

SURVEYOR

California

Winter 2014

Issue #176

Retracement of Original Surveys

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Registration Form on page 20

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

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

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Commercial advertising is accepted by The California Surveyor. Advertising rates and information can be obtained by contacting CLSA 526 So. E Street, Santa Rosa, CA 95404, (707) 578-6016, Fax (707) 578-4406. Circulation: 4,800.

EDITORIAL MATERIAL

All articles reports, letters, and contributions are accepted and will be considered for publication regardless of the author's affiliation with the California Land Surveyors Association, Inc. Contributions should be emailed to clsa@californiasurveyors.org. We can accept WordPerfect or Microsoft Word files. We can accept ASCII text files or word processor files from the following programs: WordPerfect or Microsoft Word.

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DEADLINE DATES

Spring..... February 1 Summer May 1
Fall August 1 Winter November 1

Articles, reports, letters, etc., received after the above mentioned date will be considered for the next edition.

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

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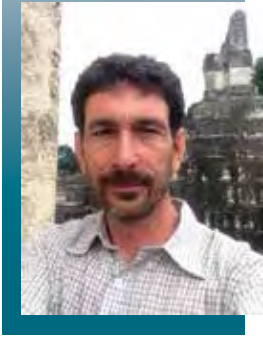
2013 Photo of the Year!

Retracement of Kingsbury’s Survey on the Sonoma County - Napa County boundary; setting a monument near the peak of Mount St. Helena. – Submitted by Adam Rivera, PLS

From the Editor

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

John works for the California Department of Water Resources in Sacramento, CA.



Copper weld survey monument in Tikal.



Tikal is deep in the jungles of northern Guatemala.

Tikal, Guatemala

In November I visited Tikal, a vast archaeological site deep in the jungles of northern Guatemala. Tikal was one of the largest Mayan cities of pre-Columbian Central America. Monumental architecture on the site dates from about 400 BC to about 900 AD, when the city was largely abandoned. Drought, wars, disease, and mismanagement of natural resources all seem to have played a role in the city's demise. According to Wikipedia, Tikal's peak population may have been well over 100,000. Archaeologists discovered and mapped the ruins of over 3,000 structures over an area of about 6 square miles. Some of those structures are temples built in the shape of pyramids.

Why pyramids?

I don't know if anyone really knows why the Mayans built pyramid-shaped temples, but it doesn't hurt to guess so here's my theory: To me, the Mayan pyramids look a lot like volcanoes. Volcanoes are a common sight in Guatemala and even today they have spiritual significance to the indigenous people there. It seems there could be a connection. My friend Ed, a civil engineer, has his own theory about the pyramids. He thinks the shape was inspired by the cone that results from stacking rocks in a pile. According to Ed, pyramids are fancy piles of rocks and their construction was, at least in part, intended as "busy work" to keep soldiers occupied during peaceful times. After all, idle hands are the devil's workshop.



Temple in Tikal.

Whatever the inspiration for the outward form, the inside of the Mayan pyramid consists of mortared limestone cobbles. Archaeologists discovered royal tombs inside the pyramids but so far they have not found extensive passageways or rooms like those inside the pyramids of Giza in Egypt, which pre-date the Mayan pyramids by 2,000 years. The outer skin consists of mortared limestone blocks. The local limestone is soft and ancient workers used knives and chisels with obsidian and flint blades to excavate, cut and shape the stone. Modern restoration workers use hand tools with metal blades but still do the work without mechanized equipment. The limestone was quarried on-site and workers moved the rocks by rolling them on logs or carrying them on their backs and heads. My tour guide, Juan, told me the only beasts of burden were of the human variety. Mayan engineers located the quarries

strategically so as to collect rain water and serve as municipal reservoirs. One of the ancient quarries was restored in the 20th century and it is used today for this purpose. Water had religious significance and the Maya believed it to be the blood of the gods. Sewage, on the other hand, was not held in high esteem and was treated with less care. Diseases resulting from poor sanitation may have contributed to the ultimate downfall of the city.

The Mayan pyramids are famous around the world, but the vast majority of the ruins in the ancient city are common rectangular buildings with stone floors and walls. Their empty rooms now open to the sky because the thatch roofs are long gone. Mayan builders created openings in the thick stone walls using lintels and corbel arches. The corbel arch is a clunky design whereby successive courses of stone are set closer and closer together until they come together at the top. They can only span short distances and they require thick walls and sturdy foundations to hold them up. There are no fancy, keystone arches in Tikal.

Mayan Mortar

Mortar is a key element of masonry construction and the Mayans made a primitive version of Portland cement by heating crushed limestone in kilns. The resulting calcium oxide powder was mixed with fine aggregate (more crushed limestone) and water to produce an effective mortar. In the early days of restoration, archaeologists used modern Portland cement to make mortar but they discovered that it did not bond well with the native limestone. Since then they have been making mortar the same way the ancients did. My tour guide, Juan, was Mayan, a descendant of the people who built Tikal, and he told me the ancients discovered cement while processing corn. Whether or not that's true I don't know, but it's true that corn was (and is) one of the central elements of the Mayan diet, and the process for making corn meal includes soaking the dried kernels in a solution of water and quicklime (calcium oxide produced from burned limestone) to remove the casings from each kernel. How the ancients came upon the idea of cooking rocks in a kiln is anybody's guess.



A temple under reconstruction.

Continued on next page



Modern crafts reflect an ancient heritage.

Volcano near Lake Atitlan in western Guatemala.



Making corn tortillas. Corn has been a staple for millenia.



Spanish colonial architecture in Antigua.



The Museum of Colonial Art.



This girl sells crafts to help support her family.



Guatemalan woman with baby.

The final step in Mayan masonry construction consisted of applying a water-resistant stucco, made from blending mortar and chicle sap, over the exterior surface of the limestone blocks. The sap of the chicle tree is a natural gum (Wrigley's used chicle until it developed synthetic substitutes) and it worked well to seal the buildings from the corrosive effects acidic rain. The acid in the rain came from acid-producing gasses emitted from volcanoes. The wood from the chicle tree was used for structural timbers like posts, beams, rafters, and lintels over windows and doors. Final stucco surfaces were decorated with colorful paints and artistic designs. The city must have been beautiful to look at in its heyday.

Astronomy

My tour guide Juan said the layout of the main temples and observatories dates to about 800 BC. The placement and orientation of the structures has astronomic significance, so successive rulers left their mark by making existing temples bigger, rather than building new monuments in different locations. This preserved the original geometry down through the centuries. It's no secret that astronomy was important to the Mayans, but Juan shared an interesting theory. He believes the Mayan nobility used astronomy to do more than mark time and determine when to plant crops. According to him, the ruling class used astronomic knowledge to help control the masses. He said by successfully predicting astronomic events, the nobility deceived people into believing they had a divine connection with the heavens. They used tricks made popular by the Indiana Jones films (for example, positioning monuments so they are illuminated by sunlight on certain days of the year) to further perpetuate the illusion that they had a divine right



Observatory with altars in foreground..

to power. Juan told my group that Tikal was not an egalitarian society. There was a kind of caste system with a small ruling class that included the nobility, religious leaders, astronomers, and professionals. The vast majority of the people were peasants. The Mayan's had a writing system based on glyphs but only the rich could read it. Common citizens did not have access to education.

Guatemala Today

Some things in Guatemala haven't changed much. There is still a wide gap between the rich and the poor and to this day a small number of powerful families control much of the nation's wealth. It is a poor country with a long history of economic exploitation by external powers. Violent crime is a real problem. I almost cancelled my trip after reading the U.S. State Department's commentary about the place: In terms of murders per capita, Guatemala is one of the most dangerous countries in the world. (source: travel.state.gov/travel/). But I took a chance and went anyway and I'm glad I did. Nobody tried to murder me. Instead I met friendly, helpful people and I found Guatemala to be a beautiful and interesting place well-worth visiting and knowing about.

My home base was the city of Antigua, which was the Spanish capital of Guatemala until an earthquake leveled it in 1773. Guatemala is seismically active (I've never seen so many volcanoes!) because it lies in a major tectonic fault zone between the North American Plate and the Caribbean Plate. After the ruinous earthquake of 1773, Spain moved the capitol to Guatemala City and abandoned Antiqua altogether, leaving the rubble behind. But its citizens never gave up on the city and many people continued to live there. That was a good thing because today Antigua is a UNESCO World Heritage Site and tourists from around the world come to visit the picturesque ruins and enjoy its mild climate, colorful culture, and comfortable accommodations. The colonial architecture is really worth seeing. Antigua was Spain's crown jewel in Central America during the peak of her wealth in the 18th century, and she spent money lavishly in the construction of the city's monumental churches and government buildings. ❖



By: Rolland Vandevalk, PLS

Rolland Van De Valk has 28 years of experience and is currently serving as senior land surveyor/project manager at Diversified Project Services International, Inc. in Bakersfield, CA. Rolland has been a member of CLSA since 2002.

President's Message

I am honored to be serving as this year's CLSA President. As President-Elect last year, I had the privilege of meeting with each of the local Chapters. That was a tremendous experience and provided me the opportunity to meet a great deal of CLSA members; members that I would probably never meet under ordinary circumstances. This gave me clear insight into the diverse make-up of each Chapter and their outlook towards the issues and topics that are important to CLSA. Not surprisingly, I learned that not all Members and Chapters share the same thoughts and ideas. I also learned that, although our membership is diverse and not always like-minded on every topic, we do have threads that stitch us together making us a unified voice for the common good of the land surveying profession.

During my visits to the Chapters, a common topic for discussion was the ensuing debate about NSPS 100% membership. For those not aware, the National Society of Professional Surveyors (NSPS) is promoting a 100% membership program in which membership in NSPS would be required for all state association (CLSA) members. The mandatory membership would significantly lower the dues for NSPS to \$40, but in turn, would raise CLSA dues by \$40. Based on feedback received, I see this as one of the more important issues that CLSA is currently reviewing. I have heard a tremendous amount of discussion regarding this topic and want to clarify where we are in this process. Let me start by saying that CLSA did not seek out this proposal; it was submitted to CLSA by NSPS. To implement this program, NSPS developed a Memorandum of Understanding (MOU) which was sent to CLSA for consideration. The CLSA Board of Directors reviewed the MOU and appointed an Ad Hoc Committee to research and provide suggestions. The Ad Hoc Committee drafted several changes to the MOU and presented to the CLSA Board of Directors. The CLSA Board of Directors approved the proposed changes to the MOU and directed the CLSA Executive Committee to provide the draft to NSPS. The MOU, with proposed changes will be presented to NSPS at the CLSA-NALS Conference in April.

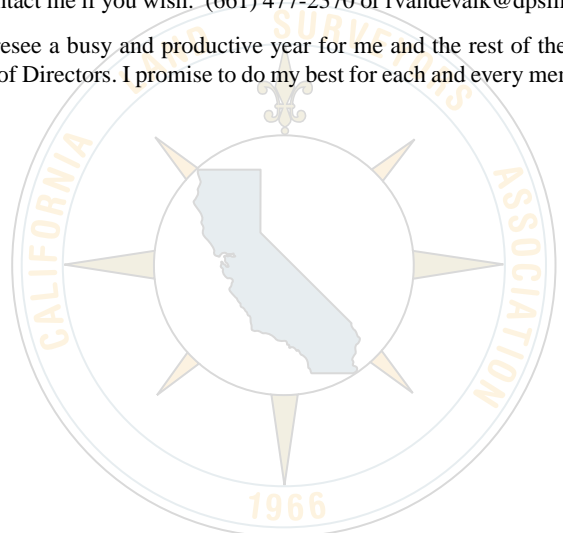
Personally, I believe that NSPS has definite benefit to the surveying profession. However, based on the feedback I have received, I am concerned that creating a mandatory requirement for CLSA members to join any other association may create a reduction in CLSA membership. I urge members to take the discussion on this topic seriously. Be assured that the CLSA Board of Directors will diligently explore this issue and provide all the pertinent details to the membership – member voices will be heard prior to taking any action.

