

SURVEYOR

California

Summer 2012

Issue #170

Where There Is No Surveyor: Building a Medical Clinic in Haiti

Article by Craig Roberts, PLS on page 10

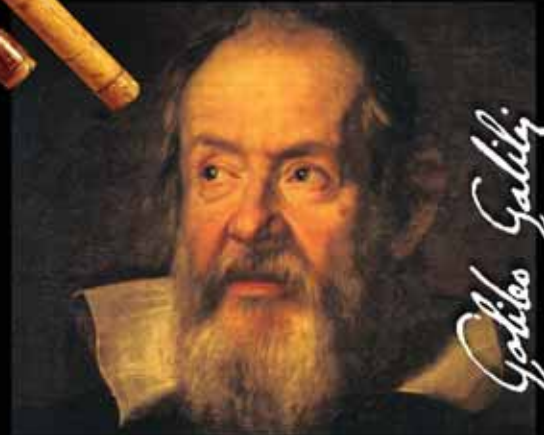
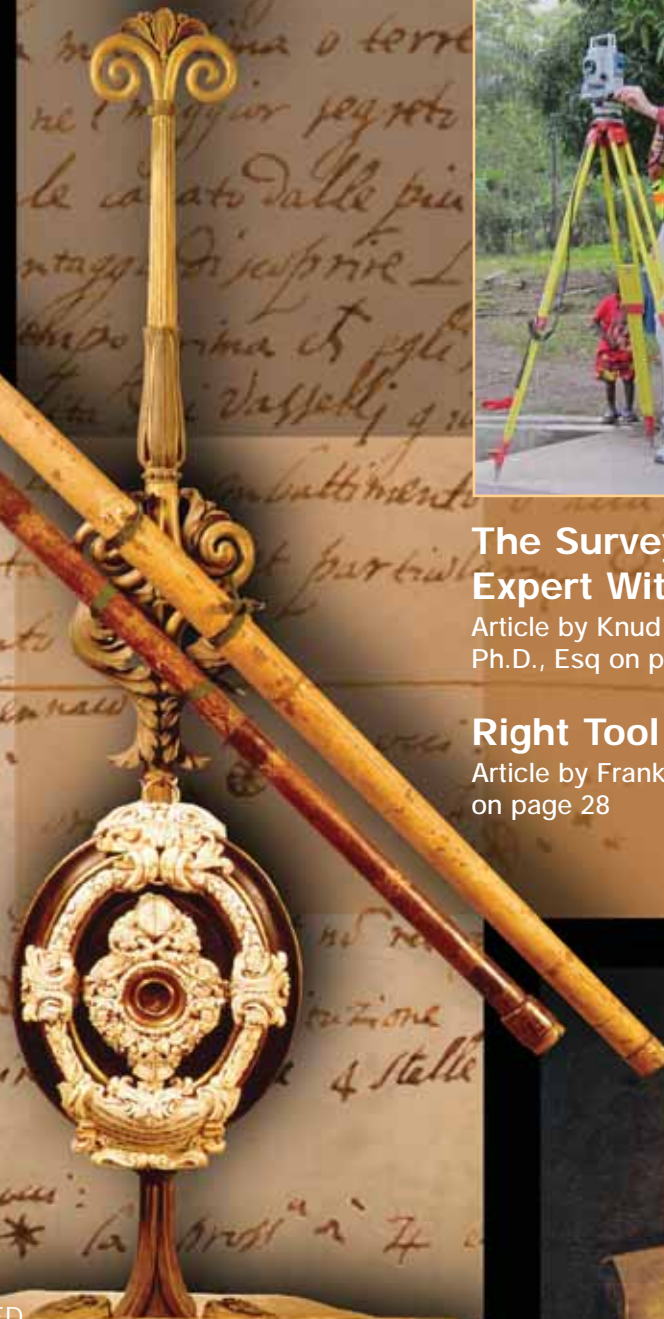


The Surveyor as an Expert Witness

Article by Knud E. Hermansen, PLS, PE,
Ph.D., Esq on page 20

Right Tool for the Job

Article by Frank D. Romano, Jr., PLS
on page 28



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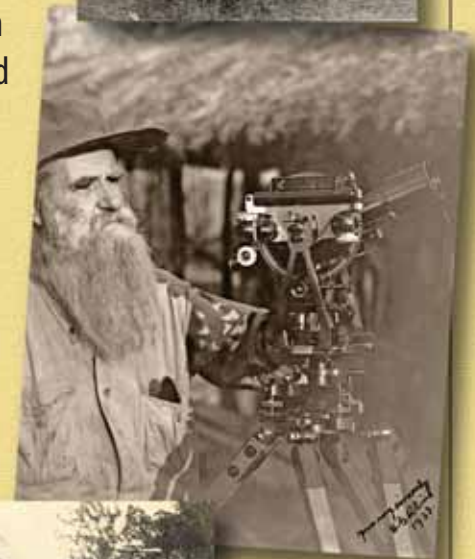
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The quarterly publication of the California Land Surveyors Association, Inc. and is published as a service to the land surveying profession of California. It is mailed to all Licensed Land Surveyors in the State of California as well as to all members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

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

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

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Inside This Issue:

Features:

Where There Is No Surveyor:

Building a Medical Clinic in Haiti

By: Craig Roberts, PLS10

Cal Poly Pomona Hosts ASCE PSWC

By: Allan Ng, PLS & Theresa Strazzella, PLS18

The Surveyor as an Expert Witness

By: Knud E. Hermansen, PLS, PE, Ph.D., Esq.20

Right Tool for the Job

By: Francis "Frank" D. Romano, Jr., PLS28

Columns:

Professional Outreach Events

By: Stuart Hagerman, LSIT25

Risk Management: Employment Practices and Cyber Liability

By: Richard Hertzberg, CPCU, ARM34

Tech Tips: Photogrammetric Measurements From Small Format Imagery

By: Jas Arnold, PLS, CP36

SMA Expert Q&A

By: Michael P. Durkee, Esq.38

The BPELSG Chronicles: First Results of Computer-Based Testing for the Professional Land Survey Examination

By: Ric Moore, PLS, BPELSG Executive Officer40

Departments:

From the Editor6

President's Message8

Kid's Korner8

Letter to the Editor9

Geography Quiz24

San Francisco Treats25

Postcards32

Index of Advertisers33

Welcome New CLSA Members33

Photo of the Year35

Crossword Puzzle42

Sustaining Members44

Cartoon Captions45

Publication Order Form46

Cover

"Galileo's Telescope," graphic art and design by Wendy Masarweh



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

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

From the Editor

National Museum of Surveying Update

In California Surveyor Issue #164 I reported on my visit to the National Museum of Surveying in Springfield, Illinois. I went to the museum in November 2010 to deliver a ceremonial \$25,000 check from CLSA (the real check preceded my arrival). In June 2012 I checked in with Treasurer Bob Church and Assistant Director Matt Parbs for an update.

What's new at the museum?



The good news is that we have seen a healthy upswing in daily visitors since you were here in November 2010. We had over 400 people attend our ribbon cutting ceremony in March 2011 during National Surveyors Week. We changed the name to Abraham Lincoln's National Museum of Surveying

(ALNMoS) to draw more visitors in and the numbers are going up all the time. Most of our daily visitors are from the metro area, but as we continue to draw from the big attractions, we are getting more people from out-of-state. We get a lot of foreign visitors as well.

Right now, we have a Berntsen's 40th anniversary exhibit of survey monuments. We are also acquiring an Initial Points exhibit so we will soon have panels featuring every initial point of the Public Lands Survey System. We continue to collect stories from our out-of-state visitors and today we have survey-related stories to share from all around the country. We are currently coming up with a way to tell the history of Route 66, the Lincoln Highway, and the transcontinental railroad from the surveyor's point of view. Seemingly every week the museum receives a new donation. Our latest one was a William Young compass used to survey Mansfield, Illinois by John Lutz Mansfield, the compass's owner. We were chosen by the Springfield Historic Sites Commission as the top educational site in 2011 for advancing the understanding of our historic heritage. The commission recognized and honored our commitment teaching the public about the history of surveying.

The Boy Scouts of America, Lincoln Heritage Council, created a badge for the museum. The Scouts earn the badge by taking a tour of the museum and then answering a questionnaire about what they learned. In April, we had surveyors on the lawn of the Old State Capitol, across the street from the museum, hosting a basic surveying seminar. Scouts also come to the museum along the way to obtaining their merit badge. The Girl Scouts will host GeoCaching and Letterboxing badge workshops at the museum starting in November and December.

Our Science on a Sphere is still a big hit with visitors of all ages. We have around twenty playlists and over 350 individual datasets that cover

Continued on next page

We did it again! For the fifth year in a row the National Society of Professional Surveyors (NSPS) awarded first place to CLSA for the California Surveyor in the professional journalism contest. State society magazines are judged on the focus and quality of their content, readability, overall publication design, page layout, and ratio of advertising versus contributed content.

As before, there is plenty of credit to go around. I will begin by thanking our executive committee for committing the resources it takes to build an award-winning publication. I would also like to recognize the executive leadership of Dorothy Calegari, the administrative support of Crissy Willson, the graphic art of Tony Monaco, the photography of Steve Shambeck, the award-winning content from our contributing writers, and editorial assistance from Jill Van Houten, Paul Brown, Scott Martin, and Rob McMillan, and I thank Bryant Sturgess for enriching our magazine (and the CLSA Education Foundation) with his outstanding collection of historic surveying photographs. Many others helped in ways both large and small and my sincere thanks to all. Our goal each issue is to give you a beautiful magazine that features well-written articles relevant to professional practice in California. It sure is nice to have our hard work acknowledged at the national level. Without doubt, it has been another good year for the California Surveyor.

Our contributing writers are the heart and soul of the magazine and for their good work I am especially grateful. But if you don't have the time or inclination to write a full-fledged article, and would still like to take part in the magazine, there are other ways you can contribute. Here are some ideas:

- × Encourage a colleague to write an article.
- × Offer to proof read and peer review your colleague's article.
- × Send us a paragraph or two about your local chapter's outreach activities. Include a photograph and we will put it all in our new column – Outreach Events.
- × Write a letter to the editor.
- × Send some ideas for the crossword puzzle.
- × Submit a cartoon caption.
- × Submit an entry for Photo of the Year.
- × Send us a picture for Kids Korner.
- × Send us a picture for Postcards.
- × Send us a picture for the cover of the magazine.
- × Put our magazine in the hands of people who would not otherwise see it, especially young people contemplating career choices.
- × Support our advertisers and tell them you saw their advertisement in the California Surveyor.

CALIFORNIA LAND SURVEYORS ASSOCIATION

a wide variety of topics: The Water Crisis; Energy; Climate Change; The Pulse of Mother Earth; Intro to Earth Science; Intro to Earth System Science; Astronomy; and many more. We are creating our own datasets using ESRI. Students and teachers can create their own datasets/playlists as well.

This summer we are looking for surveyors to participate in historical re-enactments for History Comes Alive events. (See the History Comes Alive website for more information:

<http://www.visit-springfieldillinois.com/historycomesalive/>)

What kind of promotional activities have you been doing?

This season we are offering free admission (with donations requested) and that has really helped because once people visit the museum they tend to promote it to their friends and families. We also invite all volunteers and employees of the major tourist sites to visit us. They have been among our best assets because they tell tourists about the ALNMoS. That kind of word of mouth advertising has been a big benefit. We also ask our visitors to review us, and many of our guests talk about our tripadvisor.com ratings/reviews.

