

SURVEYOR

California

Fall 2008 Issue #156



*Women in
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"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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Women in Surveying



The 28th Annual ESRI User Conference, August 4-8, 2008, San Diego, CA

In August I had the opportunity to attend my first Environmental Systems Research Institute (ESRI) User Conference. What a trip! I knew GIS was huge but it's even bigger than I thought. One quarter of a million organizations across the world use ArcGIS in a vast and diverse array of applications such as: planning, utility distribution, water resources, transportation, civil and environmental engineering, flood management, land surveying, mapping, natural resources management, human resources management, defense, archaeology, emergency services and public safety; in other words, anything and everything that pertains to the collection, analysis and use of spatial data. Forgive me if I left something out. The list appears to be endless.

That GIS is diverse is reflected in the people who use it. The first thing I noticed about conference attendees, besides there being so many of them, was that women and minorities were well-represented. The GIS crowd is young too, much younger than what we are accustomed to seeing at land surveyors' gatherings. The opening ceremony and plenary session was hosted by the charismatic Jack Dangermond, founder and president of ESRI. According to Jack there were some 14,500 attendees from 121 countries, and to me it looked like they were all present to hear him speak. The sheer size of the audience conveyed the message that GIS is changing the world, one click at a time.

The plenary session also featured a number of speakers besides Jack. Each in their own way touched upon the conference's theme "GIS: Geography in Action." Of particular interest to surveyors was U.S. Department of the Interior Secretary Dirk Kempthorne, who announced that the full archive of USGS Landsat images will be available online and for free by February 2009. For more information on this welcome development go to: http://landsat.usgs.gov/images/squares/USGS_Landsat_Imagery_Release.pdf

In some ways the most impressive plenary speaker, at least for me, was a 6th grade student. Molly Paterson of Flynn Park Elementary School, University City, Missouri, spoke with remarkable confidence and poise about a GIS demographics project she worked on at school. Turns out that smart kids like Molly are integral to Jack Dangermond's vision for the future; ESRI is drawing the attention of youth to GIS by an ambitious outreach program. One example is the ESRI GIS program for 4-H. By various grants this program supports national 4-H efforts geared to bringing GIS

CORRECTION NOTICE: Correction to the Summer Issue #155

Our apologies to Cecilia Whitaker, PLS, for errors inadvertently introduced into her article during layout of Issue #155. The correct version of "Using the Scripps Epoch Coordinate Tool On-line Resource (SECTOR) for Changing Between Epochs" is in the digital version of the magazine posted on the CLSA website at: <http://www.californiasurveyors.org/files/calsurveyor/CalSurv155.pdf>

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

From the Editor

to young people. At the conference I met several 4-H clubs from across the country. One group from Oklahoma told me about volunteer work they did to locate and document fire hydrants for their city's GIS. A teenager from upstate New York told me how she applied her GIS skills, with software donated by ESRI, to help preserve local endangered wildflowers. Another group from North Carolina used ESRI-donated software to create a map book for their county's Economic Development Department. The book features exhibits pertaining to their county's history, economy, geography, demographics and recreational opportunities. It was subsequently published and over 7,000 copies sold. ESRI outreach coordinators are also working on a GIS Scouting merit badge, which they anticipate being in place in 2009.

Women in Surveying

Fortunately for us land surveyors we have volunteers doing similar outreach work in our own professional community. Our theme this issue of the *California Surveyor* is "Women in Surveying." Be sure to read Dee Smith's inspiring article "Girl Scouts and the Basic Land Surveying Badge." I bet you did not even know there was a surveying merit badge for the Girl Scouts. That's because there wasn't one until Dee and her colleagues took action. If there is a better example of surveyors promoting their profession I have not heard about it.

Continuing our "Women in Surveying" theme we are featuring a series of articles written by female land surveyors. Our goal for this feature is twofold: First, we wish to highlight contributions women make to professional land surveying practice in California. Second, we hope to provide inspiration and encouragement to young women who might be attracted to a career in land surveying. We asked our contributing writers to tell us how they found their way into this profession and what it's like to be a woman in a male-dominated field. Taken together, their articles paint a colorful picture of what great diversity there is in professional land surveying practice in our state, regardless of gender. By their fine efforts we have an opportunity to learn about areas of professional expertise we might not otherwise be exposed to. Many thanks to my friend Annette Lockhart, our guest editor, for her instrumental role in bringing this feature to the magazine. Without her it would not have been possible.

Speaking of service to the profession, I'm pleased to announce that our own "woman in surveying," Dorothy Calegari, was by unanimous vote made an honorary member of the California Land Surveyors Association at the July Board of Directors meeting in Oakland. Congratulations, Dorothy!

And finally my thanks to all who make our magazine the award-winning publication that it is. As I've said before it takes many hands to make the *California Surveyor* and I feel fortunate to have mine among them. ❖

John Wilusz, PLS, PE, is a Water Resources Engineer in the Delta-Suisun Marsh Office of the California Department of Water Resources.

From the Guest Editor

By: Annette Lockhart, PLS



My grandfather, who was a retired mechanic from Operating Engineers Local 3, asked me at a family party one time if I was still hanging with those surveyors. Yep, Papa, I still am.

I work for Caltrans. I started work as an Office Assistant for the Lab and Surveys in District 10 (Stockton). I did not even know that there were land surveyors until I came to work there! An opportunity presented itself to take the Junior Engineering Technician exam (a classification, I am sad to report, that Caltrans has chosen to eliminate). From that exam, I landed in a job on a Caltrans Surveys Field crew. I have worked with some excellent people over the years, each one helpful in their own way. Last year, I passed the PLS exam and I was never so happy to see an envelope in my whole life!

Working at Caltrans is great! Surveying has many faces and you can try them all here. I have been on a field crew, in the office, in field support, in Right of Way Engineering (that is boundary surveying to the rest of the world), in the Office of Photogrammetry, the Office of Land Surveys and now, the Office of GIS. Each stop has afforded me one of the great opportunities that land surveying has to offer...learning. In this profession you only stop learning because you want to stop.

I feel very fortunate to be involved with this issue of the *California Surveyor* that focuses on Women in Surveying. In my "normal" life, I prepare the Focal Point, a newsletter for the Sacramento chapter of CLSA. I have to tell you this job is a whole lot different. John deserves a great standing ovation for the outstanding job he does! It is really tough!

As you read these articles I hope you will see what I saw...a little bit of yourself in each story. It was amazing to me how parts of each of their stories are actually a part of my own, as well. One writer was a Navy Seabee (I was a Navy Storekeeper). Another works with the American Association of University

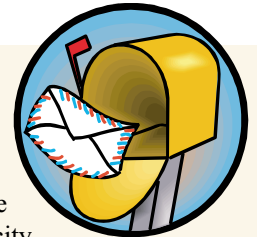
Women (I recently delivered a keynote address for one of their events.) All of the contributors found their way to the surveying profession by accident. (Me, too!) I think you will find their paths interesting and the work they highlighted fascinating!

In addition, all the women talk in glowing terms about "the guys." I have to say on this point I must agree. I have always found men and women in our profession to be encouraging and helpful. I realize somewhere there are things that happen that are not wonderful, but in this issue we have contributors from all kinds of backgrounds and they all seem to think that "the bad stuff" must have happened somewhere else.

I think you will also enjoy reading about the number of ways these women give back to the profession. I believe this to be very important as well. In Sacramento, I help facilitate the PLS exam preparation course for the Sacramento Chapter. As part of preparing folks for licensure, we stress the importance of giving back by taking an active part in the shaping of the profession.

Well, you are just a turn of the page away from our efforts. I sincerely hope that you enjoy these articles as much as I did. Take an opportunity to share this issue with others who might be waiting for the "accident" that leads them to a fulfilling career in land surveying. ❖

Letter to the Editor



In the article "The Surveyor and the Speed of Light" published in the *California Surveyor* issue #155 the author has taken CORS station velocity data of a few years, expanded this data back in time ~80 years and insinuates the original surveyors made a measurement error. I personally would accept invar tape measurements over any GPS or EDM data produced today.

Anyone with survey experience knows that expanding your survey beyond your original control is going to multiply the error by the distance expanded compared to the original distance. For example, a 100 foot control line with an error of 0.01ft expanded to 200 feet now has at least a 0.02ft error. Expand it 15 times and do the math.

This is the same unsubstantiated thinking that has some people in this Country making millions of dollars (Al Gore is one) off the "Man Made Global Warming (GW)" theory. And that's exactly what it is, a theory. The computer programs they are claiming proves the GW theory by taking old weather data and predicting our weather 40 years from now cannot predict the weather of the 60's or 70's.

Should we use 5 or 10 year old data, push it out 60 or 80 years and say that is more accurate than actual data created at that time?

W. Tom Foster, P.L.S.

Kids Korner

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



Ashley Allums spends kids day at work helping Dad (Spear & Associates Party Chief Bob Allums) establish a control traverse in a commercial development in San Marcos.

Looks like she's showing old Dad a few new tricks, like how to make a dirty old vest look good!



Jacob Gambino, son of Peter Gambino, PE, PLS, appreciating the fine articles and historic photographs in Issue #150



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President's Message



It is moving towards autumn at seemingly breakneck speed. Time does fly when you are having fun! This year as your president is definitely moving along much faster than anticipated so here I am working on my third quarter message. Before I get to the main topic I have a couple of items that I want to point out to you. First of all I want you to know that we have completed the Salary Survey and the results are available on the CLSA website www.californiasurveyors.org. I want to thank all of you who participated in the survey. We tabulated nearly 1000 responses, which is a good sampling. We broke the survey into four geographic sections and each section was further broken down by job description. There is a mountain of information in these survey results and I encourage you to review them. Also I want to be sure that everyone is aware that Patrick Tami was reappointed to the Board for Professional Engineers and Land Surveyors by Governor Schwarzenegger. At the July 31, 2008 Board meeting Pat was elected President of the Board! Pat has also become the Vice President of the Western Zone of NCEES. This is probably old news by now but I want to recognize Pat for his efforts. We are fortunate to have someone like Pat who is willing to take on these extra duties and I applaud him for that. There is an old saying that some of you might remember, "The cream always rises to the top". In the case of Pat Tami this is definitely true!! Thank you Pat!

The primary topic that I have chosen for this issue is the Voluntary Professional Development Program that CLSA has recently established. There is a link to specific information, details, and the required application on the CLSA website. In a nutshell this program was designed to follow the NCEES model that most states use. It was designed this way to make it easier for those of us who are licensed in other states that require Professional Development Hours to renew professional licenses. Having said that, I want to reiterate that this is a VOLUNTARY program put together by CLSA.

There has been much discussion about Professional Development over the years but, regardless of your position on "mandatory" Professional Development, I assume that we can all agree that, as professional land surveyors, we have a professional obligation to remain current with the technical, legal and professional areas of our profession. This is certainly an obligation to ourselves, our clients and the public at large. There are many ways to do this and it was to that end that CLSA decided to put together this voluntary program. It gives a California land surveyor a way to remain current and remind their staff, co-workers, and clients that they are putting forth the effort to continue to develop professionally. It gives participating land surveyors a goal to shoot

for and maintain. This is a benefit to both the land surveyor and their clients regardless of whether you work in the private or public sector. Once you qualify you will be awarded a wooden plaque that will show the CLSA Professional Development logo and the current years for which you qualify. This plaque is suitable for office or conference room display and you should display it proudly. Along with the plaque you will receive a certificate suitable for framing and an electronic version of the logo for use on your letterhead or cards. CLSA will also maintain your Professional Development Hours (PDH) to assist you with license renewal in other states that have mandatory Professional Development.

Applying for this program is really quite simple. The application form must be filled out once every two years and submitted with an initial fee of \$50.00 for members and \$125.00 for non-members. After the initial submittal fee is paid there will be a \$25.00 fee for members and \$62.50 fee for non-members each time you submit an application for a two-year renewal. You must have 30 PDH's for each two year period. They can be split up in any way over the two-year period and can even all be acquired in one of the two years. To complete the form, simply fill in the blanks with the information about the PDH type (a list of types is on the front of the application), a brief description or a course title, the date completed, the number of PDH's and the name of the presenter or organization. The determination of the number of PDH's is explained in detail in the Voluntary Professional Development Program brochure. If you are acquiring them by attending seminars, one PDH is generally equal to one hour of contact time. Most seminars that are given these days actually tell you in the literature how many PDHs the seminar is worth. You total these PDHs up and if you have at least 30 in the two-year period you can submit. You can also carry over to the next reporting period any PDHs in excess of 30 up to a maximum carry over of 15 PDHs. Determining what qualifies is also explained in the brochure. There is a list of typical things that are qualifying activities and those that are not. A large amount of leeway has been purposely granted in determining what qualifies. This was done to insure that the broadest possible range of activities benefiting the professional land surveyor is included. So, as you can see, you do not have to go back to college to qualify for this program. There are many different ways to earn the required credits.

As explained in the brochure, it is your responsibility to maintain adequate records to provide backup to the items claimed on

Continued on next page

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your application. These records are not sent in with the application but should be kept available in case CLSA chooses to audit your application. These records should consist of certificates of attendance to a claimed seminar, copies of a publication that published your claimed article or any other form of verification that the items you are claiming on the application were indeed completed by you.

As I traveled around the state last year, as the CLSA President-Elect, the subject of Professional Development was an often-discussed topic. There was overwhelming support for it at every chapter I visited. I have recently been reminded that actions speak much louder than words. So, if you truly support Professional Development, I ask you to support this voluntary program to help show that the profession supports Professional Development. I encourage all professional land surveyors in California to participate in this program. It is relatively painless and you will not only gain recognition for your efforts from CLSA, you will personally benefit from the effort. So will your clients. The profession of land surveying is a rapidly changing profession both in the fields of technology as well as practice. By striving to fulfill the requirements of this voluntary program, you will find yourself learning many new, different and beneficial things. You will be able to utilize this knowledge and apply it to your own work to your advantage as well as the public's advantage and I encourage you to do so. I look forward to seeing your name on the CLSA list of professionals that have taken advantage of this excellent opportunity. ❖

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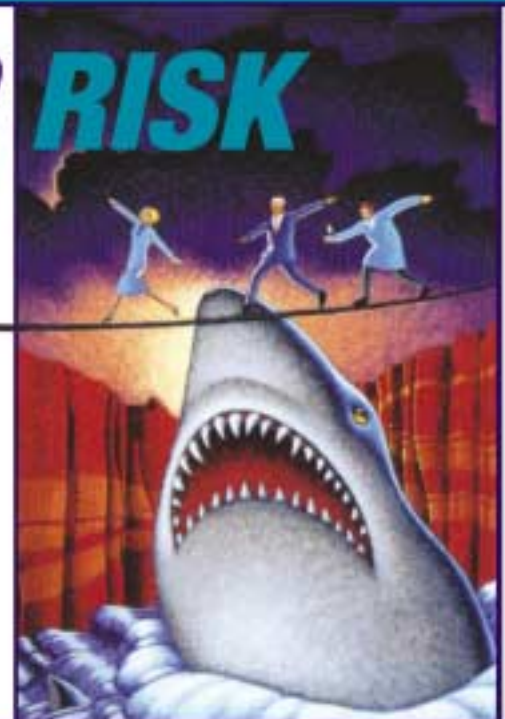


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Girl Scouts and the Basic Land Surveying Badge

“It is no secret that the land surveying profession is facing a shortage of qualified personnel...If the land surveying profession is to survive, we need to expand our pool of recruits” (“Women in Surveying”, copyright 1994, P.O.B. Magazine). One way that the California Land Surveyors’ Association is taking action is by promoting one of the original core merit badges of the Boy Scouts of America (BSA); Surveying. A colleague asked me to apply as a counselor for the BSA program since he and I had been to a few career day events together promoting land surveying. I assisted with one BSA Survey Merit Badge in Highland, CA. After that experience, I began to wonder if the Girl Scouts (GS) had a badge that promoted land surveying. I was a Girl Scout myself when I was younger and I have experience working with GS in a staff capacity as well.



