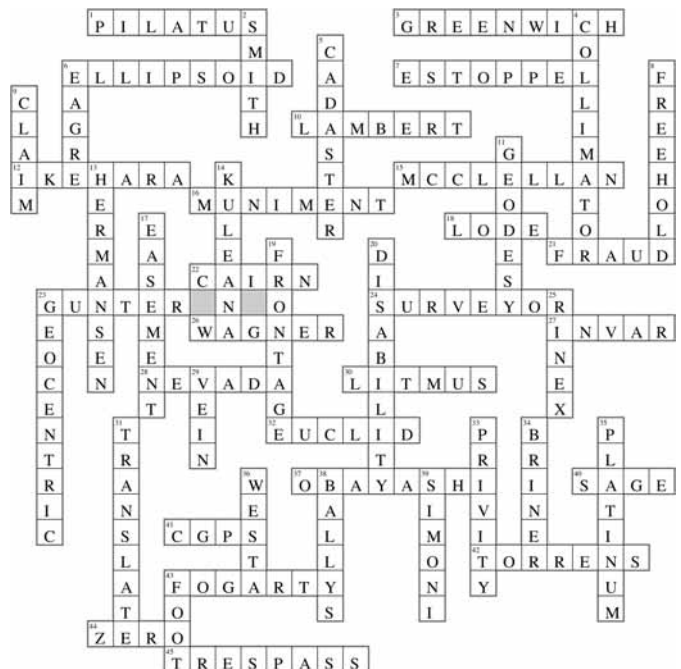
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### Key to CLSA puzzle #18 (Surveyor Issue # 165)





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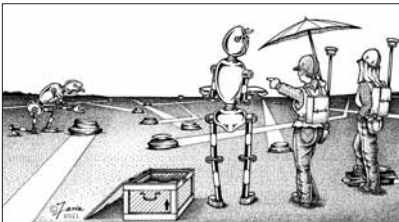
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### Top Two Captions for issue #165 Cartoon

*"Preparing for the Surveyors' Olympics Exploding Cow Patty Pacing Contest."*  
John Wilusz, PLS, Editor

*"No wonder they call it Death Valley. I walked across this desert last time and put that marker there."*  
Tyler Core



Submit your caption for the cartoon above to [clsa@californiasurveyors.org](mailto:clsa@californiasurveyors.org) by September 1st. Our favorite captions will be published in the next issue of the California Surveyor.

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