The CLSA Board of Directors is in the process of reviewing and amending the CLSA bylaws. It is my hope that the Board can work through the remaining bylaw amendments this year. The bylaw amendments approved by the Board will be submitted to the full voting membership for final review and action. Our goal should be to have the bylaw amendments presented to the general membership for voting by the end of the year.

At the February 2014 Board of Directors meeting, and my first as CLSA President, I challenged all of the Directors to do a better job communicating with the membership. Part of the Directors job is to provide information regarding state activities, programs, and issues to the Chapter membership. During my visits to Chapters, I was witness to several Director reports. I was surprised at the lack of information being provided in many of those reports. I believe the Directors are the arteries carrying the life blood between the state and the chapters. As President, I will make it a priority and impress upon the Directors, the importance of keeping the membership well informed.

My proverbial door is always open to each and every one of you. You can contact me if you wish: (661) 477-2370 or rvandevalk@dpsiinc.com.

I foresee a busy and productive year for me and the rest of the CLSA Board of Directors. I promise to do my best for each and every member. ❖



Members Only – Articles on CLSA Website

Additional articles and resources can be found on the CLSA Members Only Website.

username: last name

password: member number

Welcome New PLS's

Eric Albanese, Martinez
Jose Alcantara, Rancho Cucamonga
Brandon Allen, Escondido
Matthew Arrington, Porter Ranch
Edmundo Asuncion, Walnut
Shane Barber, Tracy
Henry Bui, Westminster
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Funny Bones

Interviewer: What is your biggest weakness?
Job Applicant: Honesty.
Interviewer: Honesty?! I think honesty is a strength!
Job Applicant: I don't give a #@%! what you think.
Submitted by Robert Reese, PLS

Kids Korner



Dane Neitsch, age 13, (now 15) helping his father Gregg Neitsch with a GPS control survey in Section 14, T.47N., R.7W., M.D.M.

Submitted by Gregg Neitsch, PLS, CFED

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.

What Were They Thinking?

Submitted by Robert Reese, PLS

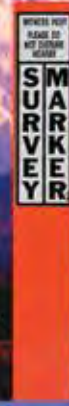
"Looks to me like the artist studied under Jackson Pollock..." *Editor*



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Geography Quiz

By: Anne Hoppe, PLS, MSCE, and Germar Bernhard, Ph.D

What is the highest point in (and above) the Indian Ocean?
(Answer on page 34.)

Congratulations!

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Melinda Brown, CSU Fresno



Retracement of Original Surveys

This paper was first written in 1971. The basic information is as pertinent today as when first written. I have made changes and updates. Please note that the manual quotes are from the 1947 Manual of Surveying Instructions, you might enjoy making comparisons to the 1973 Manual. A further note, any original survey retracement should also be guided by the manual in authority at the time of the survey. I would like to acknowledge Mr. Homer Banks Jr. L.S., now deceased. A true friend and a great land surveyor who inspired and insisted, in 1971, I put something in writing that might be helpful to others.

Larry Hyder

Introduction

I shall premise with the hypothesis that "retracement" is an important aspect of surveying. The Manual of Surveying Instructions (MSI) provides the verifying words:

"The engineer is not prepared to consider the restoration of a lost corner until he has exhausted every other means of identifying its original position, and at this stage of his work he should have determined upon an approximate position of the original monument based upon his findings resulting from retracements leading from known corners to the lost corner, from one, two, three, or four directions in accordance with the plan of the original survey (page 289, paragraph 361)...preliminary retracements furnish the only possible means of arriving at the discrepancies of the courses and distances of the original survey (page 289, paragraph 361)...the restoration of the lost corners cannot proceed until the retracement of the original survey has been completed (page 290, paragraph 362)."

Chapter V, "Restoration of Lost Corners," refers specifically to retracement no less than 23 times. I have found the manual to be a strict taskmaster. It is, indeed, the "Bible" of surveying and demands our constant reference. Most of what I offer will not be new to men with considerable experience. I only hope I might present a fresh approach, constructive review, and "one new idea."

Span of Retracement

The full spectrum of necessity involves all records, all local testimony, all physical accessories and field information. The importance of these is known by everyone and I do not wish to minimize in any way the significance of any category. For the purposes of this paper, however, I shall dwell more specifically on methods developed over a period of years for use in the field and the study of accessories. I do not feel it proper to dismiss even temporarily any segment without acknowledgment and review of the guiding principles involved. I would refer to page 283, paragraph 350, MSI:

"The rules for the restoration of lost corners are not to be applied until after the development of all evidence, both original and collateral,



that may be found acceptable,...or where the point can be located by an acceptable supplemental survey record, some physical evidence, or testimony. Even though its physical evidence may be entirely disappeared, a corner will not be regarded as lost if its position can be recovered through the testimony of one or more witnesses who have a dependable knowledge of the original location."

Cardinal Alignment

I submit that compass retracement versus mathematical projection is most likely to re-position one in the proverbial "footsteps" of the original surveyor.

"The retracements, which are usually begun at known corners, and run in accord with the plan of the original survey, will ascertain the probable position, and will show what discrepancies are to be expected; (page 285, paragraph 354, MSI)."

As a reader and one who specializes in survey retracement, I choose to derive meaning and logic that reminds me that original surveys, until approximately 1890, were run by compass. A survey retraced by any method, if successful and complete, is obviously a good retracement.

My work revolves around retracement that was incomplete. This situation compels one to ascertain why the work was incomplete and what might serve to remedy.

I often encounter surveyors and engineers using only mathematical projection and random search for retracement. The manuals also states;

"...the question is not where a new or exact running of the lines would locate the corner, but where or in what particular position was the corner established in the beginning, in the approved official survey, (page 283, paragraph 387, MSI)."

Continued on next page

I suggest a good compass will lead one through the calls and attractions in a like manner to the proper area of probability.

I would emphasize a compass in good working order, preferably with a needle of four or more inches in length, self-contained leveling, open sight, and staff mounted. This is not to say that a competent person cannot make good use of a Brunton or similar compass. I carry and use a Brunton constantly. However, I would remind you there will be those times when a short needled compass, particularly a handheld, will not be as responsive to certain anomalies. It is always good to know the type of instrument used in the survey you are retracing if this information is available. This can often be ascertained from the introductory notes of the survey. It might be well to remember that much of the early work was done with a vernier compass. At least one author on compass surveying de-emphasizes attractions from metal objects on your person (10). I am sure he would agree, however, that it is best to develop habits eliminating the possibility. I find many local attractions, or anomalies, in the field not encountered in the field notes. Noting such an anomaly directs one to project two areas of corner probability, in case the original surveyor did not maintain constant reliance on his back sights. Also, survey notes recording the magnetic variation at every section corner leave us scratching our heads, especially when we have retraced the same lines, at the same time of year, and encountered days on end of rain, fog or snow. Even for the most conscientious surveyors, solar observations had to be quite a challenge.

It is obvious one cannot retrace unless you have “plugged in.” Care must be taken to start from an original corner or a known call. The greatest emphasis must be given to ascertain a point where both latitude and departure are assured. Examples would be; known corners, line trees, rock formations, directions of ridges and streams, fences, ponds, dams, cliffs,

buildings, and you can add many more. Somewhere I must discuss offsets. This place may be as good as any. You realize that most of our original surveys were done on the basis of a series of straight lines. These lines encountered countless obstacles, many of which required offsets. An offset was an opportunity for something to go wrong. It sometimes provides a great opportunity to “plug in,” if you can find it. I was asked to search for a corner that called for a rock mound four feet across and two feet high. It had been proportioned and my surveyor was not prepared to accept it without extensive search for that elusive huge, rock mound. He had traversed through and established a locus to search for the corner. Double checks, double angles, thorough search—no four foot rock mound. I “plugged in” at a good corner ½ mile to the south. The notes called for a stream, a cabin on line, and a ridge. I crossed the stream and hit the cabin “on line.” I knew that they most likely had coffee with the occupant, went to the other side of the cabin, set up, took off on the bearing and **probably without a back sight**. The cabin had long since succumbed to time and fires, but the rock foundations remained. I simply walked to the opposite side of the foundation, set up and took my shot. I had a good back sight, but I ignored it and followed the magnetic bearing. There was a seven degree magnetic anomaly in the bottom of the canyon. I carried the bearing to the next call, a ridge, and paced directly to the rock mound four feet in diameter and two feet high.

If you are forced to take a magnetic shot in the bottom of any ravine, and especially a deep canyon, always check for possible magnetic anomalies. Trees generally create little or no offset problems. Large redwoods may, rock formations may, and running alongside a large hill often causes “mass attraction.” It is already well known that large ore deposits cause magnetic problems, however, smaller, concealed, sneaky deposits can

Continued on next page

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trick you. Serpentine formations will always cause magnetic problems, and generally severe ones as well. None of this can be treated properly without occupying the line with a compass in the same manner as, and in the footsteps of, the original surveyor.

If discrepancies develop it is often necessary to study many miles of a given surveyor's work. Only then can idiosyncrasies, discrepancies and anomalies be analyzed. Some surveyors were inclined to "pencil whip" particularly East and West. This does not mean they failed to set any or all corners. It does mean you should look for corners set by direction or a method other than the original plan. The Manual tells us to expect to retrace from two, three or four directions. I find this most pertinent. In starting a project to do any retracement within a township, I insist on having every single word available from the record involving that township. This would include introductory notes (i.e. instruments used, chainmen, axemen, flagmen, etc.) These have proved extremely important. A resume of the township written at the conclusion of the field work frequently includes occupations at the time of the survey and in what sections. It may well include other meaningful information and facts that just makes your work more interesting: e.g., observations about animals, Indians, fish, etc.

There is a continuity, or flow, to surveyor's notes that cannot be understood by reading notes of one or two sections. With all the township notes, a good topographical map, and a scale, you can worm your way into the rhythm of the surveyor's "modus operandi."

I do a lot of work where mining was carried on and claims were surveyed. These were nearly always tied to the rectangular surveys. I request all mineral surveys of record and then dig for the surveys that were completed but no patent issued. The latter may be tough to find, **but they can be found!** Do I need to remind anyone of the importance of such collateral evidence as a claim corner with bearings and distance to a section or quarter section corner? Only experience can teach one to make "expertise applied" and "expertise needed" arrive at a point simultaneously. I would want all readers to understand that my many years of research has not affected my recognition of the facts of economic feasibility.

In the retracement of corners of the rectangular surveys, I "plug in" by checking all calls thoroughly (placing primary emphasis on calls nearest the corner) and pace the record distance for the first look, while "topoging in" by using the topographic calls in the notes. If the land is timbered, I observe for forest site transition and fire history. As you well know, a great percentage of calls are streams (ravines). Generally they will give direction running and often the exact bearing. This may be where I can gain latitude and departure. At any rate, if I have carried my bearing carefully I can chain in and start my detailing.

I have a theory about which I have become adamant. Several shorter observations of a corner area are of immensely more value than one long look. I might use the second viewing of a movie or your drive to town as examples. Permit me to call this "recurrence" and insist that it will produce a new perspective. There was a famous old forester in our country, now many years deceased, with whom I was privileged to spend many precious days. He spent 40-50 years of the early 1900's retracing hundreds of section corners. He was always saying "better run that in from another direction, maybe more." His cruiser mark "M" is to be found all over the mountains. This "M" has been, and is, the perfect example of "most reliable." Without sufficient research to understand the marks and the men they are meaningless. Running in from two, three or even four directions will better define your area of probability and perhaps most important of all, help give you that new perspective. **Different direction, different mindset, different lighting, new day, new idea, new perspective, recurrence, BINGO!**

Recurrence does provide a new perspective. I was once told by a surveyor that I found certain evidence because I "did not know that it was not

there." Perhaps one important deduction from this man's opinion could be that a negative attitude gives narrow perspective and is, in fact, a dangerous trap. I am not naïve about fraudulent or "bar surveys," but I have managed to find enough so called "unset corners" to receive the mandate to go forth and find whatever evidence exists. The most precarious position involves deciding exactly how much work the surveyor who skipped steps actually performed. The best way to not find a corner is to know or think that it is not there. The deep river canyons have always provided the psychological format to enhance the decision that the canyon was not crossed.