The GS website revealed a few math and engineering badges, but nothing specifically for land surveying. After much thought, I wrote up the requirements for the Girl Scout Basic Land Surveying Badge. The backbone of this program is taken from the BSA Surveying Merit Badge requirements. The GS Basic Land Surveying Badge is designed to focus primarily on measurements. My vision is to educate the girls in this non-traditional field without overwhelming them with information. Once we have some interest, we could create some more advanced surveying badges, such as aerial photography, boundary, construction, geodetic, hydrographic, mapping, route, and topography.



While writing the requirements in 2006, I wrote to all of the licensed female land surveyors in my area requesting their assistance. I set it up as a one-day event open to as many Girl Scouts as were interested. I would like to extend a very special thank you to our volunteers and to Riverside County Flood Control and Water Conservation District (RCFC) for the use of their facilities for the event. Volunteers include Angela Dorf (PLS) from Stantec, Gwen Gee (PLS) from County of Santa Clara, Travis Kottwitz (PLS) from County of San Bernardino, Venyssa Lopez (PLS) from California Department of Transportation, Cecilia Whitaker (PLS) from Metropolitan Water District, Michelle Brown (LS Tech) from Stantec, Trish Ortega (LS Tech)



Continued on next page



from RCFC, Marti Ikehara (Honorary LS Tech) from National Geodetic Survey, and me, Dee Smith (PLS) from RCFC.

It was a clear, sunny day for our event on August 25, 2006. Our twelve participants, ranging in age from 11 to 17, arrived at 7:30 a.m. to learn basic land surveying techniques in measuring angles, distances, and elevations, drafting field notes, and operating both surveying-quality and hiking handheld GPS (Global Positioning Satellites) equipment. We began with some ground rules after registration and then moved into introductions. I requested each of the volunteers share with the group how they became involved in land surveying. From there we moved into some instruction on first aid, horizontal measurements and instruments, levels and instruments, and GPS Surveying before breaking up into groups of three and heading outside for the practical application component of the badge. There were four stations consisting of (1) Traverse - including closure and one side shot measurement, (2) Elevations with level and differential rod, (3) Pacing and chaining with plumb bobs, and (4) GPS survey-quality RTN (Real-Time Network) and hiking with handheld units.

The traverse station was set up under the large shade trees at RCFC and the Elevation and Pacing stations were mixed sun and shade. However, the GPS station was mostly in the sun due to satellite communication. The girls spent about an hour at each station. We all stopped for lunch, which was provided by the Girl Scouts, half way through rotations. After rotations were complete, we headed inside for instruction and to draft our field notes. We completed our tasks at 4:00 p.m. and everyone seemed to have a good time. It was hard work, but very rewarding. I had the opportunity to work with some remarkable women and men in promoting our fine profession. Now we need to refine the literature that accompanies the requirements. Once that task is complete, we will be ready to promote future day camps for Girl Scouts to earn the Basic Land Surveying Badge. ♦

Delia K. Smith, PLS, is currently a Senior Engineering Technician with Riverside County Flood Control and Water Conservation District, as well as the 2008 Secretary for Riverside/San Bernardino Chapter of CLSA.

An advertisement for SURV-KAP surveying products. It features a collage of six black and white photographs: a person surveying in a wooded area, a person carrying a large bag, a cactus in a desert, a person surveying on a dirt road, a person surveying in a field, and a person surveying in a snowy area. Below the collage is the text "EXPLORE NEW BOUNDARIES!" in large, bold letters, followed by "Monuments, Caps and Accessories" and "800-445-5320 · surv-kap.com". To the right is a circular logo with the text "The Landmark Name SURV-KAP In Survey Products".

An advertisement for REESE Water & Land SURVEYING SERVICES. The top section has the heading "Hydrographic Surveying Services" in large blue letters. Below this is a list of services: "Hydrographic Surveying Services: • single beam bathymetry • sidescan imaging • ROV underwater video imaging". A "featuring:" section lists: "• Trimble™ TerraModel® software for benthic surface models & reservoir volumes • HyPack® Max for hydro surveys • Imagenex Win881 for sidescan imaging". On the left is a small image of a boat labeled "16' survey launch Benthic II". On the right is the REESE Water & Land SURVEYING SERVICES logo. At the bottom, contact information is provided: "For more information: Tel/Fax: 805-543-5375 robert@reesesurveying.com San Luis Obispo, CA". A final line states "Geodetic & Land Surveying Services also available".



Women in Surveying

I Would Not Trade It For Anything

By: Marta Y. Alvarez, PE, PLS



In 1969, at the age of nine, my family emigrated from Chile to the U.S. to escape communism. It was not an easy task for a family of five to get a U.S. Visa. And it was even harder for us to leave everyone we knew, and everything we had, behind. My Dad had to come by himself first, to get a job and get established, before they would allow the rest of us to follow. It took about a year before my Mom, two younger brothers and I received visas and green cards to be able to join my father in Miami. In 1976 we moved again, from Florida to California, because my Dad missed the Chilean mountain views and thought California would be the cure. Even though this move was daunting in some ways it was also very exciting, as a teenager, to travel cross-country and see the sights from the cabin of a U-Haul truck.

I knew that I was going to be an engineer since I was a teenager. I didn't know if I wanted to go the mechanical, aerospace, systems, or civil routes that were offered at CSU, Northridge. What narrowed it down for me was the fact that I did not want to build weapons or be involved in defense systems. CSUN, at least at the time, was very connected with and funded by the aerospace and defense industry. So, without initially intending to I went the route that my father had gone before me – civil engineering. In 1984 I received a BS in Engineering and in 1999 an MBA, both from CSUN.

During my senior year at CSUN, and at the urging of one of my professors, a group of us entered a statewide engineering student competition that had a land surveying component. Even though our group did lousy on the traverse, I was hooked on land surveying from then on. Unfortunately, CSUN did not offer any land surveying classes, but I was determined to learn more about this profession that combined two of my favorite things: math and being outdoors, and, as a bonus, we got to use really cool tools.

While in school, and after I graduated, I gathered experience working for various consultants throughout Southern California, and learned that just about everything I did in engineering was somehow tied to surveying. Wherever I was working, I would ask the land surveyors to let me help with the survey portion of the projects I was designing. Many were very accommodating. Slowly, I learned as much as I could. I attended various seminars on land surveying, went to the Fresno and CLSA Conferences, and took as many workshops as I could. At night I took a land surveying exam review class and even sat down for the exam many years

Continued on next page

Hi, I am Marta Y. Alvarez, president and founder of YCE, Inc. We are a small office that provides land surveying and civil engineering services. Our largest client base is in one way or another connected to the agricultural industry, but we also provide services to land owners, architects, and environmental firms. Over the past twenty years that we've been in business, we have been involved in survey projects that have taken us from Crescent City to San Diego, and from monitoring well sites, to cellular sites, to hazmat remediation sites, to environmental and water resource sites. It has been quite a ride (I would not trade it for anything) and I am not ready to get off just yet.

Continued from previous page

prior to passing it, and prior to being ready, just to get the experience of what the exam was like. By this time I had passed the civil exam, but to me, it was not enough.

Unlike my father I had decided while I was in school that I would someday have my own company. At the time I had envisioned both of us working together, side by side. However, this part of my dream would not come true. After trying so many times it felt like I was hitting my head on the wall. I finally realized that my Dad and I could not work together. Maybe it was because I was too demanding of him, or simply because I was his daughter. I do not really know, and will never know now that he has Alzheimer's. I continued on with my dream, first working out of my house, then in a one-room office that I sublet from an accountant, and now to a slightly larger office that I share with a design firm. Next, I'm looking to buy a larger office building.



I have always believed in giving back to the community and helping our younger generation learn about what land surveying and civil engineering is all about, what it has given me, and how rewarding it can be. One way I have done this is by serving as a volunteer judge for the County's annual Science Fair for over fifteen years. I also volunteer for as many young career day functions as possible. One example is Brighter Horizons, a local event sponsored by the American Association of University Women. It is geared to enhance young peoples' awareness of careers in math and science and is a perfect example of one of the events that I truly believe is making a difference. I normally take all the survey equipment, some sample plans and more recently have added the CLSA outreach packets to display and give out to the kids. It gives me great joy to see how excited the kids are when they look through an instrument, ask interesting questions, or just to take one of my business cards as if it's the greatest thing ever. I am happy to give them just a little insight into the possibility of a future career that they might not have considered otherwise.

Because this is a male-dominated field (that has always been very rewarding to me), I have always had a soft spot for events and organizations that particularly promote the profession to young women. Whenever I discover such an opportunity, I am more than happy to help out. I hope that this article along with the others in this Women in Surveying feature of *California Surveyor* is such an example. ♦



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Practical Applications of Photogrammetry

By: Lorraine B. Amenda, PLS

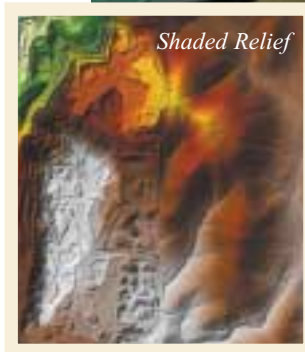
I must confess that my childhood was not spent with dreams of becoming a land surveyor or photogrammetrist. That came much later, in my early twenties. However, at the tender age of fourteen I did fall in love with the city of San Francisco and my career as a photogrammetrist has made it possible for me to spend the last eighteen years working in the “City by the Bay.”

My road into this profession was definitely not a straight line. My favorite classes in high school were geometry and trigonometry. However, I had no idea that there was actually a profession based on those principles. After high school my goal was to find reasonable employment in a short period of time – I was simply tired of school. I ended up attending Fresno City College where I had a course load that must have been unique – typing, shorthand, accounting, and calculus. After three semesters, I left school and began working as the Administrative Assistant for the United Way of Fresno County. However, after about two years it became apparent that I needed to find more lucrative employment. So, back to college I went.

After much debate regarding majors, primarily alternating between accounting and some form of engineering, I decided to give engineering a shot. Since I had now been out of college for two and a half years, I decided to wade back in at Fresno City College to finish most of my prerequisites for engineering. During that time I attended an open house sponsored by the School of Engineering at California State University, Fresno. Most of the presentations were really dry, but Dr. Nader made Surveying Engineering really interesting – contour maps of horses and pennies among the more traditional things. So, I decided to give it a try. At the end of my time at Fresno State, I finally made the land surveying/photogrammetry decision and chose photogrammetry with Towill, Inc. in San Francisco.

I began my career at Towill performing high-level technical work and have added project management to the mix over the past eighteen years. Even though I have specialized in photogrammetry in my career, Towill was very supportive in helping me get the field experience necessary for me to be licensed as a Professional Land Surveyor in California. As a project manager, I work with clients to design a photogrammetric project that will meet their needs and coordinate as necessary with our land surveying department. Each project seems to have particular challenges which could range from site access (ground or aerial restrictions) to terrain to the formatting of the deliverables.

I really appreciate the Towill model of project management. Our managers are not separated from the work flow. I enjoy getting my hands on project data and preparing deliverables. I have at least a small role in most projects which pass through the office. I continue to do the vast majority of the aerotriangulation (AT) computations, and the related QC. Since the AT is the basis for all subse-

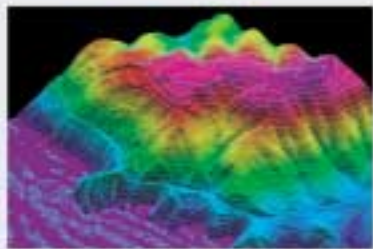


quent work, if it has problems then everything produced from that point forward will have problems. I also step in and help with CAD work to finalize map data when we have multiple project deadlines at the same time.

I work with clients in a wide range of industries, including: transportation, energy, resource management, environmental, municipal planning, etc. However, I would like to highlight one particular group of clients with whom I do all of the project coordination – sand and gravel companies. The work with sand and gravel companies most frequently consists of computing volumes for inventory. If you ever wondered how they know how much concrete sand, pea gravel, or aggregate sub-base is on site – now you know, they give me a call and I measure it. Some of the companies I deal with have a single facility, others have more than ten. By using aerial photography we capture the entire site within just a few moments of time. This data can then be revisited at a future time as necessary. Aerial photography also allows us to inventory multiple facilities on the same day. The majority of the sites are in California, but I have worked on facilities in Nevada and Oregon. Recently I had three clients conducting inventories in a single month with twenty facilities between them, all results due by the end of the month. In addition to designing and managing the projects, I continue to do the actual volume computations. I feel that it is important to have the same team working on these volumes from period to period since these numbers are used to balance accounting records as well as to determine material available for sale. Many of these gravel piles are not placed on flat ground. Some piles are created by pushing material off the top of a cliff to form a stockpile at the bottom. In these cases, the material is piled against a slope that you can't see. By having the same team work on the volumes, we bring the same assumptions to the situation each time, allowing for more consistent volumes, thereby allowing the accounting records to balance more easily period-to-period. I also assist these clients in the determination of material removed from a quarry pit over a period of time, and can provide topographic mapping for mining plans, reclamation plans, and compliance with County permits.

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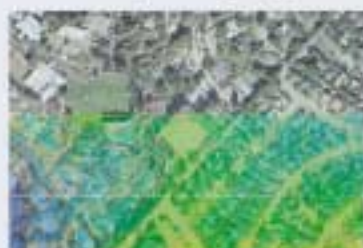
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Continued from previous page

Being in an environment with more men than women was not new to me when I entered this profession; I actually had two high school classes in which I was the only female. While surveying and mapping are male-dominated fields, the ratio is not as lopsided in photogrammetry. There are also significantly more women in our surveying department now than when I started at Towill eighteen years ago. In fact, the only time I've really felt that my gender was a "problem" was on a summer job I had during college. We were in a remote area on the last day of our trip. The day stretched to fourteen hours in an area with no "facilities" available. Suffice it to say, women are not as well designed to "take care of business" in the woods.