We are also getting more and more school groups and we are becoming a popular choice among teachers as a field trip destination. We have had over 2,000 school kids visit since you were here in 2010. Most school groups are 80 to 100 students, with our largest being 108. If our booking agent is right, the next school year will be a big year for us! We have interns from Robert Morris University (RMU) working on a marketing plan to draw more tourists into the museum, and RMU CADD students helped us find ways to make better use of our space.

Our two-year anniversary is coming up in September 2012, and we are working with multiple parties to make a big splash. There is the Route 66 Mother Road Festival, a national car show, going on at the same time. So check back with us for more information on that.

Finally, the museum asked the NSPS governors to ask their members to do ten things for the ALNMoS. Some are simple things surveyors can do right now, like visit our Facebook page and send us an interesting story and/or land description, and watch the five minute promo video on our website. Some are bigger tasks such as organizing trips to Springfield, creating exhibits for the museum, and appointing historical liaisons.

How is the museum's financial situation?

The museum has a strong commitment from an undisclosed source, and the source will match dollar for dollar up to \$200,000 any donations made to our "Reaching Our Orbit" fund raising campaign until the end of 2012. The museum is looking for pledges of one to five years, and pledges will count towards the match. All donations will go towards paying down the mortgage. Besides the Orbit campaign, we also have memberships and regular donations constantly that go towards operating costs. The museum is able to make its monthly obligations as we speak, outside of the mortgage.

We are renting out two suites on the second floor to the Illinois State Historical Society and the Springfield and Central Illinois African-American Museum, and we have plans of renting out more office space. We are looking into endowments, and we recently made some good contacts that we hope will help us get sponsors.

For more information and a virtual tour of the museum visit the ALNMoS website:

<http://www.surveyingmuseum.org/>

Blog: <http://nationalmuseumofsurveying.blogspot.com>

Facebook: The National Museum of Surveying ❖



(Above) Surveyors demonstrate the basics for the Boy Scouts.



(Right) Badge developed by the Abraham Lincoln Council of the Boy Scouts of America.



Science on a Sphere continues to be popular with visitors of all ages.



School groups learn about surveying as a career choice at the museum.



President's Message

Greetings fellow surveyors. This President's Message is coming at a time that has me being more introspective than I normally find myself. I recently have had the pleasure of seeing family, friends, and children of friends, graduate at various levels of our education system, from elementary through university. I have also experienced the exuberance of young adults starting out on their chosen career paths. It's exciting to see the thrill and anticipation as they venture forth in their lives. In stark contrast, I was also reminded of our own mortality when a personal friend was the victim of a vicious attack. Life is fickle and this point was driven home with the recent passing of CLSA Los Angeles Chapter President Dave Hobbs, PLS, a loss felt by the entire land surveying community. As I reflect, I consider our profession and what it means to be a Land Surveyor.

I have always felt that we, as surveyors, are not working at a job, but rather in a profession, as a vocation for which we have a calling. For most of us, surveying is not what we do, but rather it defines us as individuals, and places us among a relatively small cadre of men and women who are typically strong-willed, opinionated, extremely resourceful, and very individualistic. It is these very characteristics that usually make for a good surveyor. As the saying goes, we create maps, monument our opinions, and record them in perpetuity for all to see. We've got to be right. That being said, in the course of coming up with our opinion, it is not that uncommon to disagree with a map and opinion of another survey professional. There are always various items that one uncovers during the course of the "peeling of the onion" stage of research on a project. It might be an additional monument one finds, or a missing document which, when included in your project, finally makes everything come together and make sense. The task of monumenting a common line of two neighboring parcels is sometimes a goal reached by two different surveyors, through two different paths. The objective is the same, but the approaches may be different and may be based on two different sources of information.

Recently, a significant amount of time and energy has been spent discussing ways of preserving the monumentation which has been set in the past, as part of our Cadastre. Various thoughts and discussions have occurred on how CLSA can better protect this valuable resource. The goal has always been the same, the approaches different. I would not think that this is a surprise given our surveyor "traits" that I touched on above. There is certainly a lot of passion and history that everyone in the survey profession

can relate to in regards to past monumentation. What is important is that ultimately we work together for the benefit of our profession and the public at large. I truly believe, by working together in a professional manner, both public and private sector surveyors in concert can arrive at the goal of preservation and conservation in a time of economic hardship that will undoubtedly continue on for some time to come.

I would like to think that we as surveyors are serving our profession well, and that when we are gone, the public will look upon us as having served them well. ❖

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

Father and son surveying team, Stuart Hagerman, LSIT, and son Carson, age two.



Letters to the Editor

THE PROMISED RESPONSE By: James K. Crossfield, L.S., Ph.D.

Six years ago (Fall/Winter 2006) I submitted an article that was published in the Cal Surveyor. The title was: How Geomatics Professional Employment Characteristics Impact Four-Year Educational Programs. I stand by my comments. Some were not amused however. Delwyn Rasmussen was motivated to respond to my article. His comments were published in the Summer 2007 issue of Cal Surveyor. Delwyn was particularly offended by my use of the word "Geomatics." Respecting Delwyn and his comments, I decided to investigate the issue further by polling new students who were entering our degree program every year for five years. My goal was to determine what the ultimate issue was causing new students to enroll in our program.

Our Introductory course is offered in the Fall Semester at 11:00-11:50 am every Friday. All new students entering our major attend. Here students learn about professional precedents, discuss ethical behavior, develop team building skills and learn about professional organizations, like CLSA, ACSM and ASPRS. But, before these students got any of the course content (at the start of the first class meeting before I even welcomed them to the class and told them my name) they were given a quick sample survey. The survey looked like this:

New Student Survey

Check the following word that best describes why you are taking this course.

Surveying _____ Geomatics _____

Half the forms looked like the sample shown above and half had the words Surveying and Geomatics switched. The data was collected for 5 straight years starting in the Fall of 2007. Before getting to the results we need to remember that CLSA started a big recruitment drive about this time. Many CLSA members went to schools, talked about land surveying and showed the CLSA "recruitment" video to many high school students across the state. We also had trig-star competitions and Boy Scout Merit Badge activity as well. Also we need to note that our students and faculty were actively recruiting through 2010.

New Student Enrollment Discipline Identification

Year	Surveying	Geomatics	Total
2007	5	18	23
2008	6	30	36
2009	6	14	20
2010	15	17	32
2011	13	17	30
Average	9	19	28

- When the program recruits, new students identify with "Geomatics".
- When the program slows recruitment new students identify with "Geomatics" slightly more.
- An average of thirty new students enter the program each year.
- Neither the word "Surveying" nor "Geomatics" appears to hurt program enrollment
- Deleting use of one of these words might negatively affect future enrollments

Ultimately, we do not need to argue about our program's name. We need to work together to optimize our efforts and maximize our success. We need students and CLSA supports an educated workforce. CLSA has demonstrated that support ever since our program was founded in 1971. CLSA contributed over \$500,000 in scholarship support to our students in the last 20 years. This is a huge commitment that makes a difference. Our 700 graduates bring a large measure of intellectual prowess to our professional ranks.

THANKS !

I want to take this opportunity to say thanks to CLSA for it's continuing efforts to promote surveying education in California. I also want thank CLSA for the nice gift and recognition provided to Dr. Fareed Nader and myself at the CLSA conference just held in Reno, Nevada. The conference was well run and a pleasure to attend. Note that approximately twenty students from Fresno State attended.

Sincerely,
James K. Crossfield, L.S., Ph.D.
Professor Emeritus, Geomatics Engineering program
California State University, Fresno



By: Craig Roberts, PLS

Craig works in the Survey Section of East Bay Municipal Utility District in Oakland, California.

Where There Is No Surveyor: Building a Medical Clinic in Haiti



Map of Haiti. The project location is indicated by the red marker.



The first point of our traverse was on the local water fountain.

“Shooting... Got it!”

The signature call of the surveyor sounded over the humid farm land. It was our fourth day in Haiti and things were going smoothly: Electricity was reliably available, no one had gotten sick or injured, and our equipment was working well. It was incredibly hot and Brian and I had been working since 6 am to avoid the heat of the day. It was time for us to take our midday break when we saw two Haitians carry an unconscious man to a tent used as a temporary cholera treatment clinic. By the looks of their clothes, we figured they must have been from a very rural part of Haiti and had travelled a long way to get medical attention. Unfortunately it was too late. The man they had brought would become yet another victim of the cholera outbreak that had taken the lives of thousands.

His death reminded me of the reason why we were there. This region of Haiti, Bayonnais, has no significant medical facilities, requiring people to travel another four hours to a hospital in the nearest city of Gonaives. The San Francisco Professionals Chapter of Engineers Without Borders (EWB-SFP) is helping people gain faster access to medical care by building a permanent medical clinic local to the area. EWB-SFP had contacted the East Bay Chapter of the CLSA in December of 2010 looking for surveyors to volunteer to work on the project. When I

Continued on next page

heard the announcement I was immediately interested. As part of the team, my job was to prepare a topographic map for the design engineers and to do a field lay-out of the first phase of construction. After about a week of consideration I agreed to embark on what would be an amazing cultural experience that tested my ability to work in adverse conditions and cooperate with others.

Project Background and Challenges

At the time, I knew very little about EWB-SFP and absolutely nothing about their Haiti project. Eric McDonnell, PE, was the structural lead on the Haiti Team. From him I learned that the clinic had been in the planning and design phases since 2001, long before the 2010 earthquake. The non-governmental organization (NGO) L'Organizacion de la Force Chretienne des Bayonnais (OFCB) was leading the effort to bring this much needed access to the area. In order to accomplish our objectives we would be there for one week in late March with a total of 8 people. Accommodations would be provided by OFCB.

Once completed, the clinic will be a large step forward for the community. The origins of the project go back to 1999 when OFCB bought the land with the intention of bringing access to medical services to the Bayonnais Valley. That same year they began sending local students to medical school in Haiti to prepare them to staff the clinic. In all, there will be two doctors, five nurses, a dentist, and a lab technician. The students accepted full tuition scholarships in exchange for five to

ten years of service after their training is completed. Upon completion the clinic will house a triage room, pharmacy, dentistry facility, laboratory, x-ray room, exam rooms, surgery prep and surgery room, delivery room, maternity ward, and women's health/OB-GYN room, as well as offices, storage and administrative rooms.

Initially, there was a lot of interest among the members of our CLSA chapter. For most, however, concerns about health and safety or prior commitments prevented them from volunteering. There is no doubt that there are significant risks involved in travelling to a country such as Haiti, including the increased risk of contracting a tropical disease and the risks associated with higher crime rates. Driving on the highways, however, was probably the most dangerous part of the trip. If an accident or injury were to occur, getting adequate medical attention could be a serious problem. From our chapter, I was the only one with time available who was ready to take on the risks associated with the project. In my eyes this was an amazing opportunity to see first-hand how people in this impoverished part of the world live and to better understand their culture and environment. This was also an opportunity to work with local engineers from the Bay Area and build relationships with other professionals. I believe that getting involved in one's community in any capacity is a valuable experience and this was my opportunity to do just that. The members of the CLSA East Bay chapter, while not able to directly attend, were still very supportive and provided guidance, supplies, and even some funding for the trip.

Continued on next page

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The Team

Once I was selected for the project I began to prepare for the adventure. One of my first tasks was recruit a second surveyor to join me on the trip. I felt it was important to have another person to discuss the project with and help prepare for the journey. I also found it important to have a backup surveyor in case one of us was suddenly unable to make the trip at the last minute. I began looking outside the CLSA as all the members I had talked with had prior commitments. After an announcement at East Bay Municipal Utility District where I currently work, my coworker Brian Kong decided to volunteer to take on this critical role. In the following weeks Brian and I attended several EWB-SFP meetings and discussed the project with people who had been to the site. Our group of eight volunteers included four who would work on the clinic: two civil engineers and two surveyors. In addition, an electrical power team was to upgrade and maintain a solar-diesel hybrid power station. Our team's goal was to finally break ground on a project that had been in the planning and design phases for years.