Corner Accessories and Site Study

In examining corner accessories we are reminded by the Bureau of Land Management that our first thoughts should be toward preservation of original evidence. Bearing trees must not be opened unless necessary. Rock mounds should be examined with as little disturbance as possible. Upon deciding that a tree needs further analysis I make an increment bore. My decision to bore is based on evidence such as the tree's position relative to a possible corner, signs of a grown-over blaze, etc. The face of a blaze or an injury will show very clearly in the sample taken from the boring. The face is age-dated by counting the growth rings to see if it fits the field notes. If it does fit, this generally is sufficient in the presence of other evidence. The increment borer is available through your local supplier of surveying needs. When the decision has been reached that it is necessary to open a potential bearing tree, maximum care should be taken. Conclusive information must be obtained with as little damage as possible. We all have our monuments of inefficiency. I have tried to develop techniques that observe the law of maximum care.

From the field notes, I get the bearing tree diameter at the time of scribing. I diameter-tape the tree and calculate how deep the face should be for increment boring. I bore and see if the blaze shows in sample. I corroborate the year of the face with the date of the survey by annual rings. I measure the depth of the blaze face and mark this on the bar of a chain saw with a felt pen. I then divide the blaze and proceed to cut a rectangular block out of the top half. This leaves the lower half of evidence untouched. After cutting the perimeter to depth needed, I take a small bar and pry or "pop off" the block from the face. This will expose the scribed face plus the superimposed face unscathed. At this point I should hasten to remind that, too often, any hardwoods will decay from the face inward, chopping with an axe may well reduce a beautiful superimposed face to chips and perhaps all that remains is an obliterated face and a decayed interior. I have also seen where an inexperienced person has chopped completely through a beautiful, superimposed face without identifying it. If possible, paint or tree-seal the injured parts. I must add, there are many times that I bore a tree with a chain saw, cutting a pie shaped piece to the heart. I might be examining some indefinite scarring, at the same time I have a sample of the tree for aging and sometimes other important information. I would caution, one must be certain any landowners involved would have given their permission to do this type of examination.

At times, assistance will be needed to properly analyze borings or wood samples. A consultant forester or the Forest Products Laboratory, Madison, Wisconsin may provide helpful. Cores or wood samples, in important cases, may be mailed to Madison for age or species identification. When species is needed, a description of the site should be sent along. This would include elevation, aspect and species growing within a reasonable radius of sample. Also, there are many books to assist you. You will note in the bibliography a list of reference material selected to be most helpful to the surveyor working with western trees.

R.M. Echols of the Pacific Southwest Forest and Range Experiment Station did a study of tree borings (11). I have used it previously, but I am not sure about current availability. It is titled *Moving – Slit Radiography*

Continued page 16



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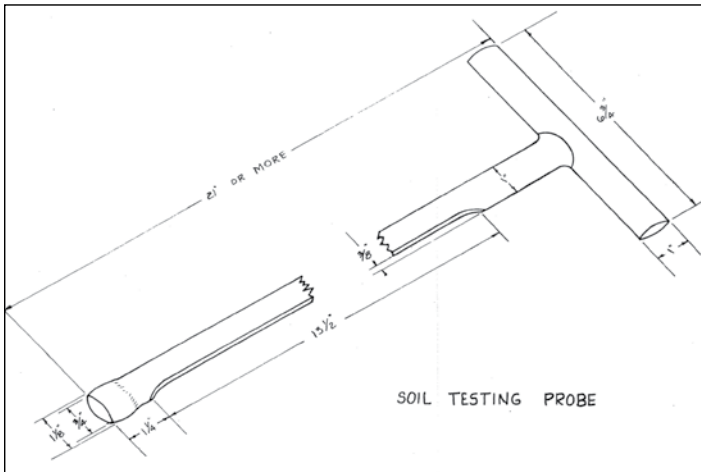
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of Wood Samples for Incremental Measurements. The x-ray picture alone makes it quite easy to discern the individual growth rings. A graph of wood density variation is obtained from the x-ray negative by passing it through a densitometer, which in turn feeds an output signal into a 10 inch chart recorder. There is an annual density variation in all trees. To obtain age from this chart it is a simple matter to count the high points of graph recordings.

By other methods, the remains of a potential bearing tree, however small or charred the pieces, can usually be systematically identified as to specie. It is amazing how Mother Nature has granted us the preservation of cellular structure through charring. A person with keen interest can soon learn to make preliminary identification of wood structure. A prime example is the ability to separate pine from oak due to resin canals found only in the pine. This can often be done on the spot with a magnifying glass.



Examining Rock Mounds and Deposit Corners

I have settled on a design for a soil sampling probe to assist in examining rock mounds (See attached drawing). I have seen other people using this device successfully for this work and I am confident you will find it most helpful. It enables one to examine and retain for analysis a core of earth approximately one inch in diameter and as deep as needed. It is difficult at the least, if not nearly impossible, to dig in a rock mound for post, charcoal, or deposit evidence, without defacing the “age, type and character” of the mound. Pieces of decaying wood, charcoal or glass are commonly spotted in the core. I always carry small plastic bags in my vest or pack to hold samples. If findings are conclusive at site, I re-deposit the core with no disturbance of the mound whatsoever. Incidentally, fairly sound post remains can be “sounded” underground with the probe. I finally learned that dry hard ground is hard to probe. Eventually the idea dawned to water the center.

Additional Marks and Collateral Accessories

It should be noted that line tree blazes, cruising blazes and other marks pertinent to section lines can also be dated by the use of an increment borer. I have recorded and identified numerous cruiser marks. Many of these people were or became licensed surveyors. It is also worthy of note, that a number of these people worked all over the West. Once again, I am reminded of the Manual:

“The expert testimony of surveyors who may have identified the original monument prior to its destruction and thereupon recorded new accessories or connections, etc., is by far the most reliable,.... Full inquiry may often serve to bring to light various records relating in to the original corners, and memoranda of private markings, etc., and the engineer should make use of all such sources of information (Page 285, paragraph 355).”

Summary

I see many needs and there is neither time, competency, ink, nor paper to allow complete assessment. I have long felt and advocated there be a policy adopted that would send competent people in immediately after wildfires to examine corners and evidence while it was most recognizable. The most efficient, expeditious, and inexpensive timing is immediately after the fire. If the field of retracement itself has boundary lines, they are divergent to infinity. One must search until return is no longer commensurate to need. It is not my prerogative to stress economic feasibility or practicability, but an accounting is inevitable.

The list of sources of information valuable to research is without end. New treasures are generally revealed with every job. Aside from the obvious sources, the usual county, state, and federal records, I will throw in a few others. Just maybe, here is that “one new idea.” Old newspapers, historical societies, genealogy centers, old books, libraries, aerial photos, old photo albums, museums, records of retired surveyors, foresters and engineers, old hydro surveys, old road surveys, railroads, and the list goes on. It seems every community now has someone researching the local history. Take advantage of the extensive, time-consuming work they have done for you.

As I recap my experience and strive to fill your needs, it seems most appropriate that I honor your predecessors, as I honor you, with the basic premise that their work was done in the field, not “from the bar.” I recognize and accept the exceptions but I will not allow it to narrow my perspective or reflect unfavorably upon the preponderance of work performed in a manner and under circumstances so as to command my utmost respect. I humbly and sincerely present this paper in whatever context it be judged, professional or lay.

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Stones and "Bones"

Set by William (Billy) Octavius Owen:

A Brief Historical Account of Living and Surveying in 19th Century Wyoming

Beginning Interests in W.O. Owen

In November 2000, while helping to create the Bureau of Land Management's (BLM) Geographic Information System (GIS) base layer—the Geographic Coordinate Data Base (GCDB)—I stumbled upon a Government Land Office (GLO) survey plat that has enlightened my views of surveying and Wyoming history. This plat was drawn from work conducted by William (Billy) O. Owen during March and April of 1881 in Township 24 North, Range 77 West (T24N R77W). Noted in the center of the plat is a line of section corner monuments labeled as "Mastodon Bones." The idea of relocating and collecting some of these "bone" section corners was intriguing, and I found myself researching the methods needed to accomplish this task. While discussing with John Lee (Cadastral Chief, Wyoming State Office [WYSO] BLM) my intent to locate and recover the "bone corners," I realized that others within the Bureau were equally eager to recover them.

Search for Mastodon Section Corners

First brought to the attention of paleontologist Laurie Bryant in 1999, the corners were not recovered at that time because it was believed that they were on private land. My background and training in anthropology, archaeology, history, and surveying fostered my excitement for the project, which in turn rekindled the fire of discovery in the Cadastral Branch at the Wyoming State Office of BLM. Research at the Albany County Courthouse revealed that some of the fossil corners monumented the location of federal lands, allowing for ingress and egress into the township by federal surveyors. Permission was then received to make contacts at the University of Wyoming for information concerning the history and the types of fossils that have been discovered in Township 24 North, Range 77 West. Dr. Danny Walker, the State of Wyoming Assistant Archaeologist, was contacted. He expressed interest not only in locating the fossils but also in the history surrounding them and suggested that Dr. Brent Breithaupt of the University's Geology Museum be contacted. Through a great deal of correspondence with Dr. Breithaupt, the concept of finding not mastodon, but dinosaur fossils, began to materialize and soon the excitement for the project could hardly be contained.¹

Beth Southwell, Dr. Breithaupt's assistant, began preliminary research in the American Heritage Center located on the University of Wyoming campus and discovered an incomplete autobiography written by William O. Owen (Owen 1930).² Among his reminiscences she found references to the surveying of Township 24 North, Range 77 West, which Owen considered to be a very special sur-

veying case. Owen described the events taking place early in the month of April 1881 (date based on GLO field notes) thus:

We had our team and wagon with us, and it was our custom, when possible, to load in the necessary number of stones at any favorable place and haul them along with us against the frequent happening that no corner material could be found when we have to have it. There was no sign of a stone near our corner point so I ran on north half a mile hoping to find a supply near the quarter-section corner. But in this we were disappointed. Not a stone could be found. As corners are set every half-mile in surveys of the public lands, we could go no farther till this quarter-section corner was established. Something had to be done. Tom Hale, my old side-partner, was my cornerman and in our extremity he pointed to the east where, about half a mile distant, lay two hillocks where, in his opinion, might repose the material we needed. "It's worth a trial," said Tom, "and if you see anything for corners load up and get back as soon as possible." Two of the boys jumped into the wagon and off they set for the hillocks. We watched them anxiously and when they reached their objective we saw the team stop and the men get out. They walked around and by their behavior we inferred they had found what we needed. After some time they started back and as they drew near I could tell they had considerable load. I ran toward the wagon asking if they had found anything for corners. "We've got something," said Tom, "but God knows what it is—I don't. It's harder then h... and every piece weighs a ton!" Now, what do you suppose those boys had in that wagon? Fossil bones of a dinosaur! There were vertebrae, shin-bones, femur bones and what-have-you, and fully as hard and heavy as Tom had said.

Upon reading this excerpt from the Owen autobiography, members of the Cadastral Branch started planning for the recovery and replacement of some of these fossil corners. The anticipation of discovery buzzed in the office, and, after contacting Dr. Breithaupt and Ms. Southwell, a date was set; our long-awaited exploration was coming to fruition. We acquired GCDB coordinates for selected corner locations and input them into a 12XL handheld GPS (Garmin model) before setting out for a day of investigation on May 31, 2001. John Lee, Mike Whitmore and myself from the Cadastral staff, Dale Hanson (BLM paleontologist), and Marty Griffith from the Resource Management staff (WYSO) were in our party. In Laramie, Dr. Breithaupt and Beth Southwell (UW Geology Museum) joined us, and we continued our trek to Township 24 North,

Continued on next page

Range 77 West to investigate and locate some of these fossilized bone corners. Dr. Breithaupt and Ms. Southwell filled us with valuable information concerning the history of area paleontological discoveries and narrated stories about colorful local personalities. Having members of the UW Geology staff to confer with was and is invaluable. Our first sight of the area was well explained by Dr. Breithaupt from a promontory overlooking the outstanding panorama of the surrounding geology. Next we visited the site of the Bone Cabin Quarry (Breithaupt, 1997), a dinosaur fossil bed that is still being excavated by a private firm. Here we were able to view the type of material that Owen’s crew probably collected for corner material, giving us a much clearer idea of what we would be searching for. It should be noted that this township is gently elevating toward the Laramie Mountains to the east, void of timber except along the Medicine Bow River and a few streams, and lacks stone materials used for monumenting corners during Owen’s historic era. Our search began at the position for the closing corner on the north boundary of the township. As we closed on the location, history was very close at hand, and we could all feel it. Mike Whitmore was the first to see the corner, which was marked with a section of Sauropod (Breithaupt, personal communication) fossil long bone. Engrossed by this first discovery, we photographed the section corner and anxiously discussed the find. Sauropods were part of the Brontosaurus (now called Apatosaurus) family—a family of very large, vegetarian dinosaurs.