The reasons I feel that surveying and mapping are good careers for women are the same reasons I feel that they are good careers for men. There is just so much variety in the type of work that falls within those categories. In photogrammetry I've always enjoyed the diversity in the types of projects we do. One of the most satisfying aspects of my work in photogrammetry continues to be the preparation of a mapping product. Though it is not quite as satisfying now that most of the deliverables are only electronic, I still enjoy the sense of helping to "create" something. It is also exciting to be "in the know" on some of the transit and other public works projects that are happening in the region. Even though land surveying and photogrammetry were not the stuff of my childhood dreams, I'm glad my path lead me here. ❖



Rendered View



Topo Map



California's Only Female County Surveyor

By: Gwendolyn Gee, PLS

brings out the excitement. If I did the same task at work everyday, every year, year in and year out, I would be so bored. Working outdoors was also attractive to me early on since I like just about anything outdoors. Taken together all these things keep me interested in my profession.

I started out in life wanting to be a professional photographer (I still enjoy photography today). But way back then I also liked building things. So I went to Delta Junior College, and then got into UC Berkeley, civil engineering. Part of my requirement was to take a surveying class. I really, really liked it! A friend's brother then told me that I could get an engineering degree in surveying.



I work for the County of Santa Clara as the County Surveyor. A County Surveyor's duties can vary depending on how the county is organized. For Santa Clara County our main function is processing Records of Surveys, Corner Records and Subdivision maps. We also spend a lot of time providing assistance to the public in researching maps, old and new and recorded and unrecorded, from the vast collection of maps that we've been accumulating since the 1800's. Our map collection even contains maps of lands that are outside of our county. Historically, the Santa Clara County Surveyor was an elected position. Many early County Surveyors had their own private surveying (and civil engineering) businesses. For that reason the map collections of my predecessors often contain maps from other parts of the state. One interesting situation was when a historian was looking for a map in the Monterey area near the Salinas River. She had done extensive research in our office previously and she knew we had a collection of maps from the Herrmann era. We helped her find a map that showed the lands of D. Jack from the 19th century. What makes this story interesting is that the landowner, Jack, also acquired a dairy where he made cheese. So the story goes, eventually this cheese became known as Monterey Jack.



What I especially like about this career is the great variety in the work. For example, I enjoy the challenge of wearing many different "hats." There is a hat for the legal aspects of boundary surveying, a hat for construction surveying, a hat for GPS surveying, a hat for working with the California Coordinate Systems, a hat for route surveying, a hat for hydrographic surveying, etc., and finally a great big management hat to coordinate all those other hats. For me there is among those hats a spark that

That was music to my ears! Off I went to get my engineering degree in Surveying and Photogrammetry from Fresno State University. I got a summer job in surveying and have been working surveying jobs ever since. Both the education and the profession have been very good to me.

Continued on next page

What is it like for a woman to work in a male-dominated field? Well, I guess you sort of stick out. There are good times and times I just had to endure because I knew they wouldn't last forever. The gender difference was definitely noticeable, but difficult situations were few and far between. Their impact and impression, however, can be lasting. Then again most of the men in my career experience have been positive. For women I think this profession offers an opportunity to get away from traditional female-oriented careers, and that in itself is refreshing and exciting. But one has to be a strong individual, or one will eventually become a stronger individual while pursuing a career in land surveying.

In my spare time "m active in the California Land Surveyors Association, East Bay Chapter. I have also participated in the Girl Scouts "Go Tech" Career Event and Land Surveying Day camp; both of which were designed to show young girls the diversity of a career in surveying. I have also participated in "Bring Your Daughters to Work Day," where we showed girls how to survey and map a basketball court. Outreach activities like this encourage young women to look at the uniqueness of



our profession, from the field to the office and from legal to high-tech, in the traditional and non-traditional applications of land surveying. And for us as professionals, sharing our experience with youth brings new motivation and enthusiasm as we ensure our profession will endure. ❖



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Maps and Mountains: A Lady Surveyor's Rewarding Climb

By: Anne Hoppe, PLS

A love of the outdoors and mathematics may lead one to a fulfilling career as a Professional Land Surveyor (PLS). The ratio of women to men in the profession is small, yet has grown over the past twenty or so years. When my career was blossoming in the 1980's, I had many 'firsts' for females. However, there are plenty more 'firsts' out there to challenge and fulfill a curious and intelligent young lady.

I grew up in the Shawangunk Mountains of New York, loved the outdoors, and graduated with honors from high school due to my love of math. Eventually my passions drew me to a surveying career without me even being aware of it. Although I did not know what a surveyor was early on, after a few years in the military I was enrolled in Engineering Aid (EA) "A" school as a Navy Seabee with a promising career of being a surveyor. After completing active duty in 1986 my first job paid \$10 per hour, versus the \$5 per hour of my non-engineering friends. Much better! A few more jobs were stepping-stones until I was employed with the City of San Diego in 1989. Within four days of commencing employment I reported to work with my most recent accomplishment, my Land Surveyor-in-Training certificate. My party chief, Ron Dodds, PLS, was proud of me; after all, he encouraged me to seek a job at the City for the varied experience.

I was enjoying the challenges of my new job and within six months was promoted to an office position. I embraced this opportunity as a chance to obtain experience to sit for the licensing exam. I wanted to learn as much as I could in regards to land surveying, and subsequently joined the California Land Surveyors Association (CLSA). In my mind I put all the surveyors on pedestals. I will always remember when I met Beth Swersie, PLS, at the meetings. She was our 1998 president and as a female, she was and still is an inspiration to me.

In 1995 I obtained my license as a Professional Land Surveyor - the first female to become a PLS at the City. When I received my notice in the mail it was the best day of my life. I remember calling my mom, ecstatic, and telling her I just received the best news in the world. She asked me if I was pregnant. Sorry mom!

Researching, writing legal descriptions, and preparing Records of Survey were fun, however, the time in the office was sincerely depriving me of the outdoors. The weekends became my "outdoors" time. I would hike and backpack with my friends. They depended on me for reading the map and getting us to our destination. After all, I am the surveyor. It was and still is a fun sense of importance. I became addicted to the Sierra Nevada mountains and mountains in general. My experience as a survey-



or, being able to locate our position on a map, my mountain experiences, being able to give Search and Rescue our coordinates, and being prepared in the mountains made it possible for my friend, Jen Louie, and I to save the lives of a doctor and his son on San Geronio Mountain in a snow storm just this past March. (*Way to go, Annie!* – Editor)

In 1994 Geographic Information Systems (GIS) caught my interest so I continued my education and ultimately graduated with a Bachelors in Geographic Information Systems in 1998 from San Diego State University. After that my responsibilities at work including obtaining 0.5-foot accuracy of the base-mapping layer of the City's land information system.

In 2002 I retired from the Navy reserves. During my military career I was the first female EA to cross-rate (military term for a change in career paths) and be a class leader. I was also the first reserve female to be promoted to a Civil Engineering Corp Warrant Officer. Yes, there have been a lot of rewarding "firsts."

Now that life offered a wee bit of spare time, I decided to get more involved with CLSA because I felt that I owed the surveying community so much for what they offered me as a young lady delving into a career. I fulfilled the duties of Secretary, Treasurer, Vice-President and in 2005 served as San Diego County Chapter President. I have remained active as a State Representative and in various committees of the Chapter. It is invigorating to be a part of such an awesome group of experienced, knowledgeable and passionate professionals.

At the City of San Diego I went on to reviewing maps and other land title documents being processed through the City. When I first started reviewing maps, the City did not have an up-to-date manual to assist land surveyors with the process. The pre-

Continued on page 22

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Alpine	X	
Amador	X	
Butte	X	
Calaveras	X	
Colusa	X	
Contra Costa	X	
Del Norte	X	
El Dorado	X	X
Fresno	X	X
Glenn	X	
Humboldt	X	
Imperial	X	
Inyo	X	X
Kern	X	X
Kings	X	X
Lake	X	
Lassen	X	
Los Angeles	X	
Madera	X	X
Marin	X	X
Mariposa	X	
Mendocino	X	
Merced	X	X
Modoc	X	
Mono	X	X
Monterey	X	X
Napa	X	
Nevada	X	X
Orange	X	
Placer	X	
Plumas	X	
Riverside	X	
Sacramento	X	X
San Benito	X	X
San Bernardino	X	
San Diego	X	
San Francisco	X	
San Joaquin	X	X
San Luis Obispo	X	X
San Mateo	X	
Santa Barbara	X	
Santa Clara	X	
Santa Cruz	X	
Shasta	X	
Sierra	X	
Siskiyou	X	
Solano	X	
Sonoma	X	X
Stanislaus	X	
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Trinity	X	
Tulare	X	X
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vious City of San Diego Subdivision Manual was written in 1967 and had undergone many revisions over the years. However, the revisions were page changes or paragraph changes issued by memos reflecting the many changes to City policies and the subdivision process. In 1972, the Subdivision Map Act went through a major revision, including the addition of Parcel Maps as a document for subdividing land. I took it upon myself as a career enhancement project to complete a current manual. I reviewed manuals of other jurisdictions to begin the thought process, specifically reviewing the County of San Diego's manual. It was important to me to have consistent mapping requirements within the region. Additionally, I wanted the manual to be a useful resource for land surveyors. My desire was to coordinate a collaborative effort in order to have a well thought out document. My supervisor and I both wrote explanatory portions of the manual, inclusive of gaps and overlaps and reversion rights, to name a few topics covered. After much research, I included current legal requirements via hyperlinks to the Subdivision Map Act, Professional Land Surveyors Act, Streets and Highways Code, California Civil Code and the San Diego Land Development Code. I included an appendix of relevant case law that has been integral in California's mapping processes.

Upon the completion of the draft manual we formed a committee of members of the California Land Surveyors Association, San Diego Chapter and City staff. The members spent numerous hours evaluating and rewriting to provide this valuable tool for a land surveyor working within the City of San Diego. Being a

member of the committee created a sense of ownership and pride for each professional land surveyor that was involved. The 1967 manual gave little guidance to the applicant regarding the preparation of a map or any other land title document. This updated manual is now the guide to preparing and processing maps and other land title documents within the City of San Diego.

Coincident with writing the manual, I completed my graduate studies in 2006 with a Masters of Science in Civil Engineering from Fresno State University. My emphasis was in surveying, particularly the Subdivision Map Act, reversion rights and antiquated subdivisions. With the aforementioned conglomeration of experience, I was soon approving the land title documents being processed through the City as the Deputy City Engineer.

Currently I am working with Field Surveys for the City. I am privileged to work with Diana Bergen, PLS and our newest PLS, Teresa Munyer. We have encouraged and supported each other for many years. We continue to support each other but now we each have our own areas of expertise. After all, there is a broad brush of fulfilling career paths for a PLS from aerial mapping to subdivision mapping to GPS. The many aspects of surveying leaves an open door to any young woman wishing to challenge her logical thinking and her math skills while enjoying the outdoors.

I enjoy surveying, I cannot leave home without a map, I love hiking, I have a military background, I love summiting mountains, and therefore, I ended up volunteering as a fire lookout host. Who would be better at locating a fire, plotting it on a map and then calling it in to the forest service other than a surveyor? Once again, passion and background guided me without a thought. Come drop by at 9,000 feet to visit me when I am on duty at the Tahquitz Fire Lookout in Idyllwild, California.

Many surveyors get excited about old monuments, probably because we often follow in the footsteps of the original surveyor. To satisfy our appetites I organized a CLSA backpacking trip to the San Bernardino Initial Point to do just that and we found all three points. We also did a bike ride to the Mt Diablo Initial Point. We have one more California Initial Point to go. Gals...hiking and biking is great fun with handsome surveyors!!

Each time I summit a mountain in the Sierras I think of the original surveyors of the Geological Survey of California of the 1870s climbing that mountain with their instruments, barometer and hob-nailed boots. They were determined to scale those mountains and map the land. The 19th-century geologist Clarence King climbed Mount Tyndall thinking it was the highest peak. He also determined a magnetic bearing to Mount Whitney from Tyndall, which was obviously in error because when he attempted Mount Whitney, he did not find the true summit. He corrected his data, continued his venture and submitted his data to the chief topographer of the survey, Charles Hoffman. The original surveyors will always be an inspiration to me. I climb the mountains, knowing the way to the summit has been established and is obtainable, just as a surveying career will be for any young lady that desires a rewarding mathematical and outdoors career. ❖



From Musician to Map Checker

By: Carol Knox, PLS

I took quite an indirect path to becoming a surveyor. After getting a degree in music (yes, I'm not kidding) from a school in upstate New York, I moved to Riverside, CA in 1982. I had a series of (very) odd jobs before finding a job as a receptionist in a mortgage company. I worked my way up to "loan funder" and I mention this because it was there I was introduced to title reports and deeds, etc. In 1988, after the third mortgage company I worked for went bankrupt (shades of 2008!) a friend got me a job at a Riverside engineering and surveying firm, doing entry-level COGO. I had computer experience in college, as well as when I was a funder. I have always had strong math skills as well. I worked there for about two years and got some experience putting maps together, doing different kinds of calculations, drafting and learning what surveying was all about. I met Paul Cuomo at about that time, during an LSIT prep seminar. Since I was a fellow ex-New Yorker, he told me about an opening at the County of Orange for a map checker. I applied for and got the job (after passing my LSIT), starting there in January 1991. For the next 8 years I worked at the County. I started as a map checker, then in the field, and then, as a map preparer and project manager. Among my biggest projects was the Antonio Parkway record of survey (a high-profile "fast track" job at the time) and the MCAS El Toro Marine Base record of survey (I believe that map still holds the record for most recorded pages for an Orange County record of survey, at 49).

One of the high points of my County career was John Canas giving me the chance to write an article about a very exciting project I worked on. The article eventually became the cover story for the April 1999 issue of POB, regarding the Orange County boundary. I had worked with an office colleague and a party chief on five records of survey along the boundary: one with Los Angeles, one with Riverside, one with San Bernardino, and one with San Diego, as well as a coastal boundary survey. The project began in 1992. The article and the maps were uniquely excellent projects (lots of history, research, and analysis), involving trips to each of the counties involved with the maps, meeting with each of the County Surveyors, and extensive research through all of the old Orange County field books. For this project, I also researched old legal documents at the Courthouse and Court library, as well as at Camp Pendleton Marine Base. We actually consulted local and state historians, agencies such as the B.L.M. and N.G.S., museums (for their historical records), title companies, and historical reference books.

Without regurgitating the entire article, let me summarize as follows: each of the four counties presented a different challenge. The boundary with Los Angeles County was quite well monu-



mented, for the most part, except for one boundary station currently within the freeway right-of-way. The boundary with San Bernardino County was also well monumented, although the retracement took the field crews through some difficult terrain. The boundary with San Diego County involved dealing with boundaries of two overlapping ranchos and some annexations. (The map for the boundary along the ocean was still in process when I left the County. I believe that it has been completed).

The most difficult boundary to research and resolve was the boundary with Riverside County, partially due to the vagueness of the original description in the Government Code for the boundary, as well as the topography in the area. Some boundary corners were located on mountain peaks and were originally triangulated in from valleys quite a distance away. There were some conflicts between the mountain names called out in the original field notes and the actual locations when these monuments were found; it was possible that some of the early records confused the names of the peaks! Some of the terrain was difficult to traverse, even in 1992. One monument was determined to have been disturbed by a landslide. After a great deal of field and office work was completed, all four of the records of survey recorded in 1996. When all was said and done, this was truly the project of a lifetime!