Scope of the Surveying Project

As it turned out EWB-SFP *did* complete a survey of the site, unfortunately it was not accurate enough for their purposes. I reviewed their existing map and noticed many suspicious areas where there were likely rod busts. Perhaps property lines are not as big an issue as they tend to be in the United States, but the clinic design was less than one foot away from the boundary--with no real explanation or docu-



The site was gently sloping with several mango trees and irrigation channels.

mentation as to why the boundary was located as it was. I later learned that the previous surveyors' traverse mis-closed by several meters. This was most likely attributed to lack of experience and some very poor equipment. They were using a T2 in serious need of repair as well as a level that miserably failed a peg test. EWB-SFP contacted the CLSA East Bay Chapter in hopes of solving these problems.

It was important that we conduct the best survey possible. I recognized that we weren't only representing ourselves, but the surveying profession. This was not only a chance to build relationships with active engineers in the Bay Area, but also an opportunity to show them how an accurate, professional survey could save time and money over the course of a project. For these reasons, I followed a similar approach to planning the survey as would be done in private practice--ensure there was a clearly agreed upon written scope with stated assumptions prior to beginning work.

A brief summary of the scope is as follows:

Perform a topographic site survey of the area to be used for clinic construction.

This step would be no problem and would be similar to just about any survey in the US. This would be facilitated by bringing equipment we were comfortable with as opposed to using the equipment available at the site. There would be no need to survey utilities since there aren't any!

Locate the property boundary.

The boundary survey would be a bit more interesting. How do you locate a property line in a country such as Haiti? Does the Haitian government even license surveyors?

Lay out the building grid lines for Phase 1 of the project.

Laying out grid lines meant we would need to do mapping and calculations at the site. We would need to bring a laptop with CAD installed and have the design plans ready.

Selecting Equipment and Preparing for the Journey

Neither Brian nor I own any survey equipment, so we needed to find brave equipment owners who would lend us their gear, or possibly donate it. We looked into insuring equipment for the trip, but this was not economical. Instead we looked for older equipment that functioned well but wouldn't be a huge loss if it never made it back. Stan Gray, Principal of Meridian Surveying in San Francisco, was generous enough to lend us their Sokkia Set 3B and HP48 calculator with the TDS surveying card. It was the perfect tool for the job: I am intimately familiar with this setup and the equipment wasn't terribly valuable in case it was lost, damaged or stolen. Special thanks to Tim Case of RBF Consulting who also provided us with equipment and supplies. We brought an older Dell laptop with Land Desktop 2004 installed for calculations and data verification--another old reliable setup, perfect for Haiti.

There would be absolutely no "go-backs" on this job--we had to get it right the first time. For this reason we rehearsed this seemingly simple survey in Brian's backyard until we were 100% confident in our equipment and supplies. Our goal was to emulate as best as possible the conditions at the site there--

Continued on next page

by alerting us to any problems we might encounter. We were told that power would be available for several hours a day which would be enough to charge our equipment. Wood and rebar would be available. Beyond that we made few assumptions. We played out the many "what if" scenarios in our head and prepared a contingency plan for each one. We brought a second data collector and TDS survey card in case the first failed. If both data collectors failed we could use the Set3B's on-board computer. We brought manuals for everything in case we needed to troubleshoot problems. If the total station failed we figured we could do an acceptable survey using the level and 200' tape. Beyond that we brought a surveying text book in case we were reduced to mathematical computations by hand.

The Bayonnais Valley was near the center of the cholera outbreak of October 2010. At the time of our project it appeared that the situation was under control. We followed the news regularly to ensure we were going during one of the safer times. Still, we needed to get a variety of vaccinations. The infectious diseases of primary concern included Cholera, Malaria, Dengue, Tuberculosis, and Hepatitis. The chances of contracting a disease could easily convince someone not to go on the trip. My attitude, based on my previous travels, was that reports often make the situation appear worse than it actually is. People frequently go to Haiti and come home unharmed. With a little caution I was expecting to do the same. EWB-SFP provided medical and evacuation insurance for the trip in case a problem were to occur. They also conducted a travel safety course to help us learn methods to minimize the chance of getting sick. After the class I realized that trip was not going to be like one of my previous adventures as a tourist. The dangers were very real, requiring us to be diligent about treating water, avoiding mosquito bites, and eating thoroughly cooked food.

Goodbye U.S., Hello Haiti

I was excited the day we left for Haiti. It had been a long time since I had travelled with a team of any kind. Our group of eight was now part of one team with a mission to begin construction of a medical clinic, upgrade a power station, and return home safely. We took the red-eye flight from San Francisco International Airport to Miami. From there we left for Port-Au-Prince. I had not slept in about twenty hours at this point (being tall makes it fairly impossible to sleep on planes), but the excitement kept me alert. The blue Caribbean looked beautiful from the air. After a short time we approached Haiti and Port-Au-Prince.

Port-Au-Prince, or simply "Port", was a sight to see from the air. Haiti is completely deforested and brownish green in color. There were large tracts of blue tarps where temporary tent cities were set up for the people displaced after the earthquake. The city itself was smoldering with many streams of smoke reaching toward the sky. I leaned over to my neighbor and said "I think I changed my mind." Obviously a joke, as we

both know there would be no turning back at this point. Musicians greeted us when we got off the plane, which was a nice touch. But the serenity was quickly replaced by chaos. The terminal was very disorganized. There didn't seem to be any order or method to how people were claiming their baggage. I started to worry that our equipment and personal belongings might get stolen. After a short panic, we were able to locate our luggage in a giant pile unloaded at the terminal.

As soon as we left the terminal people aggressively vied for our attention. Some wanted to help carry luggage (for a fee). Others were hawking trinkets or peddling. Others begged for money. I held on to the instrument and my baggage tightly and kept focused on finding our ride out of there. It was a relief to meet our contacts. The quarter-mile trek from the terminal had stressed me out. My jeans, which were ideal in cool San Francisco, were now damp with sweat from the humidity. One of our new friends, Eddy, was a Haitian-born American who had returned to the country to help the people of the Bayonnais Valley. The other two were locals from the village who worked with OFCB. They had an old U.S. school bus ready to take us to our destination.

Before we could leave Port-Au-Prince, we needed to pick up some supplies for the power station. The bus fired up and the roller coaster began. We tore through the streets of the city. People, mopeds, trucks and cars were all expected to make way for the big yellow bus. My life was now in the hands of the bus driver but I did my best to relax and enjoy the many sights of the city. Everything was grey, dusty, and drab. There was trash everywhere and plenty of air pollution to go along with it. People crowded the streets selling food, water, and other items. Nearly all the buildings were made of concrete and cinder block. Most yards had high walls around them with



Large hand trucks in Port-Au-Prince.

broken glass embedded in the tops to stop intruders from entering their property. Surprisingly, I didn't see many collapsed buildings.

Eventually we made it to the solar power systems dealer, Green Earth Solutions. It might have been easier for us to

Continued on next page

import our own parts and equipment for the power station. However, an important part of EWB's mission is to create sustainable engineering projects. Many times engineering projects in places such as Haiti end up non-functional a few years later

and a half. In the morning I was surprised to find myself surrounded by a beautiful agrarian village. It was lush with many trees and large tracts of irrigated farmland. It was a welcome



Street markets were crowded and dusty.

simply because the locals do not have the resources to repair or maintain them. They may be salvaged for materials and forgotten about. For this reason, it is important for EWB to source as much material as possible locally. Not only does this stimulate the local economy, but it ensures that replacement parts will be readily available in the future when the system needs repair.

I have to admit, visiting Green Earth Solutions was one of the more memorable experiences of the trip. The yard was surrounded by a high wall with peeling paint. We were greeted at the door by a guard carrying a shotgun. Once inside we waited to meet the owner. Electrical parts and scrap metal pieces were strewn about with no apparent organization. The eerie feel of the place made me feel like we should be buying contraband instead of alternative energy components. However, once we were introduced to the owner my attitude changed. He spoke decent English and was by all means a solar power expert. Our energy team discussed the specifics of our project with him as he provided a variety of ideas on how to provide electrical energy to rural communities. We bought two solar panels and 25 gallons of battery acid to be used for the generating station at the site.

After a very long and death-defying bus ride, which included a breakdown, a battery acid spill, and a very bumpy dirt road, we finally arrived at our site. It was 10 pm. At last I had a chance to get some rest. The night was so warm I didn't need any covers at all. I could faintly hear the beating of drums as I dozed off and finally got my first bed rest in a day



The locals (especially kids) were happy to help.

change from urban landscapes of the San Francisco Bay Area. Kids followed us around everywhere and the locals were always curious and eager to help. There was very little crime and we felt safe walking around at night admiring the stars. The accommodations were hostel-like with bunk beds and a shared bathroom. Compared with much of what local Haitians had available, we had the luxury of showers and flushing toilets. Our hosts were excited to have us and went out of their way to make sure we were comfortable. The food was decent, but more importantly they made sure it was well cooked so we wouldn't get sick.



Once in the village, Brian and I wasted little time before we started working. If there were going to be any surprises, we wanted to discover them quickly. To our delight, things went very much as we had anticipated them. We did our control traverse and then collected topographic data. In many ways it was no different than surveying a one-acre farm lot in the United States. But some things were different--for instance locating the property boundary. Clearly we were in a very unique situation as I don't have any knowledge of Haitian law or an understanding of the local culture. As in the States, we started with the deed. We pestered the owner, OFCB, for the deeds to the property and to our surprise, they had them! Eddy, our Haitian-American colleague, translated them for us as they were written in French.

Continued on page 16

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Upon examining the deeds we discovered that they were very loosely measured to the nearest meter. Each metes and bounds description mis-closed by several meters, or even tens of meters. Most courses were free calls. Points-of-beginning were difficult to locate as well, calling from the intersection of



(Above) We worked closely with OFCB, the local NGO, when planning the construction of the clinic.

(Right) Every one chipped in to help erect batter board and set grid lines.

two streets (more like dirt paths) that were difficult to delineate. It appeared to me that the person who had written the deeds paced the boundary with a compass and didn't make any effort to check the closure of the parcel. Later we were introduced to Fermin St. Louis who handled the real-estate transaction to buy the land. He was the most knowledgeable of the property boundary location. With video recorder in hand, we walked the boundary of the parcel taking careful field notes as Eddy translated Fermin's description. We measured the location of all the topographic features he pointed out and then entered the boundary in CAD. I placed a note on the map stating "Property Boundary located per interview with Fermin St. Louis." I felt this was the most appropriate course of action given my lack of understanding of Haitian law and the severe ambiguities in the deeds.

We downloaded all our data into our laptop computer and drafted an accurate, yet unpolished map to use for the building layout. The lead engineer and I overlaid the design plans and positioned the buildings using the updated topographic data. We were finally ready to stake Phase 1 of the project. This is when we experienced our first failure--a row of numbers on our data collector simply wouldn't work, possibly from the heavy humidity. It would be pretty difficult to lay out the buildings without using numbers 4, 5, and 6! Luckily we brought a second HP48. But when we turned it on we received a card reading error! We were experiencing a double failure. I couldn't believe my eyes. We researched all the manuals we had

and found nothing to help us. However, we did have an internet connection. We found a discussion group where someone had commented on the same card reading error. According to the discussion group, all we needed to do was type "PINIT" into the HP48 command stack and press enter. To our surprise, it worked! I have no idea what the PINIT does but nor did I care--our crisis was averted.