We continued our search one half-mile south of this corner and found the 1/4 section corner of sections three and four. This position was monumented with a portion of a large fossilized dinosaur vertebrae (bone) and, to our amazement, was plainly marked with 1/4 (Figure 1) on the upper right corner of the fossil.



Figure 1: Quarter corner made from fossilized dinosaur vertebrae. Note scribe “1/4”.

Owen wrote in his autobiography that these stones were too hard to “scribe” (Owen 1930). Finding one that was marked adds to the historical significance of the survey. Recall these stones were set in 1881; and it is quite possible that we were the first people to see this particular monument in 120 years. The 1/4 corner was collected and replaced with a BLM brass cap. Presently, it is awaiting identification at the UW Geology Museum.

Continuing our investigation another half-mile south, we suffered some disappointment as we were not able to find any trace of the section corner monument. After lunch, however, we focused our search half-a-mile east of the lost position and were more successful. We found a portion of a fossilized dinosaur ulna where a 1/4 corner should have been between sections three and ten; there was no inscription visible on the fossil. The bone was large, most probably belonging to a mega-vegetarian (Breithaupt, personal communication).

The use of GCDB latitude/longitude in developing the search area was put to excellent use during this project. Township 24 North, Range 77 West is controlled by 29 digitized corner locations from a 1:24,000, 7 1/2’-quadrangle map, allowing for a search area of 40 feet. By utilizing the lat/long values from the GCDB geo file, we were able to navigate close enough to spot the fossil corners in the field (Table 1).

POINT Id.	GCDB, GEO FILE LAT/LONG		GPS'd FIELD LOCATIONS LAT/LONG	
	LATITUDE	LONGITUDE	LATITUDE	LONGITUDE
400700	42- 5- 12.17220	106- 3- 14.35195	42- 05- 13.0	106- 03- 14.7
400640	42- 4- 54.71241	106- 3- 14.27052	42- 04- 55.0	106- 03- 13.5
400600	42- 4- 28.63073	106- 3- 14.09038	NOT FOUND	NOT FOUND
440600	NOT CALCULATED	NOT CALCULATED	42- 04- 29.0	106- 02- 38.3

Table 1: Latitude and longitude comparing office calculations and field locations.

There are several more of these “Mastodon bone section corners” documented on Owen’s plat that are yet to be located. They are on private or a combination of private and state lands, requiring landowners’ cooperation before these historic corners can be positioned and recorded. Our initial field trip was described in a short article co-authored by Mr. Whitmore and myself and later presented by Mr. Al Pierson, State Director of Wyoming’s Bureau of Land Management. An article outlining our work was published in the Wyoming BLM biannual journal *Horizon* (Whitmore and Drucker 2001).

“Billy” Owen, the Surveyor

Research has continued into the life and times of Mr. Owen (Figure 2). As more information is gathered it seems fitting to call Mr. Owen “Billy”—a long lost friend and comrade, a surveyor from the past with whom we in the Cadastral Branch of the Wyoming BLM all feel a kinship. Owen’s autobiography contains many accounts of surveying the high plains, deserts, and mountains of Wyoming, which impart the enthusiasm he must have had for life, his work, and adventure. It is our hope that in the future, with the help of the Wyoming Historical Society, we can publish Owen’s autobiography in order to share these remarkable accounts with other audiences.

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CANCELLATIONS: To receive a refund on registration fees (less a \$35.00 cancellation fee), all cancellations must be received in writing no later than March 20, 2014. Substitutions welcome - additional fees may apply, contact the conference office at : (707) 578-6016 for more information.

Stones and “Bones”

Set by William (Billy) Octavius Owen



Figure 2: Young Billy Owen (Reproduced with permission from the American Heritage Center, William Owen Collection, University of Wyoming).

The American Heritage Center on the UW campus houses a large collection of Owen's personal letters, calculations, photos, and newspaper articles. Based on this information, numerous other directions of research could be followed. For instance, one could study other dinosaur

fossil discoveries made by Billy Owen, his adventures in mountaineering, and family ties to the well known Downey family of Laramie. Another significant repository of information and, consequently, source of research ideas is the Government Land Office record preserved on microfiche at the Wyoming State Office of BLM.³ This record contains original plats and field notes with observations pertaining to important historical, geological, and natural resources in Wyoming. Locations recorded by early surveyors in their field notes or on plats have proved to be of particular value in research into historic trails.

Billy Owen was the most prolific surveyor in the early days of the State of Wyoming. He received 20 contracts from the Government Land Office: his first contract was issued in 1881, his last in 1894. This does not include time spent working for other surveyors such as William O. Downey, Mortimer Grant (a relative of Ulysses S. Grant), and Thomas Medary. Owen was appointed to the position of U.S. Examiner of Surveys in the Interior Department in 1899, retiring in 1914.⁴ A letter to the U.S. Survey General dated August 17, 1930, archived in the William O. Owen file at the American Heritage Center confirms that Billy surveyed a number of forts in Wyoming, including Fort Laramie (April 1896), Fort Sanders (May 1886), Fort Fred Steele (July 1887), and Fort Fetterman (June 1887). In his survey notes for the area surrounding Fort Laramie he makes mention of the original fur trapper's fort—Fort William or Platte (original field notes, WYSO BLM microfilm)—and documents its location. In 1999, field work was done at Fort Laramie by the Office of the Wyoming State Archaeologist (OWSA) to find Fort William. These efforts were focused at Fort Laramie proper, not at the Owen locality, and the fort location was not substantiated. Further investigation at the Owen location could reveal the fort's true location.

Billy Owen also conducted numerous mineral surveys throughout Wyoming (original field notes, WYSO BLM microfiche). Some of these mineral surveys (such as the surveys around Hartville) were done prior to the completion of the Public Land Survey System in the state. Last but not the least, Mr. Owen was an adventurer—a mountaineer and a Wyoming pioneer. Billy served on the posse' trying to capture the “Sundance Kid” during the heyday of train robbery in the state. In 1898, he and a small group of men were the first white men to climb the Grand Teton (still somewhat controversial). He was also the first person to tour the Yellowstone

area on a high-wheeled bicycle (Annals of Wyoming 1997). While on the subject of bicycles, there was a race with a stagecoach from Laramie to Cheyenne that was won by Billy and a compatriot. According to the tale, the bicycle team pushed and walked as much as rode to Cheyenne through the thick mud of the trail.

2001 marked the 100th anniversary of the Carnegie Museum's discovery of an intact fossil *Apatosaurus* (Figure 3) at the Sheep Creek Quarry. Billy Owen was involved in surveying the location of several fossil beds, as can be deduced from telegraph messages between his employer (Stephen Downey) and the Carnegie Museum. Owen may even have led the expedition to the site. The Cadastral Branch of the Wyoming State Office of BLM participated in this celebration by adding our research into Billy Owen's surveying and other work. Many of the discoveries he made came twenty years before the Carnegie find.

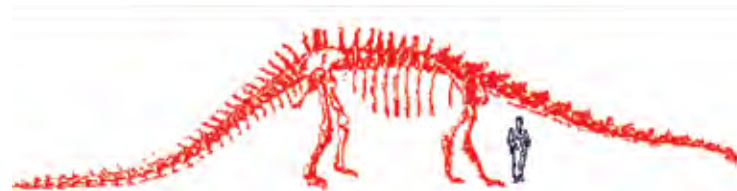


Figure 3: *Apatosaurus* skeleton [From the Carnegie Museum's website]

Footnotes

1 In fact, upon Ms. Bryant's leaving the Wyoming State Office of the Bureau of Land Management, she received a framed copy of the plat.

2 The autobiography, *Reminiscences of William O. Owen*, was discovered in the Bancroft Library at the University California, Berkeley, among the papers of Sheridan Downey, Billy's nephew and former state senator of California. A roll of microfilm containing the “Reminiscences” was ordered and received early in June 2001. Although incomplete, the stories Billy relays in his autobiography are historically invaluable giving the reader insights into the early days of Laramie City and Wyoming. Some of the stories imparted by Billy appear to be closing on tall tales, but his writing style is so enthralling that one laughs through some of the more unbelievable yarns.

3 Very few of the GLO plats fail to mention some historic detail, be it trails to battle sites, mining camps, or forts. In some cases, the original GLO information is all that exists for township, range and section descriptions; and locations; this information is the basis of information for BLM's GCDB and other GIS databases.

4 A typewritten list of Owen's career accomplishments can be found in the William O. Owen file at the American Heritage Center.

References:

Paul Schullery, 1997, *Development of Yellowstone: myths, realities and uneasy prospects*. Annals of Wyoming (fall 1997), Laramie Breithaupt, Brent.

2001, personal communication. Michael Whitmore and J.D. Drucker

2001, *Stones and Bones Set by Billy Owen*, Edited by Ms. Cindy Wertz. Owen, W.O.

1930, *The Reminiscences of William O. Owen*, University of California, Berkeley ♦

Professional Outreach Events



Caltrans workers Frank Romano, Greg Grant, and Robb Rinella introduce land surveying to Cub Scout Pack 679, Boy Scouts of America.

Submitted by Francis "Frank" D. Romano, Jr. PLS

Teaching with Spatial Technology (TwIST)

CLSA has partnered with Western Federation of Professional Surveyors (WFPS) and the 13 western state surveying associations to participate in the TwiST program. The TwiST program is designed to teach educators (grades 6-12) how to use Geographic Information Systems (GIS) and Global Positioning Systems (GPS) in the classroom. The skills and knowledge obtained through this course will allow teachers to create lesson plans to engage students with hands-on activities and modern technology that can be applied in the real world.

If you know of a teacher (grade 6-12) that would like to participate in the TwiST program in order to gain an understanding of the land surveying profession and pass that information along to students, please contact the CLSA Central Office at clsa@californiasurveyors.org

Special thank you to Tim Kent and Clark College for coordinating and hosting the event and to NCEES for providing matching funds allowing CLSA to send two teachers this year. ❖

At the Conference

Let's Talk Communication Skills

By: Bill Beardslee, PE, PLS, PP

A few days ago, I received an e-mail from Crissy Wilson of CLSA asking me if I would be interested in being a speaker at your 2014 Educational Conference, April 13-16 in San Diego. I was honored and immediately responded that I would be happy to come and meet some new friends – the great surveyors of the States of California and Nevada. (Can you imagine what my wife would have done if I said “NO” to a trip to beautiful San Diego?)

While I have been in this wonderful field for forty-seven years, my seminars focus on skills you don't usually spend a lot of time honing; and yet they are as important as your incredible technical skills. What I try to do is assist you in strengthening your communication skills.

Whether writing or presenting to an individual or group, your communication skills are right out in front on every project. Discussing the needs for a project with the client, then preparing a proposal, working with your staff, completing the project, then perhaps presenting the project to a board or agency, all require strong communication skills. I have been told by clients that it is better to have a good project with a great presenter than a great project with a fair presenter.

I have had the honor and pleasure of presenting communication courses to land surveyors across the country. Once we adjust to the accents, knowledge is passed, and a good time is had by all.

At your Conference, I will be presenting three courses – each designed to increase your company communication processes. All the courses are very interactive as the knowledge you gain from stories your peers may tell greatly enhances the course subject matter. Each course will be 3 class hours.