While I worked at the field offices at the County I also met John Knox, LS 6365, who was to become my husband several years later. He was a party chief so I didn't see him very often at work (the field offices were in a different location) but we always joked that I only began dating him so I could get removed from his crew (he was a "hard core" party chief) – where I had been temporarily assigned. We moved to Orange County (from Corona) in 2001.

Continued on page 26

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over the state, people I might not have met otherwise. I have also done some Board enforcement work.

Since I struck out on my own I have been a contractor for several surveying/engineering firms in Orange County, as well as a contract map checker for Orange, Ventura, and Santa Barbara counties. I was able to work with one private company for several years, and have worked for several others off and on, as dictated by their “overflow” work needs. I have worked on a huge variety of projects, everything from one-lot surveys to huge multi-county landbase mapping, including sectional work, freeways, lots of easement, right-of-way and title issues, involving thousands of title documents. Right now I mainly check subdivision maps, with occasional right-of-way determination, and some map preparation. Truthfully, map checking can tend to be tedious, yet if I keep in mind that I am helping to better the profession (that is my wish and goal, anyway!) then I do not mind some of the repetition. For detail-oriented, editor-type people like me, map checking is an ideal aspect of surveying. I also enjoy working on Certificates of Compliance, taking a piece of property back to when it was first created and determining its legal status. This, as well as putting dozens/hundreds of deeds together to form a base map, is the most interesting aspect of what I have been able to work on. It is true that from week to week, I often do not know whether or not I will be employed, but over the 10 years I have been self-employed, I have been fortunate in having steady work almost all of the time (except for the first few months of 2008).

I know that some women in surveying have had problems related to the fact that it is truly a male-dominated field. I must confess that I personally have had very few problems in this regard. I hope it is because as the men came to know me, they respected my work ethic, my math (and spelling!) skills, and my willingness to help where I could. I wonder if I had spent more time in private practice (or in the field!) instead of working for the Orange County Surveyor, if I would have encountered more problems. I am much more comfortable in front of a computer than carrying around heavy instruments, hacking brush, standing on the freeway or using a star drill (just ask my husband!) and there has always been a place for me in this profession.

I feel very lucky to be a private contractor/consultant. I think that for someone who works well independently, and can also be part of a “team” when needed, land surveying is a fine career choice. I believe that many people, once licensed, tend to specialize. Obviously I have specialized into mapping. I love the flexibility I have, of working at home (for map checking), and I also enjoy my occasional visits to clients’ offices, visits I need to make when working on projects for them. And I hope that women realize that they don’t have to spend all (or much) of their career “in the field” if that does not suit them. Or, if they love being outdoors, this is also a fine career choice!

And as for working with MEN, my advice is: “Keep your sense of humor!” ❖



I got licensed in 1995 and that same year, started doing work for the Board, being a part of various committees, grading the LS Exam nearly every year since then, and serving on the Exam Committee for the last three years. I think that my work for the Board has been the most rewarding and interesting of my career. It makes me feel as if I can “give back” to the profession by being involved with the exam, trying to maintain its content and quality. Also, participating like this has allowed me to make friends all



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Standing in Tall Barley

By: Linda Richardson, PLS

My name is Linda Richardson and I am proud to be a Professional Land Surveyor licensed by the State of California. I work for a private engineering and surveying firm in San Luis Obispo by the name of eda design professionals, where I solicit survey work, prepare proposals, research background information for surveys, perform preliminary calculations, and schedule surveyors to perform the field work. We have three survey crews so I am kept pretty busy trying to keep them busy. As an added bonus, I get to have a lot of fun! By the time the field crews bring their survey data back to the office and download it, I have done most of the necessary research to be able to resolve boundaries for boundary surveys, plot easements for topographic survey maps, or prepare legal descriptions for easements and right of way descriptions. One of my favorite projects is preparing ALTA/ACSM surveys because it usually involves all of the above.

A typical job starts with a phone call. "I just want to know how much it will cost to set a couple of property corners." Once I finally convince them that I really am a surveyor and not just taking a message for one, I try to get a name, address and site location. I usually have to work at it. I get "Bob" for the name and have to pry out the last name. "What do you want my address for?" usually comes next. I explain that I would like to prepare and send a survey proposal to him. He will usually tell me where the job is but not always; maybe he thinks we'll run out and survey it while he's not looking and send him a bill! Once I look up the property on the tax assessor's maps, I ask about the purpose of the survey. Sometimes it is "I just want to build a fence so setting two corners can't cost more than \$200, can it?" Then comes the explanation of what a surveyor does, how it's done and why it generally costs more than \$200. There are times when they say something like "My bank says I have to have a survey to get the loan." Next, there comes a bit of digging. Is this survey for a purchase or a refinance? Does the bank paper say anything resembling "ALTA Survey?" This is the time to explain to the lay person what all six pages of ALTA survey instructions mean, try to pry out of them the bank's survey requirements and the bank's required certification, so I know what is involved in the survey.

Now comes a little detective work. Researching previous surveys in the vicinity can be a challenge. Some counties are wonderful about keeping indexing records available to the public. Others are less helpful. I often spend more hours researching a project than the client is actually charged for. The better prepared the surveyor is going to the job, the more time is saved in the field. If a client sends us out to perform an ALTA survey and tells us to use the "standard" certification and requirements, our proposal reflects a price for that specific type of survey. After the survey is completed and the bank sends it back with a brand new list of survey requirements that I have never seen, it is time to prepare an addendum for a revised scope of services. The client is always completely surprised. "Oh – is that what you meant



by "survey requirements?" Once all parties are finally satisfied with the survey and the client purchases the property then the fun begins. We may then be asked to do construction staking for the project they have designed for the site. They may need legal descriptions for easements. They

may need an "as built" survey after construction and then – you guessed it – an "updated" ALTA survey. One phone call can turn into several years of work, so be careful how you react to someone who seems to be expecting a \$200 survey.

While working for Volbrecht Surveys in Atascadero, I had the opportunity to do some sectionalized land surveys in the backcountry of the central coast. One of them was in a small community called Adelaida between Paso Robles and the coast. I spent a lot of time standing in the middle of a huge barley field with the instrument set up waiting for my partner, Doug Marin, to wind his way up into the hills with the survey truck to locate a section corner for me to shoot. As my wait progressed so did the temperature. It got up to about 112° that day. It is amazing how effectively barley reflects the heat up to the top of the stalks – about where my head was. Instead of wearing my hat (as I should have been), I was wearing a visor with the top of my head bare. Neither of us expected that I would be standing there for well over an hour; I left my water in the truck that was winding up the mountain. Eventually I called Doug and told him I was starting to feel faint and needed to get out of the sun for a few minutes, but I was going to leave the instrument set up and in place. "Don't come back and run over it!" The ranch house was a short hike away. I figured I could walk to it, get a drink of water, and cool my head off. Unfortunately, when I arrived I found their water had been turned off

Continued on next page

to make a repair. By this time I was not in very good condition. I needed to cool off my boiling brain so I used what was available. I stuck my head in the cattle trough! (I decided I could wait for that drink until the survey truck returned.) I then folded up a record map into a pirate hat and got back to the instrument in time to get the shot. That was the last time I EVER left my water in the truck “for a few minutes.” Even with that discomfort, the country was so breathtakingly beautiful I would not trade the experience for anything.

My favorite project, which I spent several weeks on a few years ago, was a survey of Hearst Ranch. That is some of the most beautiful as well as diversified land I have ever walked over. I hiked along coastlines that are not generally accessible to the public. At one point I flushed out a full-grown buck from a bush ten feet from me, where he had hunkered down to hide. I also had an encounter with a Charolais bull that took exception to my presence. He snuck up behind me and then charged. All I knew was that I had been grabbed by the collar and seat of the pants and thrown bodily into our vehicle with my partner landing on top of me as the door closed. (I swear that bull laughed). We went into rugged backcountry where the trees were morphed into what looked like a full-grown tree but with trunks that were only half of normal height (pygmy oaks). We traversed up to the Hearst Castle parking area and set up a triple backsite. When we finished our traverse I tried to check our backsite but couldn't get a shot on it. When we drove back to the parking lot we found it pointing in a different direction. People were gathered around the backsite; they had it turned toward the castle and were trying to look at it through the glass!!!!

Many people don't realize that surveyors do as much work in the office on computers, or sleuthing through records doing research for projects, as they do working in the field pounding stakes and digging for property corners. Someone has to tell the field surveyor where to look or where to pound that stake! Since only surveyors can create new parcels of land, there is a lot of mapping and legal description writing to be done as well. An interesting aspect is trying to read old deeds that are hand written. The handwriting is amazingly beautiful on some of them. And some have beautiful handwriting that is nearly completely illegible. It gets really interesting when you get some old English document where the “f” and “s” is the same character. You can come up with some very interesting translations that may or may not help you with your survey. I once spent two days trying to decipher a deed that included the allowing of railroad crossings. My task was to determine how many crossings were allowed and where they could be. Much of the information I needed fell in a place on the deed that was almost completely black. By going to the County Recorder and looking at the best available copy of the deed I was able to determine the information I needed using a magnifying glass, a copy machine to enlarge the copy, and a lot of imagination. Once you decipher a couple of words in a sentence it's much easier to see the missing, almost illegible, words.

Some of the old maps are a real treasure trove. Others are nearly useless. I've spent many hours at the County Recorder's office with my trusty magnifying glass trying to read the bearings and distances on the original copy of a record map. It gets most challenging when the reference is to the “red” line as opposed to the “green” line. If you can't see the original you're out of luck! I remember standing on a table at the County Recorder's office with a scale measuring ties to the old City Boundary for San Luis Obispo. It seems that the only map “on file” at the County Recorder's office is framed and hanging

on their wall. As I understand it, the County used a similar method to write their legal description for the County boundary. I figured if it's good enough for the County it is good enough for me!

Back in 1983 I was working as an engineering technician preparing grading plans, topographic survey maps, subdivision maps, record of survey maps, etc. One of the surveyors I worked with challenged me to take the “LSIT” exam just to see if I could pass it. I took it and I did pass it. Of course, then he challenged me to prepare to take the “PLS” exam. I did not have a college degree so it never occurred to me that I could still qualify to take the exam if I could obtain enough field experience. I already had several years of office experience. It sounded intriguing. After all, it is the surveying side of the business that I love. I then went to work for an office that did only surveying (no engineering) and I was happy as a clam. I was performing field surveys for boundary, topography, aerial control, ALTA, etc. I got to take my own fieldwork into the office and make it into something useful! I loved it! I finally knew what I wanted to do as a career. The only problem I had was when I had to switch from instrument to rod. My partner was a foot taller than me. Try as he did to lower the instrument to a reasonable height for me it was always over my head. I simply stood on the instrument case and all was well. (Don't tell my boss!) I began taking PLS review classes provided by our local CLSA Central Coast chapter (yes, we were doing them as far back as 1990) and I passed the exam in 1993 (on an appeal, by the way, in case you don't think anyone is ever successful with an appeal). I never could have done it without the support of CLSA. That is why I have always tried to continue to be involved and do what I can to support the organization through all the years since I got my license.

I was one of the lucky ones. All the people (mostly men) that I worked with encouraged me to become a surveyor. None of them tried to discourage me. My parents were very supportive as well. I was raised knowing that I could do whatever I wanted to do if I worked hard enough at it. The only discouragement I ever received was in high school where a teacher's attitude was to not allow me to “take up space” in a drafting class that could possibly prevent a male future “wage earner” from finding employment. I do not even want to think about how they expected a female to survive if not married immediately upon graduation from school! I finally had to compromise and take the class during summer school. (I wound up teaching drafting at the junior high school in my senior year for work credit. So Ha!)

I have had the pleasure of working the booth during high school career days and have been President of our CLSA chapter on two occasions. I have worked on the PLS exam preparation, grading, and appeals for several years. I am also a Technical Expert to the Board of Professional Engineers and Land Surveyors. I've attended nearly all the CLSA Conferences since 1986 and like to keep up with continuing education through CLSA sponsored seminars, all as a means of keeping current with our industry. I am a certified member of the CLSA Professional Development Program for 2006-2007, and have had the pleasure of working with Robert Reese on creating the “Choose Your Path...Make Your Mark” recruitment video.

Surveying is a wonderfully rewarding field for women. Some day I hope there will be enough of us so that we will have a line at the ladies room at the end of a meeting, instead of there only being one at the mens room. Until then, I will enjoy being part of the minority in the profession! ❖



Controlling a Photogrammetric Model from the Sky

Background

Conventional photogrammetric methods for model setup utilize the known positions of paneled control points on the ground and the measurement of these control points within the photogrammetric model. The re-creation of the photo geometry that existed when the photographs are taken (relative orientation) is mixed with these photo control point measurements (absolute orientation) to produce a stereo model within the ground coordinate system. If only the two positions of the camera are known as determined through airborne GPS observations (AbGPS), the orientation of the model cannot be accurately determined due to instability about the flightline. By adding a second flightline perpendicular to the first, four virtual control points (the camera centers) coupled with aerotriangulation (AT) can be used to orient the models. This article will discuss a test performed to evaluate the feasibility of using control points in the sky to control a pair of photogrammetric models.

The Project



Borrego Test Site

This experiment was conducted on a shoestring. Skyview Aerial Photo, Inc. generously donated the AbGPS observations and the additional flightline required to create the control network of four points in the sky. Two single model flight lines were flown 3600' above five paneled control points. The Plate

Boundary Observatory "provided" the ground monitoring through a nearby CORS, P486. Rick Engineering Company provided the static GPS observations required to put the ground control points and the CORS on the same coordinate system. Photo centers, denoted PC4X in the graphic, formed a diamond of "sky control" which was used to control the two models. Estimated accuracy levels are based on a comparison of the "true" coordinates of the ground control points with their photogrammetrically determined values obtained from AT where all five points serve as unconstrained pass points. Additionally, the camera station (a.k.a. photo center) positions determined from the ground control-based AT were compared with those determined using AbGPS. Three independent AT runs were made in order to create three data sets for comparison. The first run used conventional AT techniques where the AbGPS data was not considered and all five-ground control points were measured in the photos. These points served both as control points as well as pass points which tie the photographs together. The next run denoted "Set 1" was made using the four camera positions determined by AbGPS as the only control. The panels served only as pass points. Set 2 was constrained to the four AbGPS-determined photo centers and a single (HV-11) ground control point. Set 3 was created by taking Set 1 AT run (AbGPS-only) and shifting it by the amount that HV-11 was observed to be out of position (a shift of 3.2' east, 2.2' south, and down 4.6'). The consistency of the values in the table illustrate this systematic misregistration and the validity of applying the shifts.

Observations

It can be seen in the table below:

- The AbGPS-only run yielded results which were approximately 3' west and 3' north, and 4' above the measured ground positions.
- The addition of a single ground control point to the AT measurements resulted in positional improvements down to approximately 1' horizontally and 2' vertically.
- The shifts between the control and the AbGPS-determined positions were systematic for both the ground control and camera centers.