Staking the grid lines for the first building was the high-point of our work. Everyone chipped in to help with this groundbreaking event. It was very satisfying for the locals and the teams involved with the medical clinic to finally see some physical evidence of what was to come.



Leaving Haiti

On the last day we found some time to be tourists. We hiked into the surrounding mountains and saw some of the more rural parts of Haiti including an abandoned French fort. Before getting on the bus to head home, I took one last photo of the site and bid it farewell. The trip home was anything but easy. The important thing is that we made it home safely. Once home, I polished up the map we made and provided it to the design team. They were very happy with the work we did. Hopefully we'll hopefully be first on the list the next time they need surveyors for a future project.

Updates on the Clinic

Since last March EWB-SFP has made several trips back to the Bayonnais Valley. Phase 1 is nearing completion. As of January 21, 2012, the first building was completed and the water and wastewater systems were installed although the latrines still need to be constructed. Funding has been an issue that will hopefully be resolved so the clinic can be fully completed. It has been very satisfying to see the progress and know that we are contributing to its success.

Lessons Learned

Looking back on the trip, there were a few things I might have done differently. First off, if possible, we would have discussed safe transportation with our contacts in advance. This

Continued on next page



The first building of four as of January 21, 2012.

was by far the most dangerous part of the trip and something we didn't plan for or expect. People in Haiti, and in many countries of the world, drive much more recklessly than we do here in the US. Vaccinations are important, but they won't save you in a car accident.

To further help the people of Haiti, it would be ideal to train the locals to do their own surveying. This takes a bigger commitment from those providing the training, but it is instrumental in helping the people help themselves. One way we can help with this is by not only donating equipment, but finding a way to help maintain it. They have a lot of junk that people have "unloaded" on them. One idea would be to have two sets of equipment: one to set to keep at the site, and one set to

bring home, maintain, and use when preparing for the next survey. Periodically the sets could be swapped. That way the team from EWB could arrive with a functioning instrument they were familiar with, and the locals could have their system replaced with one that was freshly maintained.

The keys to the success of the Haiti project are similar to those in on any survey project: Have a clearly defined scope, anticipate problems, and make contingency plans. The fact that there are no "go-backs" means we must be very diligent about bringing precisely what we need to do the job. I recommend doing rehearsals ahead of time using the equipment and supplies you'll have available on site. This is the best way to prevent surprises.

How Can You Help?

As mentioned earlier, there is always a need for additional funding on a project like this. If you would like to help fund the clinic's success, visit www.ewb-sfp.org and click "donate." Select the SFP-Haiti project when prompted.

If you are interested in getting involved with Engineers Without Borders, go to www.ewb-usa.org. You don't need to be an engineer to be a member! It can be a great way to explore new skills and meet other professionals. I found my trip to Haiti exciting and fun. EWB-SFP has a high standard of quality and you will be expected to make a commitment, but the work is rewarding and the memories will last a lifetime. ❖

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Cal Poly Pomona Hosts ASCE PSWC

On March 22nd, 2012, California State Polytechnic University, Pomona students organized and hosted the American Society of Civil Engineers Pacific South West Conference (ASCE PSWC). Eighteen ASCE student chapters from universities throughout southern California, southern Nevada, Hawaii, and Arizona, competed in nineteen different events. The conference gives students an opportunity to develop leadership skills and apply classroom knowledge.

The land surveying competition was designed to assess students' knowledge regarding basic land surveying field techniques, calculations and precision in a time constrained setting. Students were asked to perform the following three events for this year's surveying competition:

1. Measure and calculate the height of an object using STADIA.
2. Measure and calculate the horizontal distance between 2 inaccessible points.
3. Set two bluetop stakes at specified elevations in a designated area.

In the first event, students used a theodolite or total station with stadia (3-wire). No instruments with reflectorless capability were allowed. A level rod was attached to a flag pole. The goal was to test students' ability to apply the stadia method to find the horizontal distance to the pole and also measure the vertical angle to the top. This information was then used to calculate its height.

The second event required students to calculate the horizontal distance between two inaccessible points by setting up a total station at a remote location, measure the horizontal distance to each point and the angle between them. By applying the law of cosines the distance between the two points was calculated.

In the third event, students were allowed to use theodolite or total station (not an automatic level) to set two bluetop stakes, which aimed to assess the students' ability to conduct one of many field survey techniques in a timely manner. All three events posed different challenges; however students appeared to have the toughest time setting bluetop stakes, which required practical skills without any calculation.

Support from the local surveying industry helped to make this a successful event. Special thanks to WestLAND Group, Inc. for sponsoring the surveying competition and to the volunteer judges, CLSA Members, Amy Bledsoe, Bill Hofferber, Stephen Hughey, Theresa Strazzella.

I encourage the land surveying community to become involved in the ASCE PSWC survey competition every year. Students benefit from the more practical surveying challenges and professional advice. Involvement in the education of future generations and the inclusion of land surveying courses in the civil engineering program can benefit both engineers and surveyors. Most importantly, it sends a first-hand message - Surveying is NOT just "a guy behind the tripod in the street" but a skilled profession on every level. ❖



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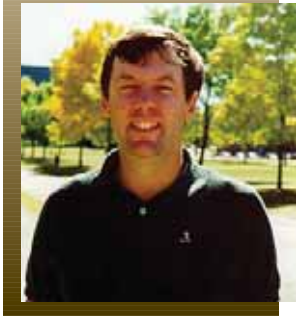
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By: Knud E. Hermansen, P.L.S., P.E., Ph.D., Esq.

Knud E. Hermansen began his surveying career in the United States Marine Corp. over 30 years ago. After completion of basic training, Knud was sent to surveying school and spent the next three years with the 2nd Topographic Platoon, 8th Engineer Battalion performing control surveys throughout the world. After his release from active duty as a sergeant, Knud worked for various consulting firms providing a wide range of services involving boundary surveys, site development, and engineering. During the last several years, Knud has provided consulting services in land surveying, civil engineering, and law. Much of Knud's present consulting activities involve boundary disputes, easements, land development, liability, title, and contract issues.



The Surveyor as an **Expert Witness**

A surveyor is often involved in litigation in the capacity of an expert witness. In the capacity of an expert witness, the surveyor performs three functions. First, the surveyor identifies, introduces, and authenticates documents and other information relevant to the disputed boundary. Second, the surveyor explains the relevancy of certain information and how the information is used to fix the position of the boundary. Third, the surveyor gives a conclusion — an ultimate opinion on the location of boundaries and other related matters. If the surveyor performs the first two functions with competence, the surveyor will establish their credibility with the court. A surveyor that appears credible will have their opinion accepted and relied upon by the judge or jury without necessarily a clear understanding or comprehension of the underlying facts and basis for the surveyor's opinion.

The client is well served by the attorney that spends some time evaluating the surveyor in their role as an expert. There are several facets of a surveyor and the services performed by the surveyor that the attorney should examine.

There are numerous surveyors who are competent and respected practitioners, yet do not portray confidence and sagacity in stressful situations.

One facet to be examined is the surveyor's ability to handle stress. Some surveyors do not make good experts because of their inability to handle stress. There are numerous surveyors who are competent and respected practitioners, yet do not portray confidence and sagacity in stressful situations. The terror of sitting in the witness chair coupled with the seemingly hostile attention of the attorney and judge often leave these surveyors struggling for simple thoughts, stumbling over words, grasping for answers, spitting out nonsensical responses, shaking uncontrollably, and sweating profusely. Many are the attorneys who left a courthouse convinced not only that the surveyor had botched the survey and testimony but must have committed all the unsolved crimes in the area given their demeanor on the stand. Given the technical nature of surveying and the difficulty in explaining technical testimony, a good demeanor is an important factor to cultivate. In complex and technical testimony such as required for boundary litigation, it is not uncommon for an incompetent surveyor to be judged a more credible witness because of their superior and calm demeanor rather than the the content of their testimony.

The root of many deficiencies in professional services can be traced to cost conscious clients coupled with surveyors willing to restrict their services based on a price the client is willing to pay.

An evaluation of the scope and depth of the surveyor's work should also be performed by the attorney. The root of many deficiencies in professional services can be traced to cost conscious clients coupled with surveyors willing to restrict their services based on a price the client is willing to pay. The purpose stated for the services also plays a role in the quality of the surveying service provided. The mortgage loan inspection used to obtain financing is a markedly different service than the boundary retracement survey used to prepare a description or erect improvements. In this regard surveyors are no different than attorneys. What attorney could honestly admit that they provide the same level of estate planning to the blue-collar worker with \$5,000 life savings as compared to the billionaire? What attorney spends the same time on a deed for a \$100,000 house as they spend on preparing a complaint starting a \$1,000,000 lawsuit? The point is that a survey performed for a timber harvest may not be sufficient to base an opinion on regarding a \$60,000 encroachment lawsuit that occurs many years later.

Also to be discovered by the attorney are surveyors who have arrived at an opinion without complete information or information that is not reliable, credible, or cannot be offered into evidence. An opinion formed without gathering or looking at all relevant information is usually determined to be untrustworthy and susceptible to impeachment. This situation is cause for the surprise of many experienced attorneys when they realize that the surveyor did not perform a complete search or limited the measurements to certain corner monuments that were convenient and failed to use others monuments more credible but less convenient.

For the surveyor to have had all the information but use it improperly is no less embarrassing for the attorney attempting to build a case on the testimony of the surveyor. There are numerous cases where the surveyor has testified at some length to the care and accuracy of their research and measurements only to admit they began their services at an unverified point indicated to the

Continued on next page

surveyor by the client. Equally problematic are the situations where the surveyor has relied entirely upon private records that clearly contradict the valid deeds recorded in the public records. In a few cases, surveyors have relied on procedures or priorities that do not conform to the rules of construction or priority of control established by the courts.

These problems oftentimes arise by oversight or mistake made by otherwise competent surveyors. In a few cases, the surveyor is simply not competent. Few attorneys are aware that licensing surveyors is a relatively recent event in many states and certainly was not foolproof in insuring competence of the individual before licensure. There are numerous surveyors practicing that have never had to take a test or prove their competency in order to obtain their surveyor's license. When licensing of surveyors began, persons that applied and could show sufficient experience or education were given a license to survey without testing or further verification of qualifications.

Before continuing, it must be stressed that not all surveyors who were licensed without examination or other proof of competency are incompetent surveyors. On the contrary, some of the finest surveyors practicing were licensed in this manner.

While there are many examples to the contrary, the presumption will always be that the more education a person has, the more knowledgeable they will be.

There is also wide diversity in surveyor qualifications. These qualifications must also be examined and evaluated for the impact the qualifications may have upon the perceived credibility of the

surveyor. While there are many examples to the contrary, the presumption will always be that the more education a person has, the more knowledgeable they will be. There are no mandated formal education standards for surveyors in many states. Experience prior to licensing also varies. Some surveyors have no college education while a few have a Ph.D. Between the two extremes are numerous surveyors with two, four-year, and various graduate degrees. Among surveyors with a college education there is a wide variety of degrees ranging from fine arts to engineering.