- We start with “Proposal Writing – An Art and a Science,” which winds it through the many steps in, and uses for, the proposal.
- The second course is “Client Communication – The Life Blood of Business,” which, I believe, should be required for all surveyors as it helps create happy clients and reduces risk.
- Wrapping it up will be “Ethics in Client Communications”, a new course discussing the ethics components involved in communication, including your state regulations, association codes, and ways to avoid legal pitfalls.

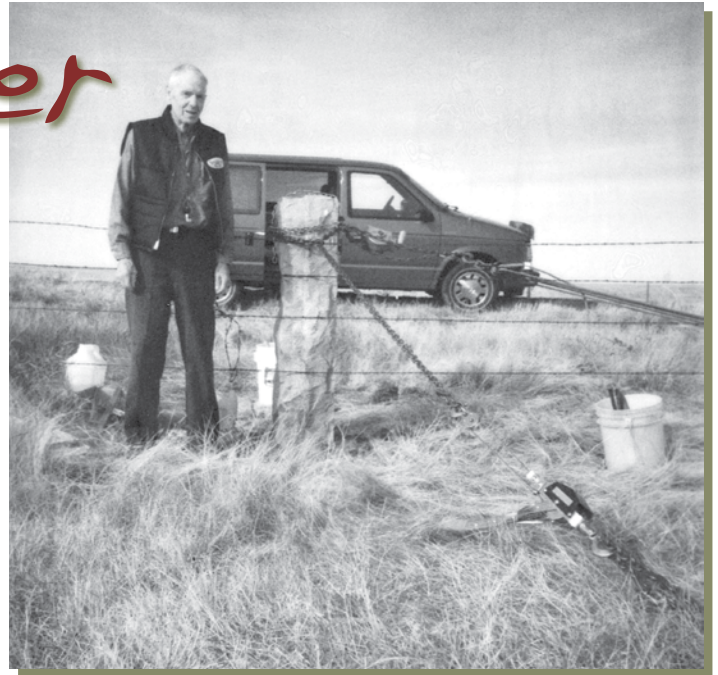
These courses, as a whole, serve a need as 80% of the complaints to State Boards about land surveyors nationwide are on business practices, most of which are miscommunication issues.

In going through the CLSA website, I was very pleased to see that the Society has a strong educational component. I hope my seminars will aid that effort.

I look forward to meeting you all in April. ❖

Boundary Walker

By: Jerry Wilson



Emmett Bennett walked the streets of Rapid City five days a week for 25 years. He walked with purpose, delivering the mail. On weekends, for relaxation — and to stay in shape for Monday — Emmett and his wife Mary Ellen took a hike.

Bennett had volunteered for the army in 1940, and fought in Africa. After the war he took a job with the postal service, where he resisted all attempts to move him to inside jobs. He retired in 1970, but even before he delivered his last piece of mail, he had found a new reason to walk.

One day in 1963, Bennett reached the city limits, but kept on walking. Then he found a purpose for his exploration of the Black Hills — searching for the boundaries of 19th-century mining claims. Emmett and Mary Ellen's children were in scouts, and Emmett took the scouts out to teach them to use a compass. While surveying an old claim in the western Hills, he stumbled across U.S. Locating Monument No. 79, and a new passion was born.

Having discovered that surveyors had marked the boundaries of the state with cottonwood, iron or granite posts at every mile a century earlier, Bennett began a trek around western South Dakota. He resolved to rediscover and map the lost and forgotten markers that encircle the entire state, except the southeast corner where the Big Sioux and Missouri Rivers provided a natural boundary.

"I have no idea what motivated him," said his lifetime mate. "He did like to hike, and he liked to have a purpose for hiking. It was a challenge to find as many of the original surveying markers as he could, and to get from one to the next. For him to take a walk he had to have some place he wanted to go."

Bennett began the western boundary at the southwest corner of the state, where South Dakota, Nebraska and Wyoming meet, the spot where Rollin J. Reeves, guided by the stars, began his survey in 1877. Reeves marked the border to the Montana line, roughly following the 104th meridian. Every mile he planted a cottonwood post, inscribed with a mile number and the name of the state on either side. The rest of the western border, with Montana, was surveyed seven years later by Daniel G. Major.

In 1904 the line was resurveyed, the Wyoming border by Edward F. Stahle and the Montana section by Frank S. Peck. This time the boundary was marked more permanently, with 6x6-inch, 6-foot granite posts where it was possible to deliver them, or with 3-inch by 4-foot iron posts with an inscribed brass cap. Many of the granite posts were quarried in Sioux Falls, hauled as far as possible by train, and then by mule wagon to the appointed place.

Though the original wooden markers were presumably rotted away by Emmett Bennett's time, he found most of the granite and steel replacements intact, though sometimes askew. When he found posts leaning, he occasionally took the time to set them right. Bennett's mapping work was so much appreciated by South Dakota's Society of Professional Land Surveyors that in 1999 they honored him for his contributions to the profession.

On some searches Mary Ellen walked with him; other times she dropped him off, then picked him up at the next crossroad a few miles up. Occasionally they lost each other, but as long as there

was another boundary marker to find, Emmett kept walking. Sometimes other motorists would stop to see if Mary Ellen had a flat or needed help. "Oh, no, my husband's just wandering out there," she'd say. "I drop him off here and wait for him up yonder."

Using whatever maps were available and a compass to guide his feet, Bennett walked several miles of sometimes rugged, pathless terrain a day — once a 10-mile stretch. He gauged the distance between markers with his watch, 20 minutes per mile in open country. Mary helped with research and typed up his observations. "He kept good notes, which now are scattered hither and yon," she said.

After he found and described as many of the western border markers as he could, Bennett turned his attention to the northern boundary. He read Gordon Iseminger's *Quartzite Border*, and in February 1990, Emmett and Mary Ellen went to the northwest corner of the state and started walking east along the North Dakota line toward the Missouri River. The first day's hike took them as far as the Little Missouri River in Harding County. Many hikes later, Emmett, now 80 years old, had walked every step of the northern boundary to the big Missouri — except a forbidding five-mile buffalo pasture.

In November Emmett and Mary Ellen traveled to the southwest corner, and again Bennett headed east, this time along the Nebraska line. Except for a 30-mile stretch east of Pine Ridge, he walked the southern border to the initial surveying point on the Keya Paha River, southwest of Gregory.

In all these hundreds of miles of cross-country walking, Bennett took careful notes of the location, condition and terrain of every marker he found. His records indicate the date, the mile post number, how much of the marker was showing above the ground, and whether the post was upright, leaning so many degrees in a particular direction, or down. His field notes sometimes included an index card with a drawing of the brass cap atop the post, a map with the legal description, and notes such as "high up on the south slope of the hill" — anything that might help the next searcher find the spot.

Continued on next page



Thirty years into his boundary walks, having traversed the borders of half the state, Bennett began in 1995 to walk the Base Line — the imaginary east-west stripe across the middle of South Dakota from Jones County, just south of his boyhood home of Ft. Pierre, through the Black Hills to the Initial Point where the Base Line meets the Black Hills Meridian on the Wyoming border. This was the original surveyor's base line, established in 1877 by James A. Williamson, commissioner of the General Land Office, and Henry Esperson, surveyor general of Dakota Territory in Yankton. It was the starting point for surveying western South Dakota and the Black Hills.

By 1998 Bennett had completed that journey, except for a short stretch between Murdo and Kadoka. But he still had not relocated the monument which marks the intersection of the base line and the 100th meridian on the Wyoming

border near the Pennington-Custer County line. On August 17 he and Mary Ellen walked west from Redbank Campground, just off Forest Service Road 117 in southwest Pennington County, seeking the point where the West River surveys began. Late in the afternoon she stopped to rest, while Emmett searched on ahead.

Darkness fell, and Emmett did not return. After a frantic night, Mary Ellen called the sheriff. Searchers finally found Emmett the second night, wandering the 6,600-foot Limestone Plateau just across the Wyoming line, disoriented and dehydrated. Apparently he had gotten turned around, and perhaps even blacked out, Mary Ellen said.

Annoyed at getting lost so near his prize, Bennett spent the next couple of weeks studying his maps, trying to figure out where he'd made a wrong turn. He made two trips to Newcastle, Wyo., looking for other possible trails. Then he set out again on the last day of September, determined to find the elusive marker.

Again, Emmett Bennett did not return. This time Mary Ellen was even more alarmed, especially when the night turned cold and rain began to fall. In the morning the Pennington County sheriff dispatched a search and rescue team. Word of the missing man spread, and for the next two days as many as 50 people combed the rugged state-line area. On the third day, a Colorado team with search dogs found Emmett Bennett's body at the bottom of a brushy ravine in Parmlee Canyon, a quarter mile across the Wyoming line, just west of the mile post he sought.

Why Emmett Bennett's passion to walk? Why the need to be out of doors, whatever the weather? Maybe his birthday has something to do with it. After all, Bennett was born on Earth Day. Or rather, Earth Day was born on Emmett Bennett's birthday, April 22, 1970. Millions of Americans celebrated Bennett's 60th birthday as he did, by walking — marching in demonstrations around the nation to protest pollution of Planet Earth.

Bennett celebrated the 20th Earth Day and his own 80th birthday by climbing Harney Peak, the highest point between the Big Horns and the Alps. But for those who knew him, the feat of climbing the state's highest mountain at age 80 came as no surprise.

The truth is, that when Emmett Bennett walked, it was only because he was pacing himself. He was reining in his natural tendency to run. For not only endurance, but speed was in Emmett Bennett's blood. From 1926-1930, he earned 12 athletic letters at Rapid City High School — in football, basketball and track. In 1929 he placed sixth in the nation in the 440-yard race in Chicago. In 1938 and 1939 he was the city tennis champion. In the early 30s he built his own canoe and paddled most of the streams of western South Dakota.

In 1953, though Emmett had only recently begun flying, he and Mary Ellen entered a cross-country lightcraft air race from Philadelphia to California. They didn't tell their friends about the race, because they weren't sure they could finish. They won first place in their division.

Retired from the post office in 1970, Bennett had more time to play tennis and to walk. A decade later, now in his 70s, he began to supplement these activities with Volksmarching. In three years the Bennetts walked 2,500 miles in 17 states. At 74 he rode his bicycle across Nebraska from Sidney to Papillion, a meandering 512 miles in seven days. Twice he rode across Minnesota.

Then he decided it was time to renew his track career. At age 74 Bennett competed in a triathlon in Northfield, Minn., a 67-kilometer race consisting of 7 kilometers by canoe, 50 by bicycle, and 10 on foot. He completed the 42-mile race in under five hours, winning not only his own age division of people over 70, but beating all the 60-year-olds and even all those over 50.

A decade later, now 85 years old, Bennett was still running. At the 1995 Senior Olympics in St. Louis, he competed in eight events, including the long jump. In five events he set new records.



Bennett (left) set new records in five of the eight Senior Olympics events he entered.

So this was the Emmett Bennett who, on that late September day in 1998, set out on his last walk. Perhaps he became disoriented again. Maybe he fell, or blacked out. Or possibly he simply lay down to rest, and didn't get up. The first chill of winter came that night, and by morning he was dead.

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By: Annette Lockhart, PLS

Annette is a past president of Sacramento Chapter and currently serves on the Board of Directors. She works for the California Department of Water Resources in Sacramento.



CLSA Sponsors Center of Population Monument

This article was prepared in with assistance from Rolland Van De Valk (President Elect) and contains portions from an article written by Mark Turner, PLS in the California Transportation Journal, Volume 1, Issue 2, 2005.

In the 2000 census, the “center of the population” (COP) for America’s most populous state was in a cotton field between the communities of Shafter (pop. 13,700) and Buttonwillow (pop. 1,300) amid the vast open tracts of western Kern County. In 2004 the Bakersfield Chapter of the California Land Surveyors Association and local officials commemorated the location by setting a COP monument at the median island of the Buttonwillow Rest Area, approximately 30 miles west. The monument remains but the California’s center of population has moved.

According to the 2010 census, the center of population of the State of California now lies in a farmer’s field southwesterly of Shafter on the south side of San Diego Street and 2,132 feet east of Wasco Avenue. The center of population can be defined as a place where an imaginary, flat, weightless and rigid map of the State of California would balance perfectly if all the residents were of identical weight. To commemorate this shift in location, a new monument was constructed at the Shafter Depot Museum in Shafter. In a coordinated effort with Shafter Historical Society (owner of the museum), society members and museum curator, Mr. Stanley Wilson, CLSA sponsored the monument construction and ceremony.