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HV-11	3.2	-2.2	-4.6	1.3	-0.8	-1.9	0.0	0.0	0.0	PC45	1.7	-2.2	-0.8
HV-13	2.0	-3.0	-4.2	1.0	-0.9	-1.6	-1.2	-0.7	0.4	PC46	1.8	-1.0	-1.4
HV-14	3.1	-3.4	-4.2	1.2	-1.1	-2.2	-0.2	-1.2	0.4				

- By shifting the AbGPS-only control values as a group back to the true position of HV-11, residuals were reduced to an impressive 1' level.
- The camera center shifts were in the same direction as the AbGPS AT runs yet magnitudes did vary.

Conclusions

Ground control-less photogrammetry has many possibilities yet the user must be aware of the shortcomings and have ways of determining their existence, location, and magnitude. In all of the sets of data shown above, a distinct bias can be seen. This implies that "sky control" has good relative accuracy yet weaker absolute accuracy. By removing this bias as is seen in set 3, accuracies are quite impressive.

- AT set 1 may be usable for low accuracy orthophotography. The largest error is seen in the Z, which usually has less effect on ortho accuracy, however, without ground truthing errors can only be estimated.
- The accuracy improvements seen in Set 2 show the importance of some ground control. Using only one point lacks the necessary redundancy.
- Set 3 revealed potential accuracies +/-6' horizontally and better than a foot vertically, suitable for smaller scale/larger contour interval mapping.

Vertical control accuracy should be better than 1/25000 of the flying height for 6" photography. This translates to 0.14' for the 600-scale photography used for this project. Photography at this scale is suitable for mapping at a scale of 1"=100' with a two-foot contour interval. The sky control measured in this study will not support a two-foot contour interval mapping. Additional ground control points would need to be added to provide the required strength.

- Inaccuracies in the AbGPS-determined camera/photo center positions (particularly vertical) can translate to even larger inaccuracies of ground positions for this single model scenario due to the shorter distance between photo centers (2200') transferred 3600' to the ground (short backside/long foresight syndrome).
- Having some kind of ground truthing is very important.

The photogrammetric journey from an aerial photograph to a map contains many components (all of which contain errors) that can contribute to the final accuracy. Photo scale, AbGPS sampling interval, satellite geometry, base station distance from project, number of photos in block, aerotriangulation, stereoplotter operator quality, etc., all contribute at various levels. Once this product has been created, an assessment and statement (metadata) of accuracy needs to be made. It all comes back to the ground truthing. ❖

Caltrans Laser Scanning Research Update

By: Kevin Akin, PLS of Caltrans and Ty Lasky of University of California, Davis

Following is the research update that Kevin promised us in his article "Caltrans Laser Scanning Research" in Issue #153. - Editor

The Advanced Highway Maintenance and Construction Technology Center (AHMCT) of the University of California at Davis has completed a research project on stationary time of flight Laser Scanners for the California Department of Highways (Caltrans). The research consisted of field trials of laser scanners on pavement, a bridge, and test objects. The objective of this testing was to clarify the common limitations of 3D laser scanners, recommend mitigation methods, help engineers and surveyors to select the right scanner, and determine optimum scanning settings for survey applications in diverse situations. CAD data formats that should be used for archival and exchanged purposes are also covered. This information will be used to create laser scanning survey specifications in the Caltrans Survey Manual. The completed report can be found at:

http://www.ahmct.ucdavis.edu/images/AHMCT_LidarFinalReport.pdf. ❖

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Virtualization, Cloud Computing and Open Source

It was 1998, the year that brought us the Unabomber, Monica Lewinsky and the ban on smoking in bars throughout the State of California. During that same year, in the not so ubiquitous shadows of the technology domains, there were acronyms being birthed like 'XML' (Extensible Markup Language) and oddly coined numeric wireless networking standards such as '802.11' (original version of wireless networking standard). Among the Internet enthusiasts and telecommunication marketers, the word 'broadband' was being used liberally. The antiquated 56k modem was insufficient to feed the appetite for online content of the refined Internet user. Ten years later, these once obscure technologies have been so seamlessly integrated into our common daily workflow, that their once significant contributions to our productivity now go somewhat unnoticed. If you had to go a day without any one of these technologies now, it is guaranteed you would be found wanting.

Hopefully, the title of this column caught your eye. These three technologies, namely virtualization, cloud computing and open source, will significantly impact our daily workflows of the next decade. They will change the size and capabilities of the devices we currently use and the way our hardware and software interact. Actually, these technologies have already begun to be put to use in our daily lives. Using the online resource Wikipedia, here's a breakdown of what these technologies mean:

Virtualization is a broad term that refers to the abstraction of computer resources. Whoa, that's a little heavy! What exactly does that mean? It means that on one computer, you can divide the resources to virtually make it do the work of what three computers would have normally done. Multiple operating systems can exist and operate simultaneously on one machine. Interesting, isn't it? Simplified, it means instead of three servers in your back room, you may be able to get by with one. Both software and hardware can be made to have a virtual presence. In our profession, we have seen this happen with the GPS base station. Multiple reference stations can be pooled, their data combined and rebroadcasted via a broadband wireless connection to impose a presence of a base station to your rover known as a virtual base station.

Cloud Computing is another catch phrase that implies computing data that is stored on the Internet. A simple example of this is what Google and Microsoft have done with their online business applications; Google Doc's and Office Workspace. The documents that you create with these applications are stored on the Internet and can be accessed and edited by anyone who has been assigned rights to the document and who has an Internet connection. Cloud Computing

encompasses a whole variety of data and file types, of which the applications for the management of this data are still being conceived and developed.

Open source is a development methodology for writing software and creating applications. Open source was made popular by a Finnish gentleman by the name of Linus Torvalds in September of 1991 when he uploaded the first version of the operating system known as Linux. Open source methodology made it possible for every programmer, from anywhere in the world to view the code for Linux, modify it, contribute to and use it, all free of charge. Today, you can download the Linux OS for free, the most popular distributors being Red Hat and Novell's Suse Linux. OpenOffice is another open source set of office applications, very similar to the Microsoft Office suite, that is available via a free download. Companies like IBM, Novell and Google have built upon open source software as a part of their business model. If you are using any of these free versions of software, you can thank Mr. Torvalds and the army of worldwide open source programmers that made this possible.

All this is nice and informative, and may even save you a few bucks on software if you switch to open source. But really, what does this mean for the land surveying profession? Simply put, in one word – convergence. In the next decade, we will see these current seemingly obscure technical phrases and terms integrated, in ways we can not yet think of into our daily lives and workflows.

Already, we are seeing the integration of broadband wireless modems and GPS receivers, making them out-of-the-box ready for virtual GPS networks. The abundance of low-cost GPS chipsets within the mobile phone community has caught the attention of the open source developers. Open source mobile GPS applications have already been developed and made available to the public for free. Some research estimates have suggested that these cheap mobile GPS chipsets will see global sales volume of more than 100 million units by 2011. Expect to see the hardware we use in the field today get smaller, more powerful and much smarter. Anticipate a convergence in technology that will bring the positional accuracies, spatial data and land information available to us today, to a more diversified user base.

As a profession, the challenges of technological proliferation and convergence will place greater pressure on the land surveyors of the next decade. Adapting to these new technologies requires a greater emphasis on education and a stronger focus on professional diversification. ❖

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CLSA Attempts to Unravel the Limitation on Land Surveyor Liability Conundrum

At the June 2007 CLSA Legislative Committee meeting, the committee discussed the age old question regarding the length of time a land surveyor remains liable for services performed on behalf of a client. The opinions ranged from the various statutes of repose which set outside limits for land surveyor liability to the notion that land surveyors liability follows them to their grave.

Needless to say, there was no consensus on the length of time that a land surveyor could be sued when their services were not performed to the reasonable standard of care in the profession. In a moment of weakness, I offered to undertake the initial legal research into the various code sections that govern this matter and attempt to sort out the application of various code sections to land surveyor services. I reported the findings of my legal research back to the CLSA Legislative Committee which then discussed the most appropriate way to validate my conclusions. Although the Legislative Committee received Board approval to request an Attorney General's Opinion, the Legislative Committee thought that it might be more prudent to obtain an opinion from the Office of Legislative Counsel in order to be apprised of their legal expertise before a published AG's Opinion.

CLSA approached Assemblywoman Noreen Evans who is a member of the Assembly Judiciary Committee and a well respected lawyer legislator from Santa Rosa to request a Legislative Counsel opinion. Assemblywoman Evans agreed and an opinion request was drafted by CLSA to properly frame the question. On April 29, the Legislative Counsel issued its opinion that concludes as follows:

...any cause of action for land surveyor services that are inaccurate or not performed to the ordinary standard of care in the land surveying profession, if the subject property is not otherwise physically improved or constructed upon, is subject to the 2, 3, or four-year statutes of limitations ..., depending on the theory of recovery, but in any event, **must be filed within four or 10 years of substantial completion of the services under the statute of repose. Also, the maximum period of time for which a land surveyor may be held liable ..., is 4 or 10 years from the substantial completion of the services.** (Emphasis added)

Therefore, according to the Legislative Counsel opinion, a land surveyor is liable for negligent survey activity for a maximum period of either 4 or 10 years, if the subject property

is not improved or constructed upon. A copy of the Office of Legislative Counsel can be found on the CLSA website.

Applicable Statutes

It is important for land surveyors to understand the complicated underlying legal rationale interpreting multiple statutes and legal theories that resulted in the above conclusion. There are two statutes of limitations that contain their own specific time period for liability depending upon the theory of recovery and two statutes of repose.

The **two statutes of limitation** contained in the Code of Civil Procedure specify the time in which a cause of action must be filed in either a contract or tort claim as follows:

CCP 337: Within four years [for an] action upon any contract, obligation or liability founded upon an instrument in writing (a contract cause of action);

CCP 338: Within three years [for an] action for trespass upon or injury to real property (a tort cause of action).

The opinion states that "thus, a cause of action based upon a written contract, such as a breach of contract, must be brought within four years. A cause of action to recover damages or injury to real property, for example, by negligence, must be brought within three years. The claim commences to run when the plaintiff knows, or should have known, of the wrongful conduct at issue." The plaintiff who alleges the injury has what is known as "an election of remedies" and is entitled to select either a contract remedy or tort remedy, or both, causes of action.

The **two statutes** of repose contained in the Code of Civil Procedure specify the outside limits to liability for surveyor services performed in connection with an improvement to real property as follows:

CCP 337.1: (a) no action shall be brought to recover damages from any person performing or furnishing ... surveying ... of an improvement to real property more than four years after the substantial completion of such improvement for ... any patent deficiency in the ... surveying ... of an improvement to or survey of, real property;

(e) As used in this section, "**patent deficiency**" means a deficiency which is apparent by reasonable inspection.

Continued on next page

CCP 337.15: (a) No action may be brought to recover damages from any person ... who ... performs or furnishes ... surveying ... of an improvement to real property more than 10 years after the substantial completion of the development or improvement for ... any latent deficiency in the ... surveying ... of an improvement to, or survey of, real property.

(b) As used in this section, "**latent deficiency**" means a deficiency which is not apparent by reasonable inspection.

(g) The date of substantial completion shall relate specifically to the performance or furnishing ... surveying ... by each profession or trade rendering services to the improvement.

The opinion states that "thus, a cause of action to recover for damages to real property caused by a **patent defect** in the construction of an improvement to the property must be brought within **four years** after the substantial completion of the improvement. Similarly, a cause of action to recover for damages to real property caused by a **latent defect** in the construction of an improvement to the property must be brought within **10 years** after the substantial completion of the improvement."

The Legislative Counsel cites the California Supreme Court decision in *Lantzy v. Centex Homes* (31 Cal. 4th 363, 369-370) for the premise that the statutes of limitation and the statutes of repose are not mutually exclusive, but must both be considered in determining the viability of a claim. The Court states that the "interplay between these statutes sets up a two-step process: (1) actions for a latent defect must be filed within three years ... or four years ... of discovery, but (2) in any event must be filed within 10 years ... of substantial completion." This is a "**two-step process in first determining whether any applicable statutes of limitation have run, and then whether the claim has been extinguished by the running of the period of repose.**"

No Physical Improvement to the Property Required

What if the property for which survey services were rendered is not improved by the client (e.g., the corner record, parcel or final map, etc. is merely placed in the desk drawer with no further action)? According to the Legislative Counsel opinion, the next question that must be answered is "whether the provision of land surveyor services, without any physical improvement to, or construction upon, the real property is an "improvement" for the purposes of Sections 337.1 and 337.15." The opinion cites "case law [that] makes it abundantly clear that the legislative intent in an acting Sections 337.1 and 337.15 was to limit liability exposure to a finite period of time for certain activities (*Gaggero v. County of San Diego*, 124 Cal.App.4th 609, 615-618) **and** that "because surveyor services are expressly included among the construction services subject to sections 337.1 and 337.15 ..., it follows that those services are among

those for which the legislature intended to limit liability exposure to a finite period of time."

Substantial Completion of the Improvement Equals Land Surveyor Services

The next question that must be answered is when "substantial completion of the improvement" is measured. The opinion cites the decision in *Industrial Risk Insurers v. Rust Engineering Company* (232 Cal.App.3rd) for the proposition that "the limitations period commences as to each profession on the date its services to the improvement are substantially complete." Therefore, the limitations period commences when the land surveyor substantially completes the services for which they were hired which then becomes a factual determination in each instance.

In summation, the Legislative Counsel opinion stands for the proposition that the legislature intended a finite period of liability for land surveyor services and that the activity of a land surveyor constitutes an improvement to the real property regardless of whether a project for which survey services were rendered was actually commenced. The applicable time periods for the statutes of limitation or the statutes of repose are triggered when a land surveyor substantially completes their surveyor services. Although the application of this opinion depends upon each specific fact situation encountered by a land surveyor, it is clear that a land surveyor's liability does not extend beyond 10 years from the substantial completion of land surveyor services.

There is an **important caveat** in the Legislative Counsel opinion which states that it is "critical to note that no court has addressed the particular fact pattern" where there is no physical construction on or improvement to real property. Although the opinion recognizes that the "statutes on their face are not entirely clear, and that neither the statutes nor case law are dispositive ... we find that land surveyor services in themselves, without additional physical improvements or construction services being rendered, would constitute an improvement for the purposes of 337.1 and 337.15."

Legislative Counsel opinions are specifically acknowledged and judicially recognized in the decisions of California courts. The appellate courts have ruled that "utilization of a Legislative Counsel opinion is appropriate in construing a statute" and the Supreme Court has stated that "opinions of the Legislative Counsel have the same stature as opinions of the Attorney General." Therefore, CLSA members encountering issues relating to a limitation on their liability can use the Legislative Counsel opinion to validate a limitation on their liability exposure and to measure their time period for their liability exposure.