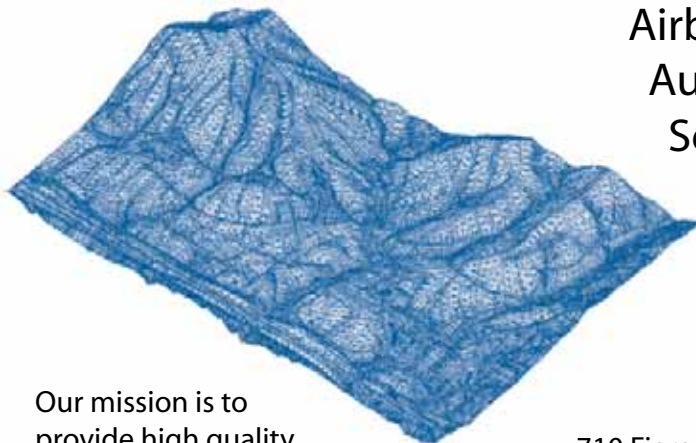
Compliance with mandatory standards should not be overlooked in analyzing the surveyor's services. In many states, surveyors have had to perform according to mandated standards or expressly except all or parts of those standards by agreement with the client. Some surveyors have ignored the standards. Other surveyors have misinterpreted the standards. A few have not understood the standards. Several surveyors were unaware standards existed for many years. Some surveyors have ignored or excepted certain parts of the standards that could prove critical in formulating a correct opinion or communicating a credible opinion.

In defense of the surveyors who have not studiously adhered to the standards or taken exception to certain parts, adherence to all parts of the standards is to substantially increase the cost of surveying services without necessarily affecting the accuracy of the surveyor's opinion. For example, the preparation of a complete report alone will often add hundreds of dollars to a typical retrace-survey yet may have no effect on the location of the boundaries that were re-established.

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The attorney must not only check that the surveyor is competent but must sometimes check those persons that the surveyor relied upon are also competent. Few surveyors do all the work required for a boundary retracement, instead relying on employees to do some or most of the mundane technical aspects of the work. In this regard, surveyors and lawyers share a common weakness as more and more work is delegated to non-professional employees within a firm. Untrained or minimally trained personnel often overlook important information or fail to catch and correct omissions. Compounding the problem is the large number of personnel and projects supervised by some surveyors. As the work-load increases for the licensed individual, review and checks becomes cursory or omitted on many projects. Proper supervision declines. Important pieces of information are undiscovered or the significance overlooked. The result is that in some cases the surveyor whose seal and signature appear on the plan had little to do with the services that the plan represent. As a consequence, the surveyor cannot always say why information was omitted or mistakes not detected.

Finally, the mindset of the surveyor should be explored. The attitude or mindset of a surveyor often has a major impact on the quality of the surveying services and the credibility of the surveyor as an expert. The attitude or mindset refers to what the surveyor understands a surveyor's responsibility to the client should be and the ethical limitations of professional practice. For example, there are a few surveyors that look upon themselves as technicians. (E.g., "You tell me where to put the corner and I'll make the measurements between the corner locations you selected.") At the other end are a few surveyors who believe they have the power and right to determine all matters pertaining to boundaries including title issues. These surveyors feel qualified and authorized to determine boundaries based on acquiescence, estoppel, adverse possession, and other equitable doctrines. (E.g., "The stone wall has been there for 20 years so your boundary is now the wall despite what your records say.")

It is not unusual for the extent of the dispute to exceed the ability of evidence to support the claim.

In discussing the surveyor and survey services, it would not be fair for the surveyor's competency as an expert to ride entirely upon the surveyor's ability, background, and care. More times than good conscience should allow, attorneys have encouraged litigation to begin or continue where the costs of litigation far exceed the value of the area disputed. Similarly, attorneys will attempt to build "castles on sand." For example, it is not unusual for the extent of the dispute to exceed the ability of evidence to support the claim. Such would be the case where two neighbors are arguing over half a foot (the location of the old oak tree) when the nearest monuments that can be used are the center of a road and a four foot wide rock wall several hundred feet away. In other cases, the technical complexity or reliability of the evidence exceeds any reasonable ability for the typical jurist or jury to understand. The fact is that a vast majority of boundary disputes should and could be handled through mediation by a knowledgeable mediator or presented before a real estate attorney or surveyor acting in the capacity as an arbitrator.

In some boundary disputes that go to litigation, adequate preparation and investigation by the attorney is often lacking. Many surveyors share the experience where they receive a call from an attorney seeking services as an expert a short time before trial. There are also numerous times when the client's attorney has never attempted to speak to the surveyor until shortly before trial or, in some cases, the day of trial. Also of some frequency are situations where a boundary dispute goes to trial where each side is equally burdened by incompetence be it the surveyor or attorney. Many decisions by courts are based on the lesser of two evils rather than a clear presentation and analysis of the evidence by the so-called experts and attorneys employed by each side.

The attorney should make a great effort to prepare an expert on how to communicate their opinion.

A common problem that frequently arises for the surveyor who is sought as an expert is the attorney who seeks a "hired gun" or advocate for the client's position. Ethically, a surveyor is obligated to perform an unbiased analysis to arrive at an opinion on the location of the boundary by a fair and reasonable interpretation of the operative conveyances guided if need be by a proper application of the rules of construction as established by appellate court decisions. Consequently, the surveyor's responsibility in retracing a boundary should be independent of the client's needs, wishes, or best interests. The attorney should not influence an expert witness in formulating an opinion (i.e., what to say). The attorney may and should, however, make a great effort to prepare an expert on how to communicate their opinion. This is an important distinction lost among some attorneys. If the surveyor has been allowed to arrive at an unbiased opinion on the location of a boundary, the surveyor is cautioned that a diligent effort is expected from the surveyor to defend that position — to become an advocate for their opinion.

A court appointed surveyor should be considered in all boundary litigation cases.

In closing a discussion about employing surveyors in litigation, one option that is often ignored by attorneys is to seek the appointment of a surveyor through the court to locate disputed boundaries — a court appointed surveyor. This option will be discussed in a future article.

In closing, it is my experience that most surveyors would rather earn a fee in some other manner than as an expert witness. While successfully educating the judge or jury can be a rewarding experience, the process is often fraught with stress and difficulties. Explaining a complex and technical analysis within a limited time frame is difficult enough. However, within the confines of a courtroom, the explanation must be done with frequent interruptions brought about by objections, trick questions, poorly worded questions, and under the ministrations of at least one hostile attorney who is trying very hard to make the surveyor or the surveyor's testimony appear faulty, biased, incomplete, and irrelevant.

Nevertheless, the role of a surveyor as an expert is an important one that must be approached with a motivation to educate, a willingness to communicate effectively, and an acceptance of the difficulty that attenuates the process of giving testimony in litigation. ❖



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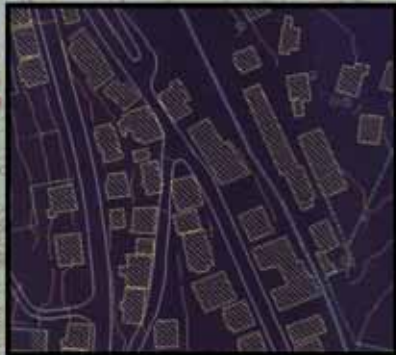
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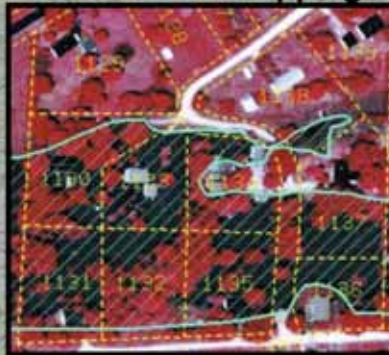
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Geography Quiz

by: Anne Hoppe, PLS
and Germar Berthard, Ph.D.

In January 2001 an Italian-Argentinean Survey Expedition, using GPS and terrestrial surveying methods, determined that this location is two meters higher than originally mapped. It is the highest point outside of the Himalaya.

Answer on page 37



Professional Outreach Events

Outreach on the Fly in Petaluma

By: Stuart Hagerman, L.S.I.T.

In March 2011 I was party chiefting during a monitoring well survey in an empty lot behind Live Oak Charter School in Petaluma, CA. During the survey this group of students came out to check on gardening projects they had in the lot. The woman you see in the photograph was their teacher. She kindly asked if I would tell the children what I was doing. I told them that I was a land surveyor and I was using this survey instrument that sends a laser to measure distances. I also told them it measures angles, but certainly didn't say anything about polar coordinate trigonometry. I explained to them about the surveyor's role in construction, how we use different types of mathematics (at that point I mentioned how important it is for them to do their math homework), and that surveyors also determine where property lines are. The students were very responsive, seemed to understand what I was talking about (better than most adults), and asked good questions. One boy asked "How do you measure underground?" I briefly described what surveyors do, and also told them that there was a geologist on site that day and explained how he makes measurements underground. I described hydrographic surveys (although I didn't use that word, of course). One boy asked if I went to college and I explained to him that people can go to college for surveying, or fortunately for me, they can also learn from on the job training, and pursue enrichment courses through college at night. (My resume includes classes offered through the Sacramento Chapter of CLSA and Pacific Land Seminars.) I lowered the gun, let them look through the scope and shoot a stop sign using the reflector-less technology on the Leica 1103 that was about 350 feet away. A few of them exclaimed "Cool!", and "Can I do it again?!" My rod man Ron Smith who was about 400 feet away walked up and snapped this candid photo using his phone. We were working for Virgil Chavez Land Surveying in Vallejo, and we considered this to be our lunch break. ❖



Let us know about your local professional outreach events so we can share the good news. - Editor

San Francisco Treats

By: Dane Ince, PLS

The following excerpt is from a story entitled "Bringing Back Boundary Fences" that was written by Anna Pratt Simpson for the magazine section of the San Francisco Sunday Call, October 6, 1907.

“...there may be some bother with the people who think that the marks of the confines of their property ought to be put in the safe deposit or some equally desirable place. Such a man came into the engineer's office one day with a bundle under his arm. He complained that his neighbor was building several inches over on his property. Mr. Holcomb propounded the usual questions and then asked-the fellow how he knew that his neighbor was trespassing."I know because here are the sticks that mark the corners of my property." He carefully unrolled the bundle and showed the stakes which the surveyor had driven so carefully. "If you had only brought with you the holes in which these stakes belonged we might have something for you." The man went away, trying to understand what Mr. Holcomb had said. The survey of his place one fine day showed that the neighbor was quite within his rights."

Charles Holcomb was assistant City Engineer for the City and County of San Francisco and head of the Division of Surveys. Mr. Holcomb was licensed as a land surveyor, LS no. 5, and lead the efforts to resurvey San Francisco after the 1906 earthquake and fire. ❖

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By: Francis "Frank" D. Romano, Jr., PLS

Frank works for Caltrans District 12 (Orange County). Caltrans now uses Google Earth Enterprise which utilizes the State's own data servers and provides a more flexible, secure platform along with additional tools and capabilities not found in the free version.

Right Tool for the Job

In 1999, I went to work for the California Department of Transportation (Caltrans), District 12, Right of Way Engineering in Orange County. Shortly thereafter, my supervisor, Greg Grant, LS, asked me to take on the role of Relinquishment Coordinator. At the time, I had no idea what a relinquishment was, let alone how to coordinate one. As with any large governmental organization, there were plenty of references, manuals and, even, state laws that I could look to for answers.

What is a relinquishment anyway?

A relinquishment is a type of quitclaim usually involving the preparation of a Relinquishment Map – a form of exhibit. (Figure 1) When Caltrans widens a freeway, it can purchase land from neighboring property owners in order to re-

200dpi. Each image was saved as an uncompressed TIF image file and a compressed SID image file (These were later converted to PDF files as Adobe Acrobat's compression technology improved.) They were cataloged and linked to a Microsoft Access database along with information about each map.