Per specific request by the society and museum, the monument is in the form of a full-fledged exhibit: A 10” diameter brass cap produced by Berntsen International, Inc., surrounded by a 4’ x 5’ brick-paved area and accompanied by a 20” x 16” bronze plaque. The exhibit is at the entrance to the museum and can be viewed through a wrought iron fence when the museum is closed. It was constructed by members of the Bakersfield Chapter.

The bronze plaque has the following inscription:

The survey monument below commemorates the geographic location of the center of population of the State of California for the 2010 census. The actual location of the 2010 center of population lies in a farmer’s field on the south side of San Diego Street and 2,132 feet east of Wasco Avenue, four miles southwest of this point. The center of population can be defined as a place where an imaginary, flat, weightless and rigid map of the State of California would balance perfectly if all the residents were of identical weight. The center of population for the 2000 census was also commemorated by a survey monument which lies on the grounds of the south bound rest area of Interstate 5 near Buttonwillow.

2010 Census Population of California: 37,253,956

Geographic location of the 2010 Census center of population of California:

Latitude : 35°27’48.9” North

Longitude: 119°19’31.3” West

Sponsored by the California Land Surveyors Association

The dedication ceremony was held on October 19, 2013 on the grounds of the Shafter Depot Museum in Shafter, CA. as a part of a centennial celebration that the City of Shafter was having that weekend. The ceremony was attended by approximately 50 people. CLSA was represented as follows:



- CLSA Executive Committee: Rolland Van De Valk (President Elect), Jay Seymour (Secretary), and Steve Steinhoff (Member at Large)
- CLSA Board of Directors: Ron Nelms (Bakersfield)
- CLSA Central Office: Dorothy Calegari, and Crissy Willson
- Bakersfield Chapter Members: Donna Fujihara, Kristie Achee, and Tim Mack
- Los Angeles Chapter Member: Theresa Strazzella

Continued on next page

Following is an excerpt from Mark Turner's 2005 article:

Why is the COP important?

Modern society increasingly needs accurate and reliable geographic data for making critical decisions in such varied activities as environmental monitoring, the effects of urbanization, flood plain management, civil infrastructure management, earthquake research, and emergency response. Organizations and individuals are working together to develop systems to meet today's spatial referencing needs. Business leaders and local officials have also realized the COP's significance. Many large warehousing and manufacturing operations in Kern County are within a 40-mile radius of the COP and are strategically positioned to distribute products around the state. The 1880 center of population in San Joaquin County is now home to large operations serving major Northern California population centers.

How is the COP determined?

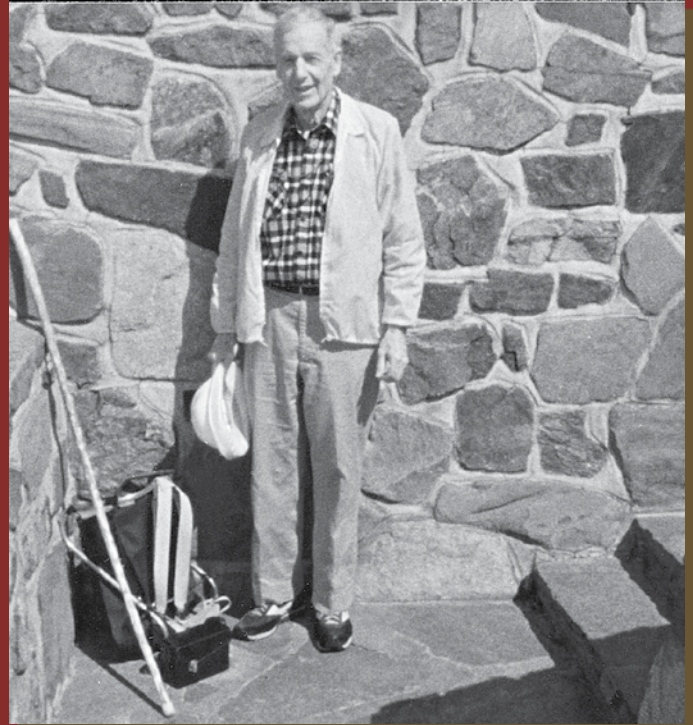
Not to be confused with California's geographic center — 118 miles north in Madera County — the center of population is the imaginary balance point used to analyze population distribution and change. In simple terms, it is the single point that is closest to all the people in the state. Even though California's COP has remained in Kern County for 70 years, its pull on the nation's population center remains a steady and powerful force. An examination of California's COP from 1880 to 1960 shows a predictable shift to the southeast. Southern California's population grew rapidly, drawing the center toward Los Angeles. Interestingly, the movement of the state's population center over the decades since 1880 roughly follows the alignment of Interstate 5 and the California Aqueduct, two major arteries constructed to accommodate the state's growth. Between 1960 and 1990, the COP stabilized, shifting slightly more toward the east. Between 1990 and 2000, the center began to slide to the northeast, reflecting the population growth in Northern and Central California, especially along Highway 99.

CLSA's support and participation in this event allows us to be a part of commemorating a bit of history as it passes us by. We leave as remembrance a monument. ❖



Left to right: Ron Nelms, CLSA President Rolland Van De Valk, Donna Fujihara, Kristie Achee

BoundaryWalker



Emmett Bennett rests by the fire tower at the top of Harney Peak on his 80th birthday.

Walking was as natural to Emmett Bennett as breathing air. But why the attraction to boundaries for a man whose very life said movement, independence, speed? For a quarter century Bennett walked the line. To earn his bread, he traversed the same prescribed path, day after day. But for 88 years he also pushed the line, tore away at the envelope, lunged toward freedom. He was a man who defied boundaries, pushed himself to the last ounce of endurance, broke through the finish line.

Perhaps there was within him some need for the line, even if artificial or imagined, something to keep him in check, to give life order. Something epitomized by a boundary marked at regular intervals with granite posts.

Otherwise, he might not have returned. He might have simply kept on walking. Somehow, it's comforting to know that the night Emmett Bennett died, he was across the line, beyond the boundary marker he sought.

But this is idle speculation, the rumination of one who sits at a desk wondering, one who might rather be there under the open sky with Emmett Bennett, a man who for 88 years did what he loved doing — putting one foot in front of the other, his eye on some goal up ahead, a mail box, a finish line, a six-foot granite post, the summit of the next horizon.

This story is revised from the May/June 2000 issue of South Dakota Magazine. To order a copy or to subscribe, call 800-456-5117. ❖





By: Greg Helmer, PLS

Mr. Helmer is a Professional Land Surveyor in four states with over twenty-five years of experience in geodetic control, surveying geomatics and GIS. As a Senior Vice President with the firm of Michael Baker, he has been an innovator for advanced technologies. He is nationally recognized for his contributions to GPS surveying and high-precision geodesy. Mr. Helmer is a contributing author to the National Height Modernization Program for NOAA, and a founding member and past Chairperson of the California Spatial Reference Center at Scripps Institution of Oceanography.

Federal Geographic Data Committee Geospatial Standards

The National Geodetic Survey did a remarkable job with the branding of "First Order Control". To this day surveyors everywhere remember that as the gold standard for survey control. And what's interesting is that for practical application First Order has been an antiquated classification since 1998; grandfathered in yes, but basically ancient Greek and inapplicable to modern horizontal and vertical control surveying. The Federal Geographic Data Committee (<http://www.FGDC.gov>) is an interagency committee of the Executive Office that "promotes the coordinated development, use, sharing, and dissemination of geospatial data on a national basis". The Secretary of the Department of the Interior is the Chair of FGDC, and the Deputy Director for Management, is the Vice-Chair. All Federal agencies responsible for spatial data themes are required to be members of the FGDC, and all federally-funded geospatial activities (That covers a significant portion of what Land Surveying professionals are engaged in.) are required to conform to the standards published and endorsed by FGDC. Among the 30 data standards prepared by the FGDC, is Geospatial Positioning Accuracy Standards, Part 2: Standards for Geodetic Networks (FGDC-STD-007.2-1998) where the current accuracy standards for geodetic control are codified. The particulars of all 27 published standards, and the 64 non-Federally authored standards endorsed by FGDC, is beyond a Tech Tip article. This editorial is aimed at promoting the brand of FGDC and the library of Geospatial Positioning Accuracy Standards available to geospatial professionals.

Part 1: Reporting Methodology, FGDC-STD-007.1-1998

This publication is a lot of words to explain that horizontal and vertical positioning accuracies are to be qualified to positions evaluated at the 95% confidence level ($-2\sigma < \mu < +2\sigma$). It is a simple concept, but it has significant impact. This essentially puts the nail in the coffin of First Order Control, relative precision, and closures. Horizontal accuracies are reported as the length of the radius for a circle where the estimated location of the point would have a 95% probability of being within. Similarly, the vertical accuracy is to be reported as the distance +/- from the estimated location of the point that would have a 95% probability of being within. The values of the classification scheme are not dictated by FGDC (i.e. there is not explicitly a 1 centimeter or 1 inch standard), nor is there one method of proof. All FGDC Geospatial Positioning Accuracy Standards are outcome based. The practitioner must state the accuracy achieved and how it was evaluated at the 95% confidence level.

Where practical, testing the reported positions with a method of higher accuracy is encouraged, however; repeat measurements, previously tested procedures, or even estimation are possible. Alternate methods of proof require additional validation. The point being

that the accuracy value must be stated together with the evaluation method, and interestingly, the appropriate application for the data must be documented. The accuracy values can be reported point by point or generalized across an entire project or similar blocks of data within a project. Many federal, state and local agencies have established bands of positional accuracy in which to report. Part 1 ends with a recommendation that, though not required, geospatial data should be related to one of the National datum.

Part 2: Standards for Geodetic Networks, FGDC-STD-007.2-1998

Thirteen (13) accuracy bands are specified from 1 mm to 10 meters for geodetic control networks, with a provision to expand the bands to larger values where needed. These bands explicitly supersede and replace the previous geodetic control standards. The accuracy bands are applicable to horizontal, ellipsoid height, orthometric height, and presumably when adopted, geopotential height control points. Though metric (S.I.) units are preferred, feet (U.S. Customary Units) are acceptable. No mention is made as to whether accuracy bands in feet should be hard conversions or nominal values. The concept of Local Accuracy, assessing how well the network conforms to the existing local geodetic control system, and Network Accuracy, how well the subject network conforms to the datum, are introduced. Both Local and Network accuracy are required to be stated for each geodetic dimension being published and do not need to be the same value. Four steps are necessary to classify a geodetic control network:

1. The survey measurements must be documented. This includes data files, notes, and other field evidence.
2. A minimally-constrained least squares adjustment is required. Blunders and systematic errors must be eliminated and an observation weighting strategy applied and validated.
3. Error propagation in a constrained least squares adjustment is used to compute provisional Local and Network accuracy values for individual points. Network accuracies (uncertainties) of the known control must be included in the error propagation computations.
4. Comparison between minimally-constrained values and known control must be made, and if not within the desired accuracy classification, additional scrutiny is necessary.
5. Comparison of the absolute residual values to the desired and claimed accuracy is always an important quality assessment.

Continued on next page

Part 3: National Standards for Spatial Data Accuracy, FGDC-STD-007.3-1998

Part 3 is the statistics and algebra lessons from FGDC. Root mean square (RMS) is described in practical terms and a few too many mathematical equations, along with its relationship to the 95% confidence criteria. Accuracy testing is again stated as the preferred validation method, and the minimum sample set noted as 20 independent measurements of a higher quality. The distribution of test points must be applicable to the particular data set, or portion thereof, being assessed, but for a uniform rectangular data set, a recommended spacing interval of at least 10% of the diagonal distance and 20% in each of the quadrants is suggested. Recommended reporting statements are provided for different assessment methods, and the appropriate metadata tags identified for digital data submissions.