Disclaimer: *This article is intended to interpret the Legislative Counsel opinion only and is not intended to provide legal advice. Land surveyors are advised to seek legal counsel when encountering a situation involving the statutes of limitation or the statutes of repose discussed in this article.* ❖



From Stone Walls to Section Corners

By: Susan Ruschmeyer, PLS



Back in New York State in the 50's and 60's, a frequent family activity in my childhood home was the viewing of our home movies on a portable screen in our den. One of our all-time favorite viewings was the one of me at about age seven, "helping" two local surveyors survey our ten-acre property in the rural mountains of the northern Adirondacks. The party chief, Edwin Knox, was the father of my best friend Gracie, so he let me tag along with them all day, asking questions and carrying what I could, which I am sure was not as much fun for him as it was for me! Our summer camp, aptly named "Cragmere", sat high on a rocky bluff at the lake's shore, surrounded by dense and steep eastern woodlands; much of the boundary was marked by a long line of blazed trees which the surveyors axed their way around as I watched with great fascination. We had no road or electricity, accessing the property by boat or by foot, and our eastern boundary was a good stretch of rocky shoreline, meandering in and out of some "table" rock outcrops and nice deep bays, where we safely moored our floating boat-house. In the ensuing years, I would make many annual treks around the property lines, on foot (and also by boat) bringing with me anyone who wanted to go, re-painting the blazed trees and making sure the perimeter path was unobstructed. Looking back, I guess that's where my career began.


My serious interest in land surveying developed when I went to a technical college to study forestry many years later. In the interim, I had been through the typical elementary and high school education for a girl at that time, which basically conformed to the standard educational mantra of that day, i.e., "girls are good at language and home economics; boys are good at math and science". In other words, we (girls) were not encouraged to study anything in school other than what our school counselors felt would make us be good "home-makers", and being a land surveyor did not fit that mold, to say the least! It was not until I had graduated from high school, attended a liberal arts college for one year, dropped out and worked at various jobs, that I found something that really interested me: forestry. So I returned to the Adirondacks to attend Paul Smith's College of Arts and Sciences, aka Paul Smith's College of the Adirondacks.

At Paul Smith's, surveying courses were a part of our forestry curriculum, as was algebra and trigonometry, and I discovered two things: I loved surveying and I was good at math! We tromped all over the vast Paul Smith's campus in the Adirondack Mountains on different timber cruising, silviculture and surveying projects, using fairly primitive field equipment such as stadia rods, chains and chaining pins, plane tables, abney levels, and closing traverses using logarithms and slide rules. We had a 300-foot topographic "tape" with a trailer, and were required to convert our slope distances to horizontal as we went. I remember that the first survey traverse we had to run went through two bogs (swamps) and dense woodlands (with lots of biting insects). All of the crews had to run it again because no one was able to close it to our required specifications of 1:5000! I was hooked. Paul Smith's was a great place to be. Even at that time, although definitely in the minority, there were a fair number of female students in my program, and our professors worked us just as hard as they did the boys.

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After graduation, I could not land a job in my field right away, so I went to work for a lumber company in Brattleboro, Vermont and became a rip saw operator in their gunstock factory. As luck would have it, the lumber company had a surveying and engineering division to measure and manage all of their many timber resources. One day, on my lunch hour, I went over to that building, and dropped off my resume. A few days later a representative of the engineering company came over to get me for an interview. Thus began my professional career in the field of land surveying in 1975, working under the direct supervision of Addison Minott, Vermont Registered Land Surveyor No. 2. Under his tutelage at this fairly small company, Southern Vermont Engineering, I was exposed to the full gamut of office and field tasks in the (then modern) world of surveying, often working on snowshoes in the winter, using the first EDM equipment on the market (which was in a very large suitcase), using old IBM computers with skinny magnetic cards (remember those?) and doing record research (pouring through the hand-written texts of the first land records in a tiny back room in small towns like Athens, Vermont). I worked for Addison for about seven years until I decided to head West. I have worked in Nevada and California ever since for various land surveying and/or land engineering companies, gaining the responsible charge and experience to necessary sit for and earn my LSIT and PLS licenses. I began my own company, Pacific Land Surveys, located in Bodega, California, in September of 1995.

Having been involved in many different types of projects over the course of my career, I would have to say that boundary retracement and riparian boundaries are two areas that I find to be the most interesting and challenging. A favorite project of mine that Pacific Land Surveys worked on for three years running was a salmon habitat restoration project on Lagunitas Creek in Marin County. We contracted with a group of environmentalists and hydrologists to run transects (cross-sections to most surveyors) of six miles of the creek in six locations at the same time each year so that our survey data could be studied to evaluate streambed sedimentation and used to come up with a scientific plan for habitat improvement. All study sites were connected by a geodetic control traverse. As with other environmental riparian projects we have done, we had to perform much of our work fully suited up in chest waders (much needed!), which actually is fairly easy to do in the water, but not quite as

comfortable to wear climbing up steep, brushy creek banks, fighting through stinging nettles and poison oak. (Lots of falling and swearing was going on!) The silver lining for me is that our data was actually used as an integral part of the implementation of a current plan to help preserve this wonderful species of fish.

During my career, I have been privileged to work with, been mentored by, and have sought the professional counsel of some of the most interesting and best people in the field, such as Dennis Mouland of Cadastral Consultants and (the late) Roy Minnick. I hope that I have been able to impart some of the things I have learned to some of the many young people I have mentored, some of whom have also been able to teach me a thing or two.

After many years in the profession one of the most important things I have learned, and one of the main reasons I still love surveying, is that there is always something new to learn, and always more to learn about some topic that you thought you already knew. It certainly keeps you humble! I am however, bothered by the fact that when I was in my twenties and thirties and attended surveying conferences, many of the folks were my age; and what I see now is that most of them are my age and not too many younger. We need young people!

That being said I would definitely encourage all young people, and especially young women, to pursue a career in land surveying. It is a profession that keeps body and mind in fit condition and has so much intrinsic variety within it. The field and office technology has continued to morph in leaps and bounds since I began, and that is not likely to change. As I have stated, there is always something new to learn, be it in the legal, technical or retracement arenas, and many gifted teachers to learn from. My advice to young people today would be to study the earth sciences, take all the math and science courses that you can, as well as some law, because, in my opinion, therein lies the future. You may just find that a career in land surveying is the right path for you. Surveying has fed my soul for many years with physical exercise, mental stimulation, the artistic expression of map making, and keeps me connected to my youth in the beautiful Adirondack Mountains. ❖



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Pat Tami, PLS Named NCEES Vice President



Patrick J. Tami, P.L.S., was commissioned Western Zone vice president of the National Council of Examiners for Engineering and Surveying (NCEES) at the organization's 2008 Annual Meeting, held August 13–16 in Minneapolis. He will be the administrative officer of the Western Zone and a member of the NCEES Board of Directors for a two-year term.

A resident of Roseville, California, Tami has been a member of the California Board for Professional Engineers and Land Surveyors since 2006 and is the current board president. He has served on the NCEES Committee on Uniform Procedures and Legislative Guidelines. He has also assisted with the development of NCEES and state-specific surveying examinations.

A professional land surveyor for over 30 years, Tami is currently vice president of RBF Consulting, a design firm providing civil engineering, planning, and surveying services. He is a past president of the California Land Surveyors Association, a past chair of the East Bay Municipal Engineers Association and the Bay Counties Association of Civil Engineers and Land Surveyors, and a former member of the board of directors for the Western Federation of Professional Surveyors.

NCEES is a national nonprofit organization composed of engineering and surveying licensing boards representing all U.S. states, the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands. An accredited standards developer with the American National Standards Institute, NCEES develops, scores, and administers the examinations used for engineering and surveying licensure throughout the United States. NCEES also provides services facilitating professional mobility for licensed engineers and surveyors. Its headquarters is located in Clemson, South Carolina. ❖



A Rewarding Career at Caltrans

By: Toni Scorallo, PLS



I am very proud to be a Professional Land Surveyor with Caltrans, Department of Transportation; the profession and Caltrans have been very good to me. Like many people, my path to becoming a Land Surveyor was circuitous. For starters, my father was a Dentist in the Navy, so I grew up a military brat and my family moved around a lot in my formative years. After having lived in several states, we moved to California in the early 70's. I never really thought about "what I wanted to be when I grow up." Particularly, not about being a surveyor, as I didn't even know about the profession.

go into the engineering field. So, I took their recommendation, and applied for a job as a Junior Engineering Technician working in the Surveying Department. I accepted the job even though I did not have a clue what a surveyor did. I figured I would find out soon enough.

I was shuttled out to a survey crew in Richmond where our main job was construction staking for a new portion of highway through that area. I LOVED IT! I finally knew what I wanted in a

I was lucky enough to graduate early from high school, and headed off to Diablo Valley College, a two-year college, to at least start my general educational requirements. Around this period of time I started working as a dental assistant to pay the bills. I thought I might like to go into the Dental Hygiene field and even took some anatomy and physiology classes. It was interesting, but the thought of gazing into the mouths of others seemed, well, not appealing. About the same time I went to work as a Dental Assistant, I applied to the California Department of Transportation, Caltrans, but was told to not expect a job anytime soon - that it could take awhile. About a year later, Caltrans sent me a job announcement for a maintenance worker where the pay was 50% higher than I was earning as a dental assistant. I thought, what the heck, I interviewed and was offered the job. That was December 1982.

Well, I guess I was a little naïve because on my first day on the job as a maintenance worker, I walked into a smoke filled room with old cussing men. My first reaction was, "what was I thinking?" As I grew to know them and appreciate what their job entailed, I began to respect them and the work they performed. It was physically demanding but I liked it. After a few months as a maintenance worker, I was asked to help out in the office because a couple of the staff were going on vacation. At the time, Caltrans was just getting into computer technology and I picked it up pretty quickly. When people saw that I had a knack for computers they told me I should

Continued on next page

career: working with surveyors and performing survey tasks. It was so cool watching the construction plans come to life, calculating the location of the various facilities, staking them so the contractor could build them, and seeing the highway constructed. Caltrans noticed my enthusiasm, and thirst for more, and they provided me with many learning opportunities along the way.

Caltrans implemented the Land Surveyor classification about the time I hired on in surveys. So, if I was interested in promotions I was going to have to get the Land Surveyor-in-Training (LSIT) certificate and eventually the Professional Land Surveyor (PLS) license. I started taking surveying classes back at Diablo Valley College where I ended up with a 2-year degree, along with a degree in the school of hard knocks.

After about three years in surveys, I decided to put my surveying knowledge to the test, literally, and I took the Land Surveyor-in-Training exam. To my complete surprise I passed. I was ecstatic. After I got my LSIT I was put into a rotational program where I rotated through the right-of-way engineering, surveying, and photogrammetry offices. What a great education. Caltrans provided excellent support and gave me opportunities for training and learning more about the profession. After three years I decided it was time to try for the PLS. Oh the horror stories I was told about how many times so and so had taken it and not passed and about how difficult and demanding the test was. So, I went to seminars, got some reading materials, took some classes, and studied until I could study no more. I figured the first time was going to be more of a practice test. As anyone who has taken this

exam can attest, it can be very intimidating walking into a huge convention center with people toting boxes of books, calculators and every color of pocket protector available. I walked out of the exam feeling pretty good, but I wasn't going to say that to anyone just in case I didn't pass. Finally after about five months, people in the office were talking about their results but I hadn't heard yet. A week later the thick envelope from the Board of Registration hit my mailbox with bad news.

I took the PLS again the following year, April 1991, and missed the passing score by two points. I appealed and passed the exam, with a little less fanfare, but hey I PASSED, and now I was officially a Professional Land Surveyor. My career at Caltrans then began to take off. I started as an Assistant Land Surveyor, and then was promoted to Chief of Land Surveys. Then, as part of an overall effort within State civil service to modernize and consolidate department-specific classes into service-wide classifications, they phased out the Chief of Land Surveys, and I was then a Senior Land Surveyor.

I went through some rough medical problems, but my Supervisors at Caltrans saved my spirit by allowing me to work from home while I recovered. I cannot express how humbling that experience was. This past spring I was promoted to Office Chief, Right of Way Engineering, Surveys and Mapping Services, the first woman in that position here at Caltrans. I did not get here without the support of my Caltrans colleagues, family and friends. I have much to learn in my new role, and thankfully, many great teachers. ❖

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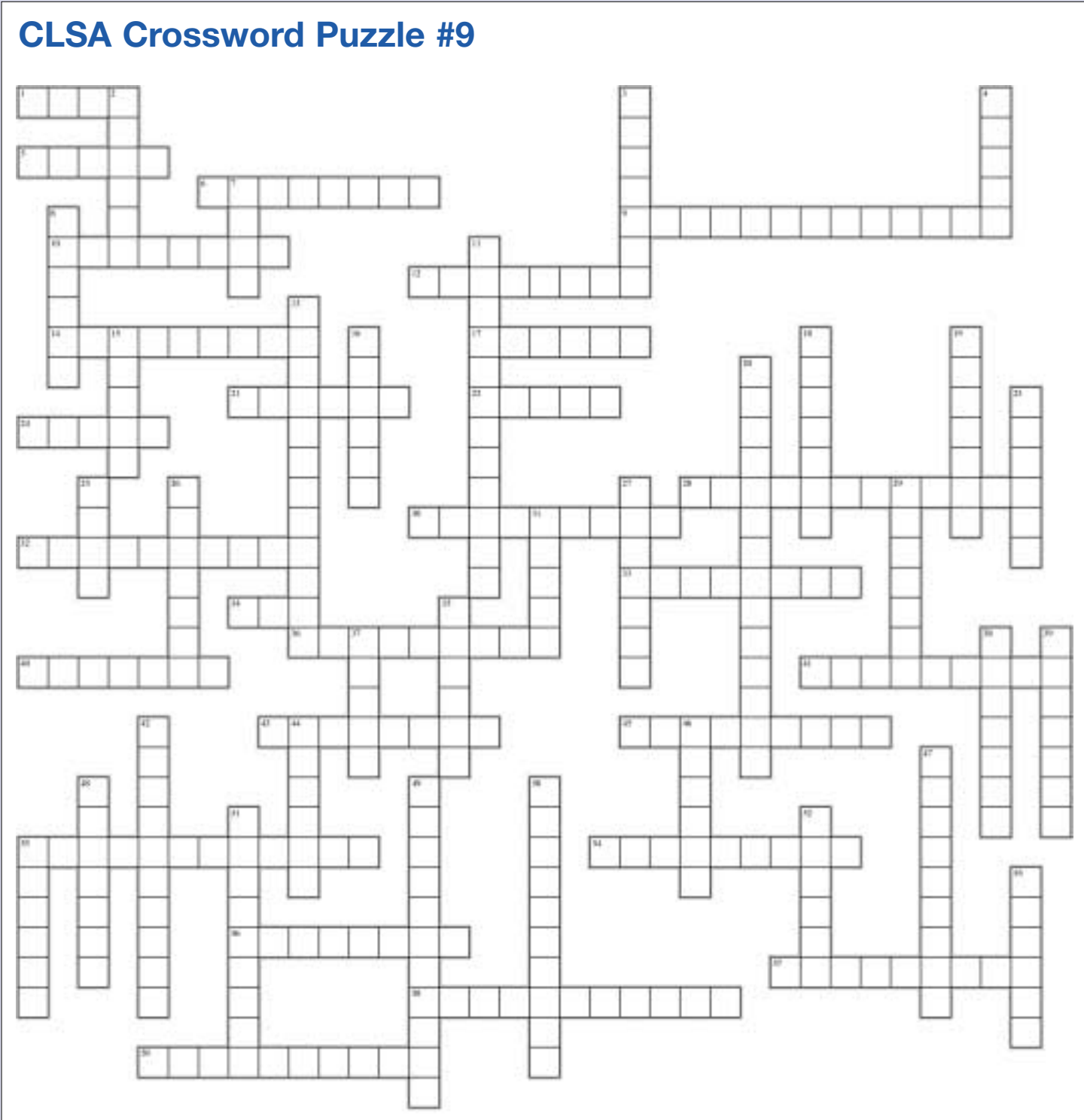
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Crossword Puzzle

By: Ian Wilson, PLS

CLSA Crossword Puzzle #9



Ian Wilson, PLS is the president of Ian Wilson Land Surveying, Inc., in Temecula, CA. His practice specializes exclusively in boundary and topo surveys. He has worked in both private and public sectors for small firms in California and Caltrans, respectively. As well as being a licensed land surveyor, he and his wife, Laura, are newly certified SCUBA divers. They are looking forward to “getting wet” on future trips along coastal California and around the world.