In order to find a scanned relinquishment map when researching, the system required one or more of the following pieces of information: the map scan number, route number, post mile, city or project number. With only had general information like the nearest cross street, it became a little more complicated. This would require looking at a Thomas Guide marked with the limits of each R/W map that was kept in the District map file room. Having identified the correct R/W Map number for the area in question, a look at the R/W map would show the relinquishment number.



configure or create surface streets, frontage roads and/or cul-de-sacs. As the project nears completion, any right, title, or interest, in and to, these areas are passed on, or *relinquished*, to the local agency (i.e. city, county, transportation authority, etc.) Our District currently has over four hundred filed relinquishments and more than twenty proposed relinquishments within District 12.

How do you keep track of all those maps?

In 2001, Caltrans decided to have all of their Right of Way (R/W) maps (including relinquishments) in District 12 converted to a digital format. Each map was scanned at

There has got to be a better way.

In 2005, another tool came along, Google Earth. I had a little prior experience with ESRI's ArcGIS (an extremely powerful and useful GIS tool); however, my experience with ArcGIS was a program with a high learning curve with use and data retrieval dependent upon having an experienced user and costly software. Google Earth, on the other hand, was easy to learn and use, accessible to anyone with a computer that had internet access, and . . . it was free!

As I mentioned, we had over four hundred filed relinquishment maps in our District. I decided it would be more productive to index them in Google Earth. In addition to indexing the existing relinquishments, it made sense to start tracking new relinquishments in Google Earth as well. Since there are a number of personnel and departments involved in the relinquishment process, such a system would not only allow them instant access to existing relinquishment maps, documents and data, but also to information, data and preliminary maps of proposed relinquishments in progress.

An old dog learns new tricks.

I commenced learning the basics of Google Earth. These included learning the KML language; how to insert

Continued on next page

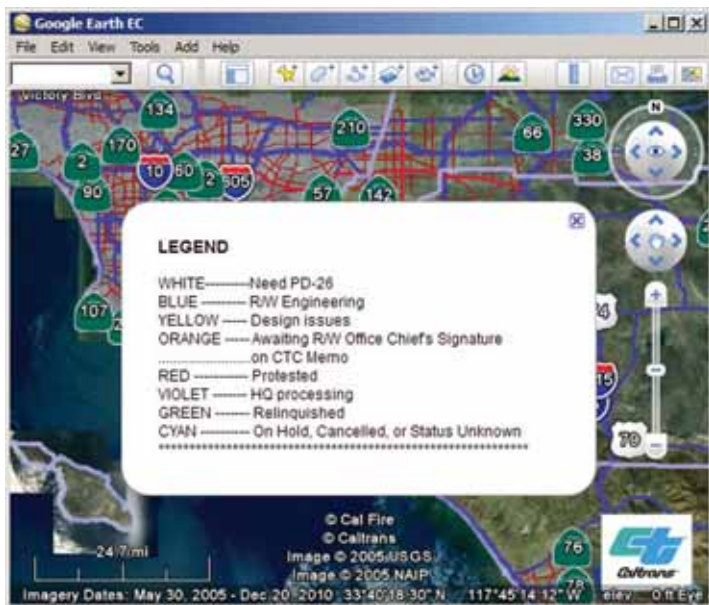


Figure 2

placemarks, populate information balloons, and insert image overlays; and create links to the map overlays and the PDF files containing the map and documents. (It is not as hard as it sounds since there are many good tutorials and discussion groups on the internet.)

The end product was a file that had a placemark for every relinquishment that had been recorded within District 12 along with those that were currently in-progress. Each placemark was color-coded according to a Legend, for quick and easy status recognition (i.e. YELLOW - Design issues, RED - Protested, GREEN - Relinquished, etc. See **Figure 2**). Maps in progress contained information regarding the location, local agency, current status and a link to view the preliminary map in Acrobat. A link to where the actual project files are located on the network server was also added. (**Figure 3**) Anyone who works for a large organization can appreciate how nice such a link is verses searching here and there on this network drive or that one, trying to discover which folder or subfolder the files were stored in.

For maps that had been recorded, a link to view the map and recorded document was created, along with links to view the image overlays. (**Figures 4 & 5**) A folder was created with links to the current relinquishment Status Report (generated monthly from an Access database), the Relinquishment Guide (a guide for Design Engineers and Project Surveyors outlining the complete relinquishment process) and to a link with information for contacting our department regarding questions or comments about the file. (**Figure 6**)

Continued on next page

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Right Tool for the Job



Figure 3



Figure 4



Figure 5

The final outcome was a simple, easy to access, easy to use, GIS system for locating any relinquishment within our district. A system that provides instant access to up-to-date data along with the status of any relinquishment currently being processed or previously recorded. All of this is stored as one Google Earth KMZ file which can be network linked to the Google Earth software on each employee's computer. Whenever new data is added or updated, it is saved to this one KMZ file.

Taking it to the next level.

This proved to be such a great organizational and research tool that I later added layers for Right of Way Maps, Vacation & Abandonments, Record of Survey Maps, and a layer with links to Training Videos. (Figure 7)

Over the years, I have come to learn that there are many tools in a surveyor's toolbox, some more sophisticated than others, some easier to use, some with a higher price tag, some even free. Some are old school, some are new, some are traditional, and some are high-tech. In the end you have to answer the question, "What is the right tool for the job?" In this case it was an easy, free, accessible form of technology . . . Google Earth.❖



Figure 6

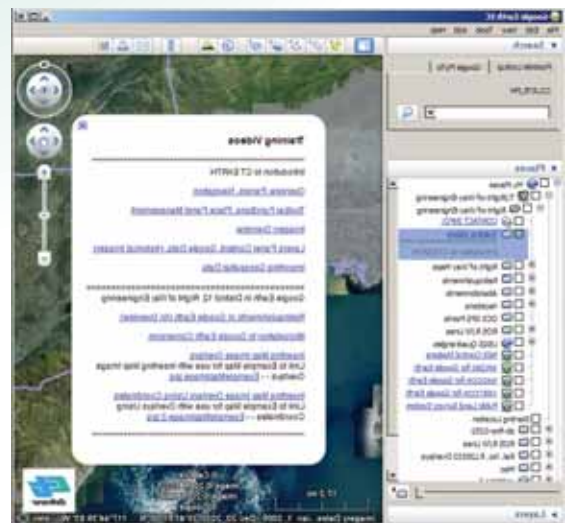


Figure 7

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Postcards



Tim Case, PLS, points to a brass disc USGS reference mark at the top of Sentinel Peak, Olympic National Park, Washington. Behind him are Hayden Pass and Mt. Fromme and in the distant background the eastern flanks of Mt. Olympus.



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Cyber liability coverage applies to:

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If you feel or think you are vulnerable, discuss this with your broker or insurance company and get a quote.

Insurance Industry Update

Rate increases

General consensus is that insurance rates are going to go increase by 4% - 5% this year due to catastrophe losses last year. It would be a good idea for you to consider this potential increase when you are preparing your annual budget.

Claims

As usual, most claims submitted have been for equipment damage and theft. Keep your eye on your remote and robotic equipment. Don't let it get out of sight or you may never see it again.

Boundary disputes are also big claim producers. Getting yourself removed from a suit against an owner or contractor for whom you worked because your name is on the contract can be costly and time consuming.

Claims Made v. Occurrence Policies

Your professional liability policy is *claims made* policy. This means that any loss you have will be settled by the current policy. It is important for you to have a retro date that goes back to your first policy term or to when you went into business. If you can obtain it, full prior acts coverage would be best.

Your general liability policy is written on an *occurrence* basis which means that the policy in force when the loss occurred is the one that would pay the loss.

If you have any questions about anything in this article you can contact me at: rhertzberg@vistainternational.com. ❖

Photo of the Year



Dedication

Submitted by Scott Martin, PLS



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Submitted by Pat Tami, PLS

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By: Jas Arnold, PLS, CP

Photogrammetric Measurements from Small Format Imagery

Introduction

Numerous surveying applications based on small format photography are surfacing from drone-acquired blocks of photos, geo-referencing of videos, through mobile mapping technologies. The positions of features are being determined by applying the principles of photogrammetry to massive amounts of imagery. This Tech Tip features an accuracy experiment where several photo pairs (models) of imagery taken with a consumer-grade digital camera are used to measure known ground positions. The measurers are both human and machine.



Figure 1

Background

The procedure followed by the photogrammetrist prior to making measurements is called orientation. Interior orientation establishes the photographic coordinate system, relative orientation re-creates the camera geometry at the time of exposure, and absolute orientation ties the photographs to the ground coordinate system. These principles remain the same regardless of camera type. Image data is collected from a camera (sensor) several miles or just a few feet away from the subject. In this experiment, a camera (Figure 1) mounted on a remote controlled 'helicopter' (Figure 2) is used to capture stereoscopic imagery of a parking lot. A field survey was performed to locate the aerial control and test points.



Figure 2

The Study; Components and Analysis

As shown in Figure 3, the aerial control and test points were painted then surveyed with a total station (Figure 4) in order to measure their precise position to create the "ground truth" for this study. Photographs of the parking lot were taken from a Canon G10 consumer grade digital camera attached to a custom built hovercraft. The interior orientation of this imagery was performed by simply measuring the corners of each image. The accuracy of the results are impressive particularly when considering the non-metric quality of the camera. The images are "exposed" to a CCD array which, in this camera, is only 7.6 mm x 5.7 mm; smaller than the fingernail of a child's pinkie. The imagery passes through a non-calibrated lens. The focal length of this lens was assumed to be 6.1 mm; a very rough assumption. The seasoned operators were asked to measure the three dimensional position of the painted targets plus the elevation at 25 foot grid locations from two models captured at 135 feet and 171 feet above the parking lot. The location of the test points is shown on Figure 5. The stereopairs were also 'analyzed' by a computer running image matching software which automatically created a surface model. A dense DTM mesh (Figure 6) was generated then compared to the control values. The results of this comparison are shown in Table 2.



Figure 3



Figure 4

Continued on next page

The Results

Table 1 shows the findings of this study. A comparison was made between the model setups by two of the operators. Table 1 shows the resected positions of the camera at the time of each exposure. Both the position of the camera above the parking lot and it's calculated orientation are impressive where the residuals between these four exposures measured by two people average 0.2 feet. The human accuracies of the ground measurements are around 0.6 feet. The computer accuracies as seen in Table 2 approach 0.2 feet.