The computations are demonstrated to determine the National Standard for Spatial Data Accuracy (NSSDA) from equivalent U.S. National Map Accuracy Standards (U.S. Bureau of the Budget, 1947) and American Society for Photogrammetry and Remote Sensing (ASPRS) Accuracy Standards for Large-Scale Maps (ASPRS Specifications and Standards Committee, 1990). Positional accuracy bands for the ASPRS Specifications and Standards are shown in the document, attesting to their acceptance (see Table A1 and A2 herein).

ASPRS Accuracy Standards for Large-Scale Maps

TABLE A1
Class 1 Planimetric Accuracy

limiting RMSE (feet)	Map Scale
0.05	1:60
0.10	1:120
0.20	1:240
0.30	1:360
0.40	1:480
0.50	1:600
1.00	1:1,200
2.00	1:2,400
4.00	1:4,800
5.00	1:6,000
8.00	1:9,600
10.00	1:12,000
16.70	1:20,000

TABLE A2
Class 1 Vertical Accuracy

limiting RMSE Sample Points (feet)	limiting RMSE Spot Elevations (feet)	Contour Interval (Feet)
0.17	0.08	0.5
0.33	0.17	1
0.67	0.33	2
1.67	0.83	5
3.33	1.67	10

Limiting RMSE (meters)	Map Scale
0.013	1:50
0.025	1:100
0.050	1:200
0.125	1:500
0.250	1:1,000
0.500	1:2,000
1.000	1:4,000
1.250	1:5,000
2.500	1:10,000
5.000	1:20,000

limiting RMSE Sample Points (Meters)	limiting RMSE Spot Elevations (Meters)	Contour Interval (Meters)
0.067	0.033	0.2
0.167	0.083	0.5
0.333	0.167	1
0.667	0.333	2
1.667	0.833	5

Part 4: Standards for Architecture, Engineering, Construction (A/E/C) and Facility Management, FGDC-STD-007.4-2002

The A/E/C Standards cover nearly all of the deliverables we as Professional Land Surveyors provide every day. "Part 4 provides accuracy standards for engineering drawings, maps, and surveys used to support planning, design, construction, operation, maintenance, and management of facilities, installations, structures, transportation systems, and related projects." That doesn't leave much out of the umbrella.

A lot of the material in the other standards is repeated in Part 4, including positional accuracy measured at the 95% confidence level, recommendations for relating maps and data to the National Spatial Reference System, quality control testing with higher quality data, consistency of either metric (SI) or U.S. Customary units, and the acceptance of different accuracies for horizontal and vertical dimensions. Appendix A includes a table of typical plotting scales, contour intervals and horizontal/vertical feature tolerances, and the publication defers to the ASPRS Specifications and Standards as appropriate for generalized A/E/C site mapping work.

While project control for locally-referenced projects is recommended to conform to positional accuracy as defined in Part 2 "where practical and allowable", there is discussion about the use of relative precision measures. The discussion goes on to note that "there is no simple correlation between relative closure accuracies and 95% radial positional accuracies" which makes determining the final accuracy of A/E/C maps and products, "at best, an approximation."

Part 5: Standards for Nautical Charting Hydrographic Surveys, FGDC-STD-007.5-2005

Part 5, currently the final chapter of Geospatial Positioning Accuracy Standards, is applicable strictly to hydrographic surveys used to update nautical charts. Hydrographic surveying for lakes, rivers, and harbors are suggested as falling within Part 4. There is a lot of good information, however, in Part 5 regarding the spacing of transects and the relationship of vessel positioning accuracy versus depth measurement accuracy, disclaimed as it is. The reader is likely better referred to the U.S. Army Corps of Engineers Hydrographic Survey Manual for traditional hydrographic surveying and bathymetric mapping.

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PEOPLE NEWS

In November the County Engineers Association of California (CEAC) awarded Gwen Gee, PLS, "2013 County Surveyor of the Year." CEAC presented Gwen the award for exemplary application of surveying management principles in the field of county surveying. Congratulations, Gwen!



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Risk Management for Land Surveyors

Why Do I Need All This Business Insurance? What Is It And How Much Does It Cost?

There are many answers to these frequently asked questions but the basic answer is for protection. Insurance provides protection for you, for your business, for your financial assets and for your reputation.

Clients, contractors and public entities are looking at you and your insurance as the first line of defense in case something goes wrong as a result of your work or because you are working on their job site. Even if your client doesn't ask for insurance it's a good idea to have coverage for unforeseen mishaps. Then you will be glad to be insured.

The argument for not having general and professional liability goes this way: I won't be sued if I don't have insurance because there is no money available. That's not right. An angry client with an aggressive lawyer will go after your assets, savings, home, car, business, future. Don't let that happen.

Also, if your client gets sued and your name is found on their contract you will be included in the lawsuit, even if you did nothing wrong, and you will need a lawyer, preferably from your insurance company, to get you out of the suit.

Common insurance requests are:

- **\$1,000,000/\$2,000,000 in the aggregate Commercial General Liability for property and bodily injury.** This is for slips and falls and on-site damage to your client or the public on his job site.
- **\$1,000,000 Business Auto.** This is for your work vehicle-if you have personal auto coverage you may be able to negotiate out this one.

- **\$1,000,000 Workers Compensation.** If you don't have any workers, you should be able to get out of this.
- **\$1,000,000 Professional (Errors and Omissions) Liability.** This is for your professional surveying work, and is like malpractice insurance.

Average annual coverage based on \$100,000 revenue is:


- Commercial General Liability including equipment	\$1,200
- Business Auto	\$1,400
- Workers Compensation	\$1,100
- Professional Liability	\$2,000
Total estimated premium	\$5,700

Make sure to include a few extra dollars for your insurance costs in all your bids, if you can, so the client helps pay for your insurance.

An insurance benefit besides coverage is that your broker will provide certificates of insurance for you, along with additional insured endorsements, if requested. However, don't ask for additional insured endorsements for your professional liability insurance because it only covers you and your work.


Also, remember to ask your sub contactors for their insurance when they are working for you. And always use your CLSA contract forms for insurance, work and payment clarity including the proper hold harmless wording. ❖

Geography Quiz Answer



The Piton des Neiges (Snow Peak) is a massive 10,069 ft shield volcano on Réunion, one of the French volcanic islands in the Mascarene Archipelago in the south-western Indian Ocean. It is located about 500 mi east of Madagascar. Piton des Neiges is the highest point on Réunion and is considered to be the highest point in the Indian Ocean.

The volcano was formed by the Réunion hotspot and emerged from the sea about two million years ago. Now deeply eroded, the volcano has been inactive for 20,000 years and is surrounded by three massive crater valleys, the Cirques (one of which is pictured in the first part of the quiz.) Despite its name, snow practically never falls on the summit. (Source: Wikipedia)



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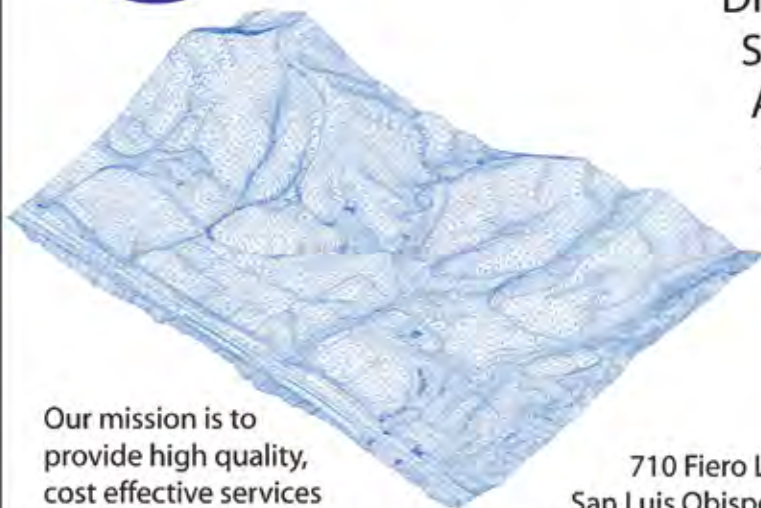
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Question:

With the economy slowly but surely bubbling back, we have seen an increase in the number of tentative map applications. Can you please provide some “do’s and don’ts” for subdividers and cities/counties regarding Conditions of Approval?

Answer:

Timely question! Yes, here are a few rules that will hopefully help improve Conditions of Approval:

- Use “shall”—not “should” or “may” or “might” - as the action verb for Conditions of Approval. Using consistent phrasing like “the Applicant shall ...” ensures that each Condition is structured in a way that includes the whos, whats, wheres and whens.
- Plainly identify what has already been completed and what has not. Example: “The Master Plan for the Park has been approved by City. Developer shall install those improvements set forth on page 3 of that approved Master Plan.”
- Coordinate the project’s Conditions of Approval with its CEQA mitigation measures. Translate mitigation measures into Conditions of Approval. Include references to the Condition of Approval number at the end of the Mitigation Measure text (see COA # ___) and the Mitigation Measure # at the end of the Condition of Approval text (see MM#___). Beyond being useful for future reference, this cross-check ensures all Mitigation Measures find a home in the Conditions of Approval.
- Do not repeat or try to define the requirements of another agency—those will change over time and potentially create a conflict with the Conditions of Approval. For example, the Mitigation Measure might require wetlands mitigation per federal requirements. Trying to define what those are or will be can create inconsistent requirements. However, be careful about deferring Mitigation Measures to another agency—a bit of a Catch 22—best to provide your requirement, but also provide that satisfaction of state or federal requirement will forgive your requirement.
- Ensure that timing of Condition’s requirements is clear. When does the Condition have to be performed/satisfied? Before final map? During the subdivision improvement agreement? Prior to building permit or occupancy permit? Most conditions are satisfied as a pre-requisite to building permit/occupancy, but you might not know that from reading the Conditions of Approval.
- Don’t double up. Conditions on different approvals often incorporate by reference every Condition of Approval imposed on every other approval for the project. This can create inconsistencies, conflicting language and interpretations, and makes subsequent amendment difficult. Say it once, correctly, and attach it to the correct approval (legislative versus judicial approvals).
- Put the right Conditions of Approval in the right place. Legislative vs. Judicial. Should the Condition of Approval be made part of the legislative regulations (do not lapse) or part of the judicial approval (that might lapse)?
- Allow for appropriate measure of flexibility. Include staff authority to interpret Conditions, and consider including staff authority to make minor alterations to Conditions.
- Anticipate and avoid later confusion. Plainly specify that the life of approvals and permits is controlled by the applicable Map Act or other law. “The life (term) of this Vesting Tentative Map (VTM) and any extensions of that life shall be that and those set forth in the Subdivision Map Act, and any amendments thereto.”
- Describe developer’s intention to file multiple final maps and Condition phases accordingly. Some conditions may not need to be satisfied with each phased final map. Conditions should anticipate what Conditions need to be satisfied with what maps. “This VTM has met the pre-requisites of Government Code section 66452.6(a) and 66456.1, and therefore, the Subdivider has the right to employ multiple (phased) final maps, the recording of which shall extend the life of the VTM as provided for in Government Code section 66452.6(a). The Conditions of Approval to the VTM have been organized to reflect this phased final map approach. The subdivider shall have the right to combine multiple separate phased final maps together into fewer phased final maps, at subdivider’s sole discretion, provided the Conditions of Approval for each such combined phased final map have been properly accounted for and satisfied as required by the VTM Conditions of Approval relevant to each combined phased final map.”
- Be careful to avoid Conditions that might undo vested rights. Map Act provides that a VTM provides vested right to laws in place at application completion. Avoid Conditions that set vested rights at another date or undo them completely.

Heaven and Hell lie in the details. Bottom line, spend the time needed on the Conditions of Approval to make them clear, usable, helpful, adaptable, etc. ❖

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By: Carl C. de Baca, PLS

Carl is Principal of Alidade Surveying in Elko, Nevada, and a past editor of the California Surveyor. He can be reached at: alidade.nv@sbcglobal.net.

Bad Backsights

A Finder, for Better or Worse

Surveyors are finders. It is a natural trait. I'm not sure whether finders naturally gravitate toward becoming surveyors or if surveyors, trained to look for evidence become finders. That would be a good topic for study...maybe grab some government funding. I find many things in the course of conducting my work. Over the years I have found petroglyphs, arrowheads, fossils, jewelry, old cars, antique bottles, marijuana fields, mine shafts, misplaced explosives, a voodoo shrine (way creepy) and some unpleasant things as well. I am a finder, for better or worse.