Across

1. FOUNDER OF ESRI
3. ADMISSIBLE EVIDENCE
9. PLS 6877
10. ESRI'S FLAGSHIP PRODUCT
15. RENDER PARALLEL
18. TOWN IN WHICH CURRENT LAND SURVEYOR MEMBER OF BPELS RESIDES
20. BROWN TRACING ON SPECIAL PAPER
21. LOCATION OF JULY CLSA BOD MEETING
23. MAGNITUDE AND DIRECTION
25. ONE OF JAS ARNOLD'S AREAS OF EXPERTISE
26. GRADUATED ROD
28. MAPPING DRY CLEANER
31. NEWEST HONORARY MEMBER OF CLSA
33. TITLE DEFECT
35. IMAGES FROM USGS DUE TO BE AVAILABLE ON LINE IN 2009
36. 660 FEET
39. TYPE OF SURVEY MENTIONED IN HERRICK'S MESSAGE
40. FREE AND CLEAR OF LIENS, CLOUDS, ETC.
45. 2.47105 ACRES
46. MARKS A CORNER
47. GPS DATE
49. CITY IN WHICH NCEES IS HEADQUARTERED
51. LAND NEXT TO A STREAM ON A MAP
52. CAL SURVEYOR EDITOR
53. CLSA CHAPTER TO WHICH ANNETTE LOCKHART BELONGS
54. BRITISH STATESMAN HERO OF CECILIA WHITAKER

Down

2. BEND
4. PLS 8286
5. CSU CAMPUS MARTA ALVAREZ ATTENDED
6. MICROWAVE DISTANCE METER
7. MEASURER UNDER PRESSURE
8. CARE AND CULTIVATION OF FOREST TREES
11. PLS 6780
12. DIFFERENCE IN NORTH OR A POLITE TURNDOWN
13. CALIFORNIA NGS LIAISON
14. PLS 8442
16. FIRST NAME OF SURVEYOR WITH CECILIA WHITAKER IN THE PHOTO WITH THE CGPS STATION.
17. TAKING PRIVATE PROPERTY FOR PUBLIC USE
19. PLS 8010
22. OUT-OF-COURT TESTIMONY MADE UNDER OATH
24. AUXILIARY SCALE USED TO AMPLIFY ACCURACY
25. LAST NAME OF 6TH GRADE STUDENT WHO SPOKE AT ESRI USER CONFERENCE
27. LAND SURVEYOR REAPPOINTED TO BPELS THIS YEAR
29. MATHEMATICAL INTERSECTION
30. SOAKS UP INK
32. DIFFERENCE IN LONGITUDES
34. GRADUAL ACQUISITION OF LAND DUE TO RECEDING WATERS

Key to CLSA puzzle #8

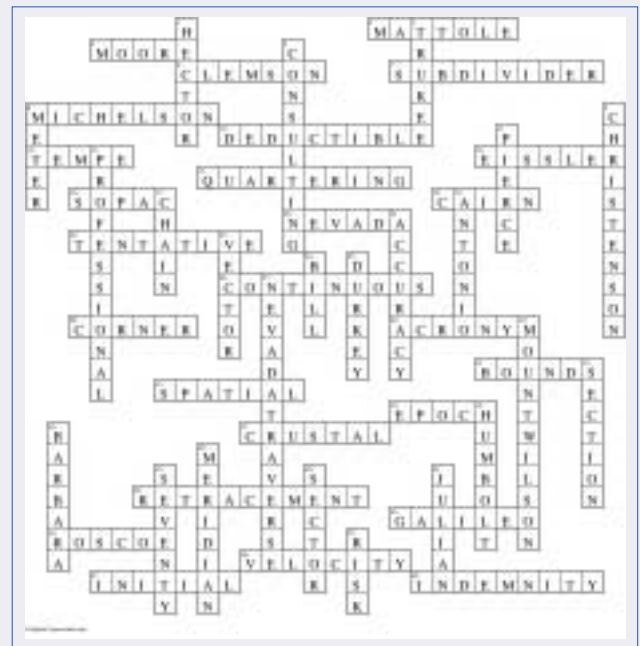
(Surveyor Issue # 155)

Across

2. MATTOLE—HUMBOLT COUNTY VALLEY
4. MOORE—BPELS STAFF LAND SURVEYOR CONSULTANT
6. CLEMSON—CITY IN WHICH THE NCEES OFFICE IS LOCATED
7. SUBDIVIDER—PERSON WHO SPLITS LAND
8. MICHELSON—DUFFY'S SCIENTIST
10. DEDUCTIBLE—INSURANCE POLICY TERM
12. TEMPE—LOCATION OF FEB. '06 POLC MEETING
14. EISSLER—BPELS ENFORCEMENT PROGRAM MANAGER
15. QUARTERING—UNLAWFUL SUBDIVISION PRACTICE
16. SOPAC—UCSD BASED ARRAY CENTER
18. CAIRN—ROCK MOUND
20. NEVADA—CALIFORNIA'S NEIGHBOR
22. TENTATIVE—PRELIMINARY SUBDIVISION MAP
26. CONTINUOUS—THE C I N CGPS
28. CORNER—MATHEMATICAL INTERSECTION
29. ACRONYM—NCEES, ASPRS, CSBSR, SOPAC FOR A FEW
31. BOUNDS—DEFINITE BOUNDARY MARKERS
33. SPATIAL—CALIFORNIA ___ REFERENCE CENTER
34. EPOCH—GPS DATE
37. CRUSTAL—HTDP MOTION MODEL
42. RETRACEMENT—VERIFICATION SURVEY
43. GALILEO—17TH CENTURY SCIENTIST AND AUTHOR, FIRST RECORD ATTEMPT AT MEASURING "c"
44. ROSCOE—HUMBOLT COUNTY ENGINEER AND SURVEYOR RCE 9157
46. VELOCITY—MODEL CREATED BY SECTOR
47. INITIAL—TYPE OF POINT
48. INDEMNITY—ISSUE #150 AGREEMENT TYPE

Down

1. HECTOR—BIG 1999 SOUTHERN CALIFORNIA EARTHQUAKE
3. TRUCKEE—RIVER THE VILLAGE OF VERDI LIES NEAR
5. CONSULTING—TYPE OF EXPERT WHOSE WORK IS NOT USUALLY DISCOVERABLE
8. METER—THIRTY NINE POINT THREE SEVEN INCHES
9. CHRISTENSEN—BPELS EXECUTIVE DIRECTOR
11. PIERCE—USCS SURVEY SUPERINTENDENT IN 1872
13. PROFESSIONAL—E&O LIABILITY INSURANCE TYPE
17. CHAIN—FOUR POLES
19. ANTONIO—LOOKOUT MOUNTAIN USGS MONUMENT
21. ACCURACY—NEARNESS TO TRUTH
23. VECTOR—MAGNITUDE AND DIRECTION
24. BILL—CGPS STATION LOCATED AT 33 34 56.0756 N, 117 03 52.5613 W ON THE SOUTH SHORE OF LAKE SKINNER
25. DURKEE—NOTED CALIFORNIA SUBDIVISION MAP ACT ATTORNEY
27. NEVADA TRAVERSE—NALS QUARTERLY PUBLICATION (TWO WORDS)
30. MOUNT WILSON—SOUTHERN CALIFORNIA OBSERVATORY (2 WORDS)
32. SECTION—1/36 OF A TOWNSHIP
35. HUMBOLT—NORTHERN-MOST CALIFORNIAN INITIAL POINT
36. BARBARA—PRESIDENT HERRICK'S WIFE AND WORLD FAMOUS QUILTER
38. MERIDIAN—NORTH-SOUTH LINE
39. SEVENTY—NUMBER OF MEMBER BOARDS OF NCEES
40. SECTOR—SCRIPPS EPOCH COORDINATE TOOL AND ONLINE RESOURCE
41. JULIAN—TYPE OF DATE?
45. RISK—ISSUE #149 MANAGEMENT TYPE



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

How Hard Could It Be?

By: Cecilia Whitaker, PLS



Women in Surveying



One of the questions we were asked to address for this issue on women in surveying, was how we got involved in surveying. I always get a kick out of this question, from surveyors as well as non-surveyors, because it is usually asked in the “Oh my God, why would you actually want to be a surveyor!?!” type of mindset. I guess my answer is sort of like the Texas bumper sticker “I wasn’t

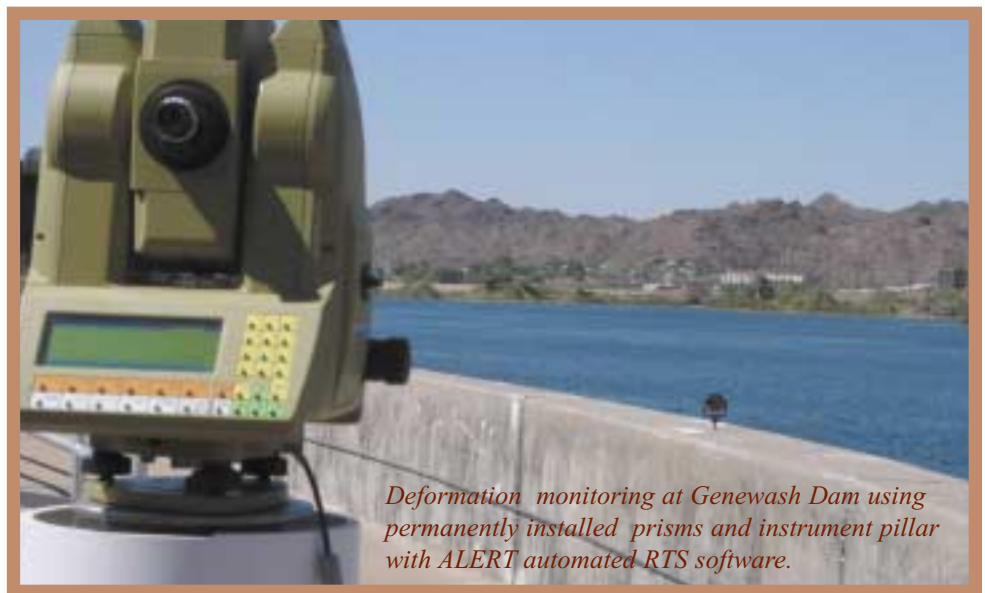
born in Texas, but I got here as fast as I could.” You might have to be a Texan to appreciate that, but it does fit my feelings about surveying as a career. I really enjoy what I do and want to be there. It may be that I have been very fortunate to work with some really fine people on some really interesting projects.

A few years after graduating from Cal Poly, San Luis Obispo, with an agricultural degree, my soon-to-be husband, Daniel, and I decided that the dairy we were working on was not a good long term position, so we started applying for jobs - in every state of western America, except for southern California (been there, done that; I grew up in Brea). I have an inch-thick stack of rejection letters from this job pursuit. Agriculture was not booming in the late 1980’s, but the building industry was. So proving that “never say never” is a truth, we applied and got accepted immediately for a job with a soil engineering firm (me) and a small surveying firm (Daniel) in Orange County.

I was a soil technician responsible for running compaction tests on a master planned community development site. This entailed driving a small pickup between raging CAT earth movers and taking soil samples in a small pit while these scrapers passed within feet of me. It didn’t take long to realize \$7 an hour was not enough to risk my life every day. Meanwhile, I was observing the surveyors on this project and thought that their job looked way more interesting (and somewhat safer) to me. I went over to talk to them and they said that their company (Hunsaker & Associates) needed office people. I had no surveying experience (one class in agricultural surveying in col-

lege) and no office skills, but I went to talk to them. Well, they gave me a chance and that started my survey career. I have to admit to not being totally enamored with my new job (I started by learning to draft tract maps) and I continued to apply for agricultural jobs. After a few months, I decided I had better accept this opportunity and I started taking classes. I also asked to be trained to do the calculations (pre-CAD) for the property lines of the master planned communities that H&A specialized in. This is what caught my interest and from then on I was hooked. Meanwhile, Daniel had decided that surveying “really sucks” and he wanted nothing to do with it (he started his own manufacturing business instead). While at H&A, I learned all the aspects of surveying and mapping land. I will always appreciate the opportunities presented to me by Dick Hunsaker, Tom McGannon, Neil Morrison and Dave Fratton. By the time I left, I had been exposed to surveying, engineering and project management. I was also licensed.

By the early 1990’s the housing market was struggling and GPS was starting to be used by surveyors. I was very intrigued by this new technology and wanted to learn about it. In 1993, David Paul Johnson called me and asked if I would be interested in working for him at the Metropolitan Water District (MWD). He needed someone to take on the deformation monitoring program. He explained that I would be involved with GPS, robotic total stations, electronic leveling, safety of dams and all kinds of interesting projects. I was sold. The only hitch was that it would be a temporary



Deformation monitoring at Genewash Dam using permanently installed prisms and instrument pillar with ALERT automated RTS software.

position (read: long term work, no benefits) and I would be taking a \$4 an hour pay cut. After some end-of-the-driveaway negotiating between Daniel and David (\$1 per hour more to start

Continued on next page

and I would carpool with David to save some money; you have to know Daniel to appreciate this event, ask David if you get a chance), I accepted the position at MWD. David warned me that things change slowly at MWD and not to get frustrated if the pace was slower than the private sector. Well, I have been at MWD 16 years now and things have been charging ahead since Day 1.