Table 1 Study Results

CAMERA CENTERS									
	Wes				Jas				
	HIGH		LOW		HIGH		LOW		
	left	right	left	right	left	right	left	right	
X	6296027.36	6296084.42	6296043.28	6296084.34	6296027.55	6296084.13	6296043.38	6296083.86	
Y	1942012.58	1942050.75	1942033.16	1942055.20	1942012.15	1942050.38	1942033.05	1942054.86	
Z	964.94	951.19	930.56	918.64	964.81	951.22	930.48	918.85	
Omega (O)	-2.06	-3.12	1.92	0.97	-2.19	-3.24	1.89	0.82	
Phi (P)	-0.32	1.52	-2.59	-0.70	-0.38	1.63	-2.63	-0.49	
Kappa (K)	-30.49	-31.10	-33.60	-30.43	-30.52	-31.08	-33.60	-30.44	
Flight Height	171		136		170		136		
Pixel Size	0.048		0.038		0.048		0.038		
Photo Scale	1.8523		1.6805		1.8516		1.6801		
			Hi Left	Hi Right	Lo Left	Lo Right			
POINT MEASUREMENT		dX	-0.20	0.29	-0.09	0.47	Feet at camera center		
Targets		dY	0.43	0.37	0.11	0.34			
Ave Diff		dZ	0.12	-0.04	0.08	-0.21	Degrees		
Std Dev		dO	0.13	0.12	0.03	0.14			
Grid Positions		dP	0.06	-0.11	0.04	-0.21			
Ave Diff		dK	0.03	-0.02	0.00	0.01			
Std Dev		Roll (O)	0.39	0.35	0.07	0.33	Feet on parking lot		
		Pitch (P)	0.17	-0.32	0.09	-0.49			



Figure 5



Figure 6

Table 2 Autocorrelated Data

AUTOCORRELATION RESULTS					
	X	Y	Z	DTM	Z-DTM
PL1	6296013.35	1942048.42	793.72	793.61	0.10
PL2	6296029.41	1942022.30	794.83	794.57	0.26
PL3	6296043.10	1941995.34	797.34	797.39	-0.05
PL4	6296068.03	1942008.42	796.99	797.02	-0.03
PL5	6296063.12	1942038.99	794.66	794.33	0.34
PL6	6296089.60	1942033.84	794.86	794.92	-0.06
PL7	6296063.81	1942093.24	792.03	792.02	0.01
109	6296025.32	1942073.90	793.26	793.18	0.08

Special thanks to the participants:

Wes Clish, Josh Bueche, Alan Calabro, Mike Gastelum (Rick Engineering Company), Brian Longuefosse (Compass Aerial Mapping), John Kolbusz (KLT Associates)

Conclusions

The study began as an analysis of accuracy potential when flying at relatively low altitudes. By having the computer as a fourth 'participant,' a greater awareness of the computer's ability to 'see' at high accuracy levels was realized. The image cloud, similar to the data obtained from LiDAR sensors and terrestrial laser scanners, contains a wealth of information. This data set can be used for not only its pictorial value, but also as correlatable image pixels used for elevation models and feature extraction. Applications are surfacing daily where photographic information is being obtained from unmanned drones, hovercrafts such as that used in this study, and vehicle rooftops for mobile mapping applications. Humans are designed to see in stereo while the computer sees even better by using numerous images. ❖

Geography Quiz Answer

from page 24

The longest mountain chain in the world is the Andes. Near the Chilean border, Argentina boasts the highest mountain of the southern hemisphere and the western hemisphere, Aconcagua, at 6,961.83 meters or 22,841 feet.



Q&A SMA Expert



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

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Sierra Club v. Napa: Sequential Lot Line Adjustments are Consistent with the Subdivision Map Act and are Exempt from CEQA

Lot Line Adjustments are back on the front page – this time with some great news!

Senate Bill No. 497, enacted into law in 2001, amended the Lot Line Adjustment (LLA) provisions of § 66412 (d) of the Subdivision Map Act. Since that time, the interpretation and implementation of that law has been as varied as the cities and counties that comprise California. Issues regularly debated were (1) whether or not there was a limit to the number of times one could seek an LLA (assuming each application met the requirements of the Map Act) – more than one LLA request over time often referred to as "sequential LLAs" - and (2) whether CEQA applied to LLAs.

In 2009, the Napa County updated its LLA ordinance and expressly included sequential LLAs as within broader definition of allowable LLAs. The ordinance also continued the County's existing policy of treating LLAs as ministerial acts not subject to CEQA. The Sierra Club "facially challenged" the ordinance by a petition for writ of mandate, alleging, among other things, that the ordinance violated the Map Act's limited exemption for LLAs in Section 66412(d) and violated CEQA by classifying LLAs as ministerial. The trial court denied the petition on the merits, ruling that the Map Act was clear on its face and did not bar sequential LLAs, and that LLA approvals were ministerial and not subject to CEQA.

The Sierra Club challenged both of these trial court determinations on appeal. I represented the California Land Surveyors Association in support of the County as the sole amicus curiae on appeal. Amicus curiae means a "friend of the court." The Courts allow amicus curiae briefs to be submitted by experts, in the subject matter of the lawsuit, who can help the court better understand the legal issue upon which the Court is making its decision. The key issue was whether or not the ordinance conflicted with Map Act section 66412(d)'s restriction on LLAs to those "between four or

fewer existing adjoining parcels." This limitation was added to the Map Act in 2001 via Senate Bill No. 497, and the Sierra Club argued that it was intended to "close a loophole" in the Map Act, and further argued that interpreting Section 66412(d) to allow sequential LLAs would violate the plain reading of the Map Act. The appellate court, like the trial court before it, disagreed, holding that sequential LLAs do not run afoul of any of the LLA criteria in Section 66412(d), and that the legislative history did not reveal an intent to bring LLAs under the Map Act's subdivision framework. The court reasoned that the ordinance "injects meaningful temporal constraints" by first requiring an LLA of four or fewer lots to be approved and the recordation of the deeds reflecting the adjustment lots before a new LLA application can be filed, and that this sequential LLA process comports with the intent of SB 497.

The Sierra Club's argument that the approval of sequential LLAs was a discretionary act subject to CEQA was also rejected by the trial and appellate courts. Ministerial projects are exempt from CEQA requirements. The appellate court paid deference to the County's classification of LLAs processed under its Ordinance as ministerial, and determined that Map Act section 66412(d) "describes a prototypical ministerial approval process."

Finally, the appellate court dismissed the Sierra Club's claims that the ordinance would allow unfettered development within the County, holding that the ordinance "does not enable any development beyond what already is possible through existing land use policies and laws."

This opinion thus recognizes the status of LLAs in the local land use hierarchy, and how claims of "uncontrolled development" resulting from LLA approvals is a fallacy; development is controlled by local General Plans, Specific Plans and Zoning (under Planning & Zoning Law), and not by the local regulations involving LLAs. ❖

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By: Ric Moore, PLS

Ric is the Executive Office of the Board of Registration for Professional Engineers, Land Surveyors, and Geologists.



The BPELSG Chronicles

First Results of Computer-Based Testing for the Professional Land Survey Examination

A new era in how the Board measures the competency of individuals desiring to practice land surveying in this state has begun. The first ever results of computer-based testing (CBT) administration for the California Professional Land Surveyor exam have just been released by the Board. There are many opinions on what format (multiple-choice, design essay, etc.) is the most appropriate for this type of measurement and as you can imagine when it comes to land surveyors, opinions are never lacking. The California Professional Land Surveyor exam has taken several forms over the years. But the underlying goal of the task was the same throughout all these iterations.

In the normal course of our daily activities as land surveyors, we encounter many different “instruments”, all of which are designed to provide us with measurement data so we can make intelligent, educated decisions in regards to accuracy and precision. Over the last century and a half, land surveyors used a variety of instruments that have changed with advancement of new technologies. The one aspect shared by all those generations of land surveyors is what was the expected measurement tolerance, or precision, when using the various forms of equipment. Regardless of when the surveys were conducted or which generational instruments were utilized, land surveyors generally had a preconceived idea for the tolerance level that was acceptable for meeting the minimum requirements of their survey.

The licensing exam is essentially a measurement instrument which serves a very similar purpose. The questions are developed in concert with the published test specifications (http://www.pels.ca.gov/applicants/ls_test_plan.pdf), which was developed as a result of an occupational analysis and that was developed by surveying practicing professional land surveyors throughout the state. Subject matter experts evaluate the test specifications to determine if each question (and the overall exam on a whole) meets the criteria for minimum competency standards. Then when the actual measurements are performed (candidates taking and

answering the exam), those responses are evaluated to determine how accurate the measurements (questions) were in relation to the expected tolerances (minimum competency).

I believe that I can state pretty accurately that many individuals, including those who work at the Board, those who provide expert services to the Board in the form of examination development, those who have diligently provided examination preparatory classes, and those who simply are part of the land surveying profession in California all had reservations on how accurately this “instrument” called an exam would perform using multiple choice format and the uncertainty inherent with implementing CBT delivery methods. After progressing through exam development over the last year and seeing the results of this all too important measurement process, I can easily say that the level of focus, effort and dedication provided by the land surveying experts, Board staff and the CBT vendor proved to be a worthwhile endeavor towards the ultimate goal of fair and appropriate licensure. By the time this article is published, the April 2012 exam results (<http://www.pels.ca.gov/applicants/ap12stats.shtml>) will be public knowledge and I would hope that those previously mentioned individuals share my satisfaction in the process. The team of experts gathered to perform standard setting was representative of a wide range of knowledge, abilities, geographic regions, and experience. One of the better discussions I have had the opportunity to be a part of was when I witnessed newly licensed individuals from the previous April banter with seasoned veterans as they keenly collaborated on the definition of minimal competence as it related to the new test plan specifications. Beginning with these exam results, candidates will only receive a “Pass or Fail” notification. The issuance of a numerical score will be discontinued, in similar fashion as the remainder of the California state exams, as it is no longer relevant to this format. Candidates failing the exam will receive a diagnostic that describes their performance relative to the published test plan.

Continued on next page

Continued from previous page

While we were not able to attend every preparation seminar throughout the state and provide individual attention to each and every concern, we did attempt to visit some of the scheduled classes, including ones at the recent CLSA State conference, and through CLSA's Central Office coordinated a webinar attended by many members. As 2012 progresses, we hope to be able to reach many more who have an interest in the Board maintaining a successful licensure program and we hope to move towards offering the California Land Surveyor exam more often beginning in 2013. In closing, we appreciate all the feedback provided by candidates and several other individuals and thought we would share some of those comments:

"Testing environment was much better than sitting in a large building with many thousands of other applicants trying to listen to the echoes of the proctor announcements."

"Liked how I was able to skip or mark questions so I could return and review before ending the exam."

"I think the CBT format was much less stressful than the previous format and the manner in which the graphics were distributed helped in easily understanding the questions."

"I think it was the appropriate level of difficulty."

"The testing center wasn't used to having all of the reference materials and calculators. This way of testing was certainly a lot less stressful, which I feel enabled me to stay much more focused throughout the exam - All-in-all, a good experience."

"I think it was a pretty fair test and a good mix of real world problems."

"Even though I had to page back and forth through the graphics pamphlet, it was still easy to read and understand."