My first task entailed updating and streamlining the deformation monitoring program. This meant meeting with the Safety of Dams team at MWD and finding out exactly what and why we monitored the various structures at our facilities. It is hard to explain in brief what a unique and wonderful challenge this has been. I began by working to improve both the field measurement methods and the office reporting methods. This included updating some field measurement systems from unreferenced 2D methods to NAD83 and NAVD88 (referenced xyz) using electronic leveling and GPS on all monitoring points. This provided the same relative displacements we needed, but allows us to check our control monuments in the absolute world of published control. This happened coincidentally with the installation of the first continuous GPS (CGPS) sites that were implemented after the January 1994 Northridge earthquake. Mike Duffy of MWD worked with Southern California Integrated GPS Network (SCIGN) to have CGPS sites installed on MWD properties. We are fortunate to have a site on almost all of our major facilities. This led us to utilize these sites for our control, saving us much time and money because we no longer had to do the extensive control survey needed prior to the deformation survey. Learning how to use these

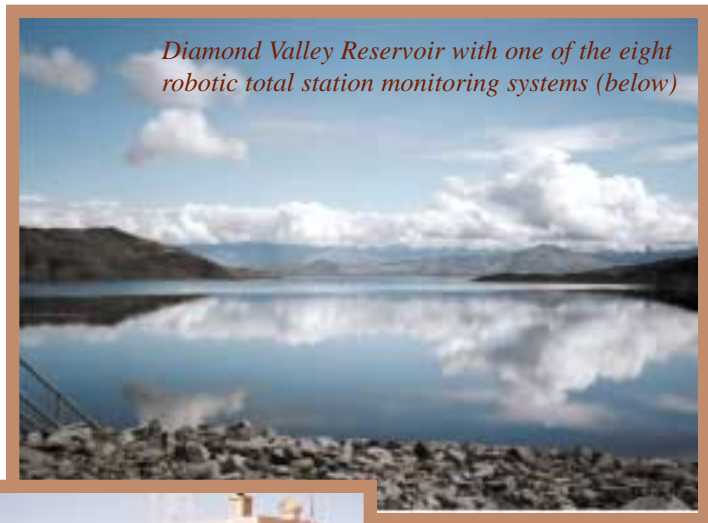
total stations (RTS) placed at eight locations on the three dams that created the reservoir. We designed a plan that included permanent installation of the eight RTS in small buildings, from which they would measure to permanently installed prism pillars on the face of the dams. Extensive design work ensured that the RTS to prism distances did not exceed the monitoring specification for a ± 1 cm error ellipse at each monument. We were fortunate to make contact with Dr. Adam Chrzanowski from the University of New Brunswick, Canada, who is an expert on geodetic monitoring systems. He gave us invaluable insights and help on the system and his University group wrote the ALERT monitoring software that we still use. He continues to be a source of knowledge and support for our monitoring projects. We also worked with several groups of engineers to install a wireless LAN, so that we can remotely access and operate the monitoring system, especially during seismic or other events. (At the last FIG symposium in Lisbon, Portugal, I was able to connect to the monitoring system and give a live demo from ≈ 8000 miles away. Who says you can't survey from poolside?) This system has been successfully working since December 2000. (Mike and I have written several papers on this project. Feel free to contact me if you are interested.)



Meeting with CSRC height modernization contractor, Johnson-Frank & Assoc., before CGPS NAVD88 leveling project begins.

Through our work with the SCIGN group, I was very fortunate to meet Bill Young from the Riverside County Flood Control District. He was (and still is, posthumously) a great source of inspiration to me and I have him to thank for my getting involved with the California Spatial Reference Center (CSRC) while in its infancy. I have worked with the CSRC since 2000, mostly in an outreach capacity as a source of support to users of the CSRC website and the California Real-time Network (CRTN), with which MWD is a partner. I have also been fortunate to work on several height modernization projects (GPS and leveling) with many fine surveyors from CSRC contracts and the individuals who volunteer their time to the CSRC to keep it moving forward. I have been exceptionally fortunate to learn much about GPS from Yehuda Bock, Mike Potterfield, Ken Hudnut, Greg Helmer, Dave Zilkowski, among the many others who put their time and effort into improving geodetic survey methods.

There are many people I haven't mentioned that have helped me on my way as a surveyor. It is due to them and the people in this document that have made my surveying career as exciting and interesting as it is. I owe them everything for their guidance and support. The guidelines for this paper ask what advice I have for women considering surveying as a career. The only advice I have, is not gender specific – find a profession that intrigues you, take



Diamond Valley Reservoir with one of the eight robotic total station monitoring systems (below)



CGPS sites was a struggle at first, but led to us having a good working relationship with the scientists at USGS/Caltech and Scripps at UCSD.

At the same time, Mike Duffy and I were involved with George Barber of MWD Safety of Dams for the planning of the deformation monitoring system, at the soon to be built Diamond Valley Reservoir. We developed a plan to use multiple robotic



RISK MANAGEMENT FOR LAND SURVEYORS

Whoops, Something Happened!



In spite of being extra careful and following all the good risk management practices we've been discussing the last couple of years, bad things can happen to good surveyors. Things like boundary errors, buildings in the wrong places, bad plans, weak contracts and payment disputes can result in claims that are incredibly complex and difficult and require massive amounts of documentation. If you see a claim coming, call your broker for advice and use the free lawyer consultation feature of your policy. Don't wait until the potential claim gets cold. Here are some recent professional liability claims that Zurich has paid on behalf of land surveyors:

Loss 1 - Building in the wrong place

A surveying company staked out a new building for a shopping center. After construction began, it was discovered the building was 30 feet west of where it should have been. The error resulted in loss of parking spaces for an office supply store. The partially completed building was demolished and moved to the proper location. The project owner filed a claim of \$656,000 for project delay and extra work.

The surveyor accepted responsibility for miscalculation but said the architect's drawings were incomplete and misleading

because they only contained two, not three, fixed reference points. The architect said the third point had been given to the surveyor by phone. The surveyor failed to document the new information. Surveyor's counsel said the architect should have provided drawings with three reference points so the building could have been properly placed. It was argued that a prudent surveyor would not have staked out a building without a third fixed point so the surveyor did not meet the required standard of care. After negotiations, the claim was settled for \$350,000 in indemnity and \$25,000 in defense costs.

Loss 2 - Church sanctuary too close to another building

A surveyor was hired by a general contractor for construction staking on a design/build church project. During construction the GC found a 12-foot difference between the construction drawings and the staking that put the church sanctuary 12 feet too close to an existing building. Holes for 50 piers had been drilled and 49 had to be redone at a cost of \$100,000. Since the surveyor was at fault, the insurance company tried to settle the loss for \$75,000 but had to pay the \$100,000.

Loss 3 - School building off by 30 feet

A contractor was sued for \$350,000 by a school district because a change that should have been made by the surveyor resulted in a 30-foot misplacement of a school building. The architect's plans did not identify the building's point of origin and the surveyor notified the architect of the error, which was corrected by an addendum. However, a subsequent addendum moved the point of origin by 30 feet and the surveyor was unaware of this change.

The surveyor was found liable for not identifying the change even though he argued the new change was not clearly marked and the architect did not directly inform him of the change. An adjacent road had to be moved and additional property for a right-of-way had to be purchased. The school district sued the contractor and the contractor sued the surveyor claiming that the surveyor failed to follow contract documents. In mediation, the case was settled for \$230,000 with \$80,000 paid in defense costs.

Check, check and check again

Please remember to always carefully review drawings and documents and if anything seems wrong or out of place talk to the owner, contractor or architect. Document these conversations carefully. Also, if you are ever involved in a frivolous lawsuit or a claim against a contractor where you did the survey work and were therefore included because your name was on the contract, remember that you still have to be defended and need a lawyer to get you out of the suit.

In other land surveyor losses Zurich has settled claims for stolen and damaged property and equipment, business interruption losses, general liability, workers compensation and wrongful termination accusations. Your insurance pays claims to help keep you in business, in the black and in good graces when the unexpected and unforeseen happens. ❖

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The hp33s has also been approved for the NCEES tests. If you want to use it for the test, we still have "Surveying Solutions for the hp33s, 2nd edition" available.

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Installation of radios and antennas for CGPS site at Lake Mathews. Caltrans District 4 came down to assist and to learn "how-to" for the Central Valley RTN.



the bull by the horns and run with it. I have three heroes in life – my parents who said you can do anything you set your mind on, Winston Churchill who said never give up, and my husband, Daniel, whose favorite motto is "How hard could it be?" This is how I approached surveying. ❖

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Photo of the Year Submissions



Photo 1

Photo 1 — Do Not, I Repeat, Do Not Drop the Radio!

Richmond-San Rafael Bridge monumentation traverse by Brelje & Race Consulting Civil Engineers, 2005. Jeff Roach setting a reflector on one of the high piers on the curve near the west end. Looking east with the westerly shipping channel in the background.

Photo taken by Ted Rollheiser, PLS 5179



Photo 2

Photo 2 — It's a Tough Job But Someone Has to Do It

Ted Rollheiser on USC&GS point 'Peaked Hill' with Goat Rock in the background, near the mouth of the Russian River.

Photo taken by Ted Rollheiser, PLS 5179



Photo 3

Photo 3 — My Other Survey Vehicle is a Chris Craft

Richmond-San Rafael Bridge monumentation traverse by Brelje & Race Consulting Civil Engineers, 2005. Chuck Deiner, PLS setting a reflector on one of the low piers near the east end. Looking west with Mt. Tam in the background.

Photo taken by Ted Rollheiser, PLS 5179

Photo 4 — Just Another Obstacle

Bicycle bench loop at a dairy in Kings County, CA. Rod man Javier Barrera waits for helicopter crop duster to re-load so he can advance to foresight. — Photo taken by: Crew Chief Shammoth Myers, Lane Engineers -

To submit a photo for consideration of photo of the year, please email high resolution photo along with caption to clsa@californiasurveyors.org



Photo 4

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2008 Complete Package: PLS Roster, Pre '82 CE Numerical Listing, PE & PLS Act, Board Rules, Subdivision Map Act & Index, Misc. Statutes & Binder	\$34.50	\$48.00	\$68.00		
2008 Complete Package (as above) plus CD	\$40.50	\$57.00	\$80.00		
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CLSA Exam Guide	\$25.00	\$35.00	\$50.00		
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Land Surveying for the Land Owner & Real Estate Professional, by Daniel E. Beardslee, PLS	\$8.00	\$12.00	\$16.00		
CLSA Decals or Bumper Stickers (Decals or Bumper Stickers)	\$1.50/ea.	N/A	N/A		
Land Surveying Story/Coloring Books (Pkg. of 10)	\$24.00/Pkg.	\$28.00/Pkg.	\$48.00/Pkg.		
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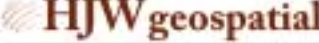

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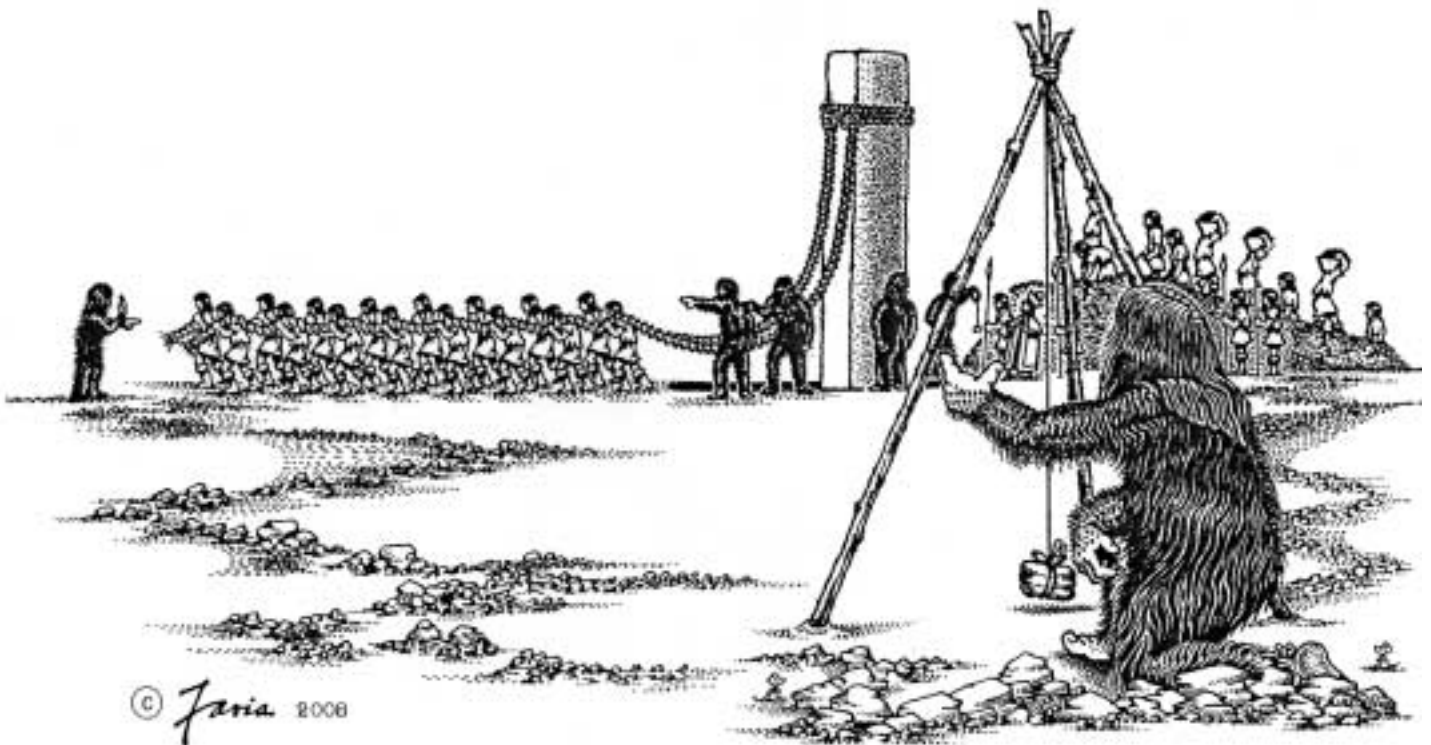
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The goal of the California Land Surveyors Association is to promote and enhance the profession of surveying, to promote the common good and welfare of its members, to promote and maintain the highest possible standards of professional ethics and practice, and to elevate the public's understanding of our profession. CLSA represents all Land Surveyors, whether they are employees or proprietors, whether in the public or private sector.

Representation

LOCAL: Your local chapter represents you in local issues. Through your chapter representative to the State Board of Directors, the individual member can direct the course CLSA will take. **STATE:** The Surveyor is represented at the state level through an active legislative program, legislative advocate, and liaison with the State Board of Registration. **REGIONAL:** CLSA is an active member of the Western Federation of Professional Surveyors. This Federation is composed of associations throughout the western United States and addresses regional issues. **NATIONAL:** Through institutional affiliation with the National Society of Professional Surveyors and the American Congress on Surveying and Mapping, CLSA is represented at the national level.

Educational Opportunities

CLSA presents annual conferences which provide technical and business programs, as well as exhibits of the latest in surveying and computing technology. Seminars and workshops are presented to assist in continuing education. CLSA publishes the California Surveyor magazine and the CLSA NEWS to keep the membership abreast of changing legislation, legal opinions, and other items which affect our profession.

Business and Professional Services

CLSA provides a fully staffed central office which is available to answer questions or to provide up-to-date referrals concerning legislation, educational opportunities, job opportunities, or other issues concerning our membership. Professional liability insurance programs are available to members.

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