"After observing attendees at my exam preparatory classes for many weeks, I can tell you that the people that I thought would pass the exam, did and the ones that did not put in the effort and dedication it takes to prepare, didn't. So from my perspective the exam appeared to be accurately targeted." ❖



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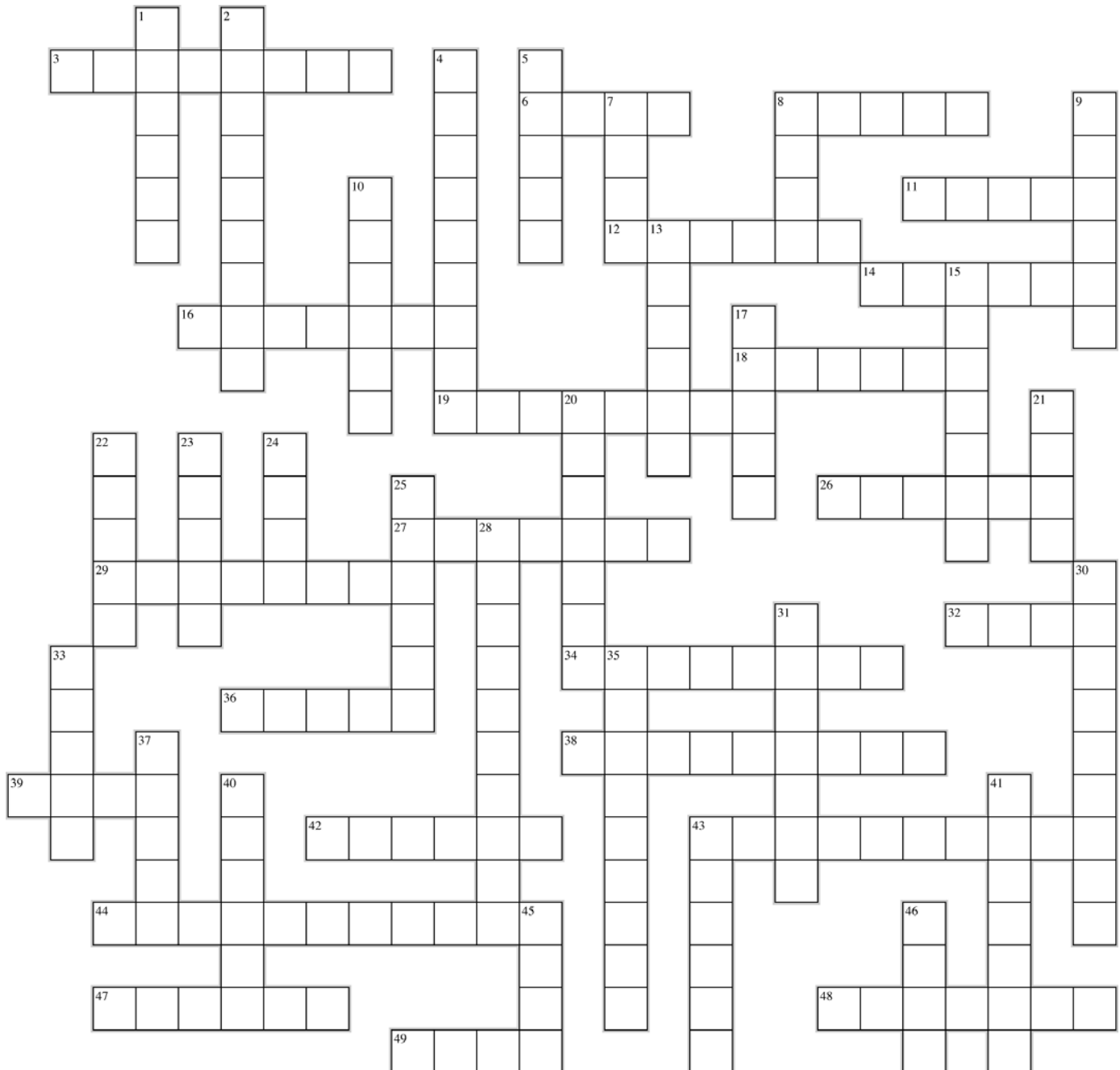
Crossword Puzzle

By: Ian Wilson, PLS

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

CLSA Crossword Puzzle #23

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



Across

3. TESTIMONY
6. 160 SQUARE RODS
8. 1 POLE
11. WIDOW'S LIFE ESTATE
12. SMA ARTICLE WRITER
14. CAL SURVEYOR PRODUCTION GUY
16. BPELSG MONUMENT PRESERVATION ENFORCEMENT ANALYST
18. AFFIRM TO BE TRUE
19. WRITTEN INSTRUMENT
26. WHAT EXPERT WITNESS TESTIMONY PRODUCES
27. HERTZBERG'S FIRST NAME
29. LOCATION FOR CLSA MEETING GUIDE?
32. COUNTY WITH JOB POSTING ADDED 4/30/09
34. BRAND NEW FULLERTON COUNCILMAN
36. 66 FEET
38. RELEASE DEED
39. HAITI GEAR ANGEL
42. 15,840 FEET
43. CLSA CENTRAL OFFICE CITY
44. PLS 3936
47. SYMBOLIC TABLES
48. FORUM DISCUSSION ZONE
49. 80 CHAINS

Down

1. AWARD WINNING CAL SURVEYOR EDITOR
2. SURVEYOR KNUD
4. SECTION MORE THAN 85 CHAINS LONG
5. MARIPOSA COUNTY SURVEYOR
7. QUARTER ACRE
8. MOST PROLIFIC FORUM POSTER
9. NSPS GOVERNOR ON THE MOUNT?
10. AGAINST LATIN?
13. AFFINITY BANKER
15. V-SHAPED INDENTATIONS
17. BPELSG SENIOR REGISTRAR
20. LAND ABOVE THE OHW LINE
21. ANOTHER HAITI GEAR ANGEL
22. INSURANCE AFFINITY PARTNER WITH A VIEW?
23. CLSA CARTOONIST
24. ROBERTS' PARTNER IN HAITI
25. RR SAFETY WRITER
28. CLSA AFFINITY PARTNER BUILDING?
30. REGION OF HAITI VISITED BY CRAIG ROBERTS
31. 1/8 MILE
33. EXECUTIVE DIRECTOR OF BPELSG
35. CLSA FOUNDATION OF LEARNING?
37. SPEAKER FOR CLSA'S SEPTEMBER WEBINAR
40. FIRST PART OF AFFINITY SUPPLY SELLER
41. WHAT EWB IS MISSING?
43. 2012 CLSA CONFERENCE KEYNOTE SPEAKER
45. C.DE BACA'S AREA OF EXPERTISE?
46. JUST LESS THAN 8 INCHES

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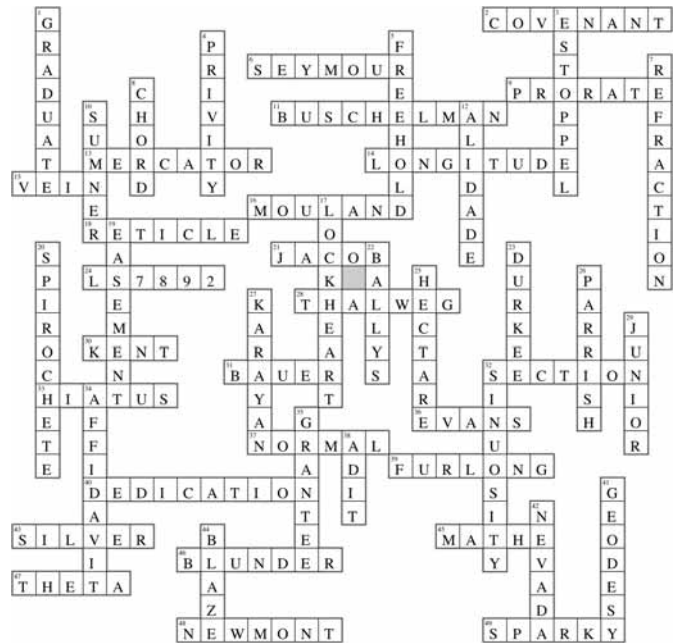
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Key to CLSA puzzle #22 (Surveyor Issue # 169)





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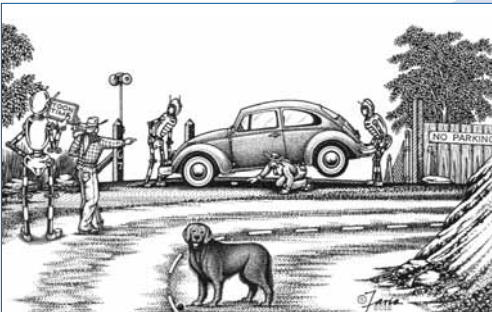


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Top Captions for issue #169 Cartoon



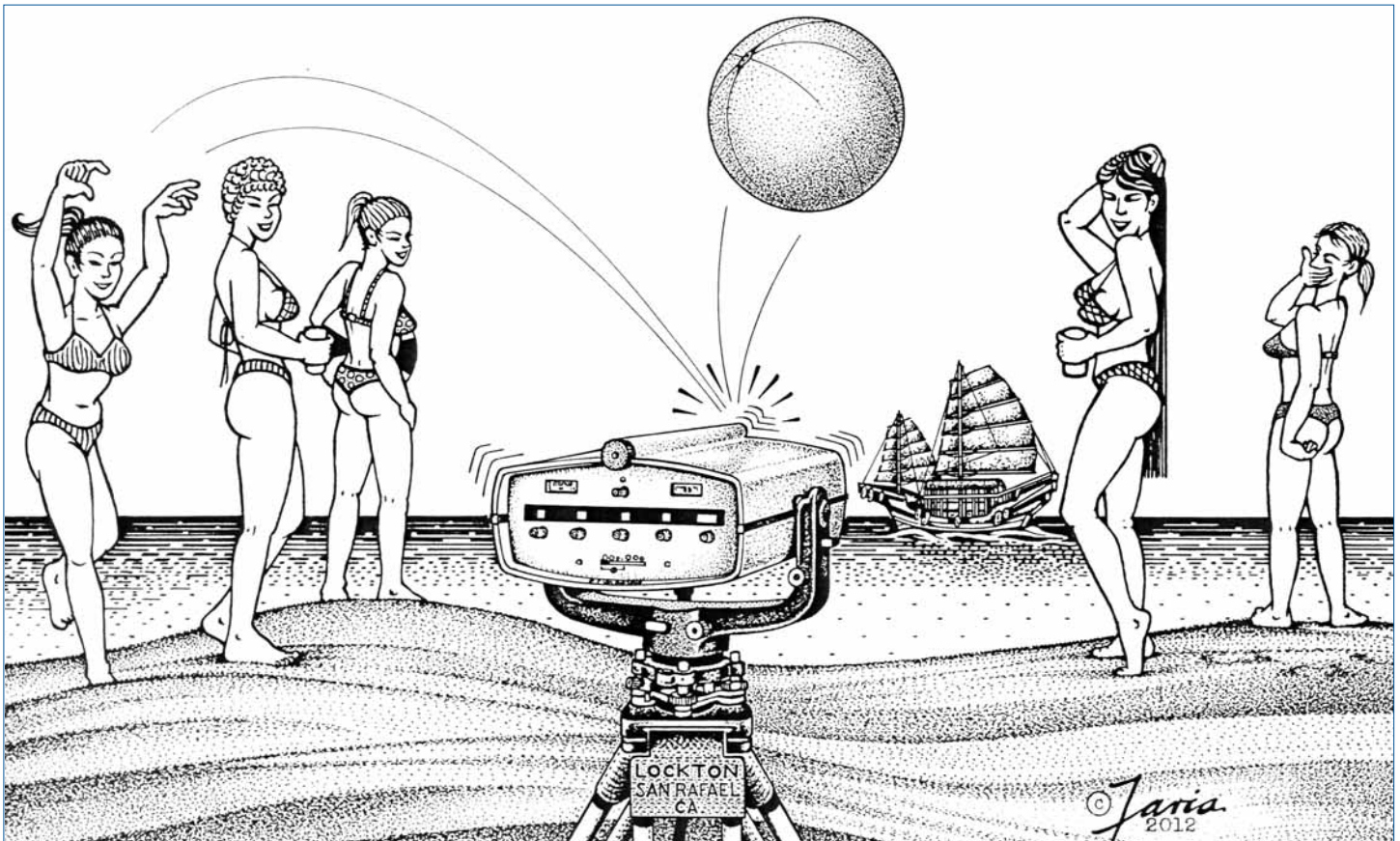
"Okay, Honey . . . I see the control point."
"Hands 'n knees!"
"R2D2 Right, push down!"
"R2D2 Left, lift up!"
"R2D2s: Rotate counterclockwise"
Set up time.

- Phil Danskin, PLS

From our setup on the hill top
We will see across the bay
Just as soon as Faria's robots
Swat this pesky Bug away.

- John Wilusz, Editor

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



Sometime in the early 70s at a CLSA Conference, a new-fangled distance meter was unveiled. After the sales pitch, Gene Lockton just had to have one! At Stinson Beach Gene's new distance meter was assaulted by an inflated beach ball and several bikini-clad young women thought we were a film crew sent to do a photo shoot. - Nino Faria

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