September 25 –I just got snowed on for the first time this season. The abrupt change from summer to fall reminds me of an event from 30 years ago. It was the fall of 1983. The weather was cold, the day gray, the leaves nearly all off the trees. Our 3 man crew was staking a new railroad line on the west edge of a small town. We were using a Wild T16 theodolite and a steel tape, setting 50 and 100 foot stations along a large radius curve the old fashioned way: short chords. (The company I worked for had a few total stations but none were allocated for the project I was working on.) We got to the end of the curve and our crew chief, who was operating the instrument that day, left himself a backsite and carried the trusty Wild forward to set up on the EC.

As Bruce went about setting up over the point, I wandered over to the edge of the rail corridor and looked through the chain link fence at a gravel pond on the other side. We had staked the new right-of-way earlier in the year across property taken by eminent domain from a crotchety old man who had been making gravel there for 500 years, at least. We had to have the sheriff accompany us when we staked the right-of-way since old man Sharp had sent us away at gun-point once already. The new rail line had taken half or more of the gravel pond and the fence sat on the crest of a slope that extended down into the water. Now that the fence was up we had no more problems with Sharp.

The north side of the pond was ringed with old feral Chinese elms now denuded by the cold weather. A constant north wind had driven all the leaves to the end of the pond closest to me and as I peered through the chain link I thought I could make out a shape. "Hey Bruce," I said, "Come here and look at this." He walked over. "What?" he muttered. I think I drove him crazy on a daily basis so he was probably expecting another bad joke.

"Look down there, looks like a body, don't you think?"

He followed my pointing finger and squinted. "I don't see anything. Let's get back to work"

"There, just to the left of that angle point in the bank. Doesn't that look like a hand?"

Bruce recoiled and then doubted his eyes. "No way, that can't be a body. Bob come over here for a minute."

Bob, our laconic chainman ambled over. Bruce pointed without saying anything. "That looks like a body." Bob drawled in some sort of Oklahoma-bred Middle English. "Are we missing any crew members?"

We were out past the edge of town, in a fenced-in corridor and a good half mile from the truck. There were no cell phones and our hand held radios were good for line of sight communication, and then just barely. Contacting the office was out of the question. It seemed like the only thing to do was climb the fence, walk to the gravel plant, track down old man Sharp and notify him of the body in the pond, assuming that was not the man himself bobbing amidst the elm detritus. Bruce looked at me and said, "You spotted it, you go find the old man." Field crews have never been democratic institutions.

I climbed up and over the 6 foot fence, tearing my pants on the wire at the top and dropped onto the pond bank. I walked over to a spot directly above the might-be body and gazed down. That was definitely an outstretched flannel sleeve poking through the leaves and terminating in a bloated, splotchy hand. I thought I could see the top of a head too but I quit looking and said, "Hey – I think I found Jimmy Hoffa." (It seemed funny at the time.)

I paced the thousand feet or so to the Sharp's office, a trailer next to a portable truck scale. I hoped he would see me coming in my orange Filson vest and wouldn't be surprised. I didn't want to end up shot for being one of those no-good bastards who'd taken his land, (even though I was). I stood by the door for a minute gathering up the courage to knock when he drove up from around back of the trailer on a small loader.

As he scowled and started to get off the loader I blurted out, "Mr. Sharp, I'm sorry for trespassing but I spotted someone floating in your pond, face down, and I figured you might want to come take a look and call the police or someone."

After editing out the cuss words, Sharp's reply can be summarized as, "The hell you say. Let's go take a look." I started walking back to the pond; Sharp stayed on the loader and dogged me all the way. I imagined being shot in the back and left in the pond as a warning to any other potential trespassers. Ah, the 22 year old mind at work.

Continued on next page

Continued from previous page

I got back to the south end of the pond where Bruce and Bob were still debating whether that there was a real body or not. There was some wrenching but I'm not saying who it was. Sharp climbed off the loader and walked over. He took a look, shinnied down the bank to the water's edge and grabbed a shirt sleeve. The body, face down, slid toward the bank. Sharp said, "Yep, that's a body alright. You boys stay here and make sure he doesn't go anywhere. I'll go call the sheriff." He chugged off on the loader and I sat down on the pond bank.

Bruce asked no one in particular, "What do we charge this time to?" He looked kind of green. Then he told me that since I was already over there, I should get a stick and try to sweep all the leaves away from the victim.

Again, editing out the expletives, my reply was reduced to something like, "Fat chance."

Bob said, "See what happens when the lifeguard looks away, just for a second."

Bruce added that one should always wait 45 minutes after eating before going for a swim.

I reemphasized the resemblance to a certain missing Teamster boss. And so on. After a while the ambulance arrived along with two Deputies. The first Deputy, who was mountain-sized, donned chest waders and stepped in to the cold water. The second Deputy took a statement from us while we watched the retrieval. Deputy Tiny let loose a running dialog of bad jokes while he labored to get the victim ashore. Everyone laughed but in an uncomfortable way. Presently the ambulance drove away and we went back to work, but without much zeal.

Death is generally not funny and finding a body is always grim business. But the sheer inevitability of death and the myriad ways that we come to our end almost begs for some levity. Sometimes you have to laugh to keep from crying. ❖

Photo of the Year Entries Submit Photos to CLSA@californiasurveyors



(Left) My son spotted this brass disc along the trail and said "I found one of those round things you are always looking for." Taken at Point Cabrillo Light Station on a family outing. Submitted by Annette Lockhart, PLS

(Right) Surveying lots in the Trinity Alps that were created before the area was changed to wilderness status.

Submitted by Brian Smith, PLS

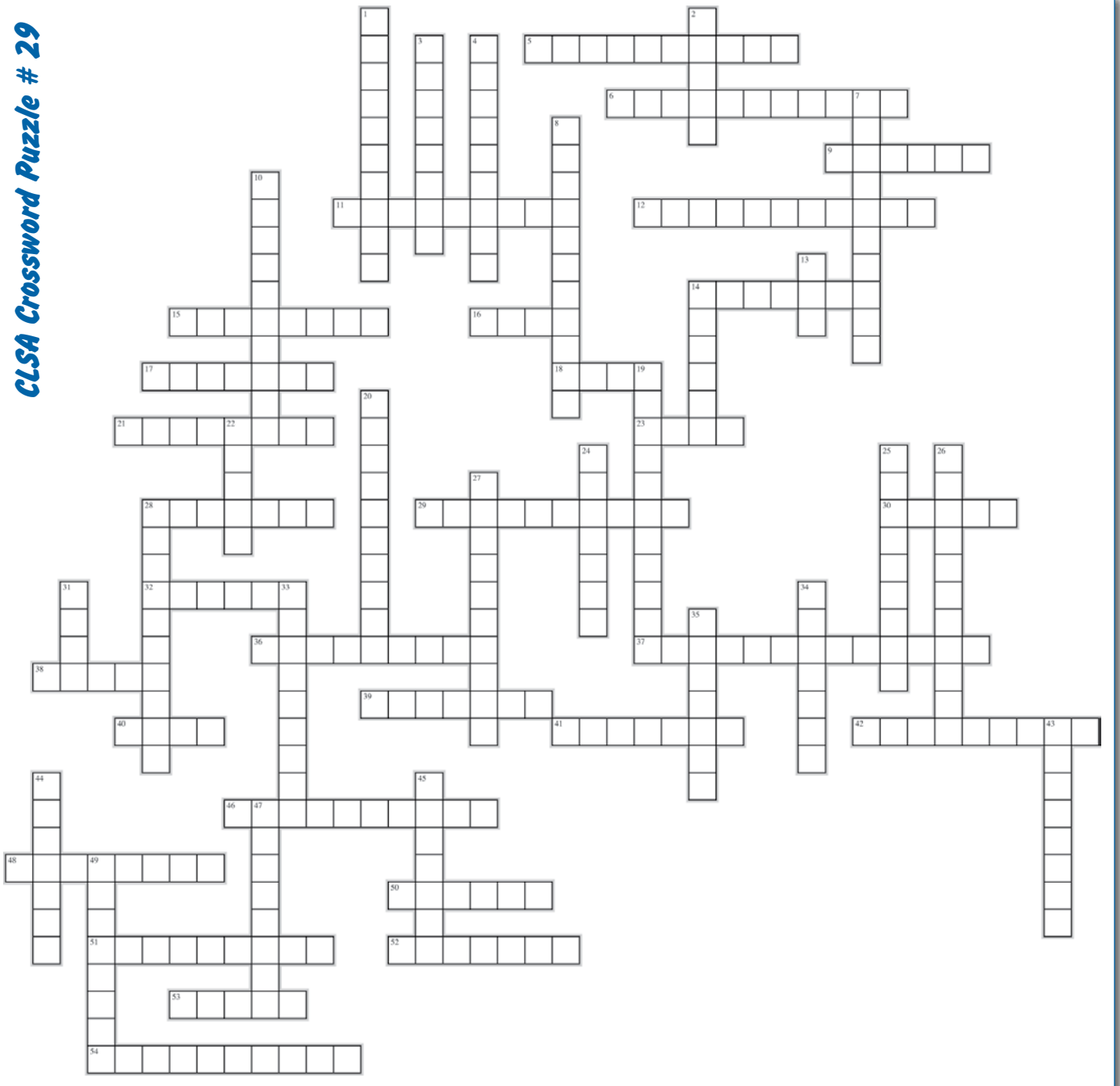




Scott Martin has been working in surveying since 1977 and obtained his California license in 1987. He worked in the private sector until 1993 and has been employed by the State of California since then. He lives in the Gold Country of California and enjoys collecting, restoring, and using Coleman lanterns in his leisure time. The one in the picture is from 1920.

Crossword Puzzle *by Scott Martin*

CLSA Crossword Puzzle # 29




Across

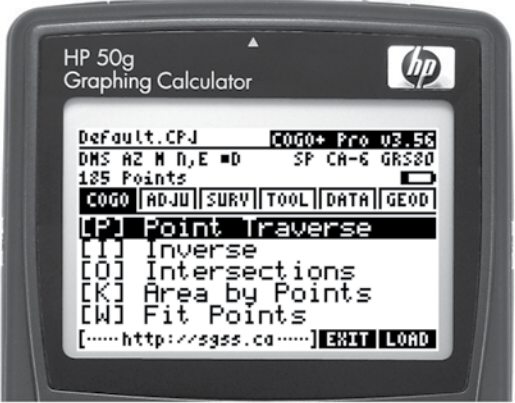
5. Field drafting tool
6. Three D viewer
9. A compass staff
11. Early pipe locator
12. It changes over time
14. California map projection
15. Depth measurement in water
16. What Emmett Bennett loved to do
17. X
18. A type of model or drink
21. Get on line between two points
23. A vertical control point (Part two)
28. Part of Ursa Minor
29. The work of a Black Widow
30. a certain triangulation tower
32. Natural gum tree
36. Communication expert
37. Geoid surface definition
38. A vertical control point (part one)
39. Best when following footsteps
40. Used to examine a tree
41. You might need a glass to read it
42. Bearings have these
46. Useful surveyor knowledge
48. Rate of change
50. Unusual section corner material
51. GNSS bugaboo
52. Compass Larry Hyder prefers
53. A type of evidence
54. Gives a new perspective

Down

1. A last resort
2. Artificial mound of rocks
3. Perpendicular approximation
4. Followed in retracement
7. "Buggy"
8. What NGS requires for the NSRS
10. Messes with the needle
13. Something you raise for
14. Direct reading rod
19. A chaining correction
20. Lots of raw data
22. Remote sensing technology
24. Line of lowest elevation in a stream
25. Bad in a legal description
26. As opposed to lost
27. Claim corner tied to a section corner
28. Disagreement in position
31. One stride or two?
33. A mask is applied to it
34. Former Guatemalan capital
35. Four pole chain
43. Art of coiling a steel tape
44. This would cost you in the day
45. Something you might chase
47. Only elected County Surveyor in California
49. A function of the radius, not the ulna



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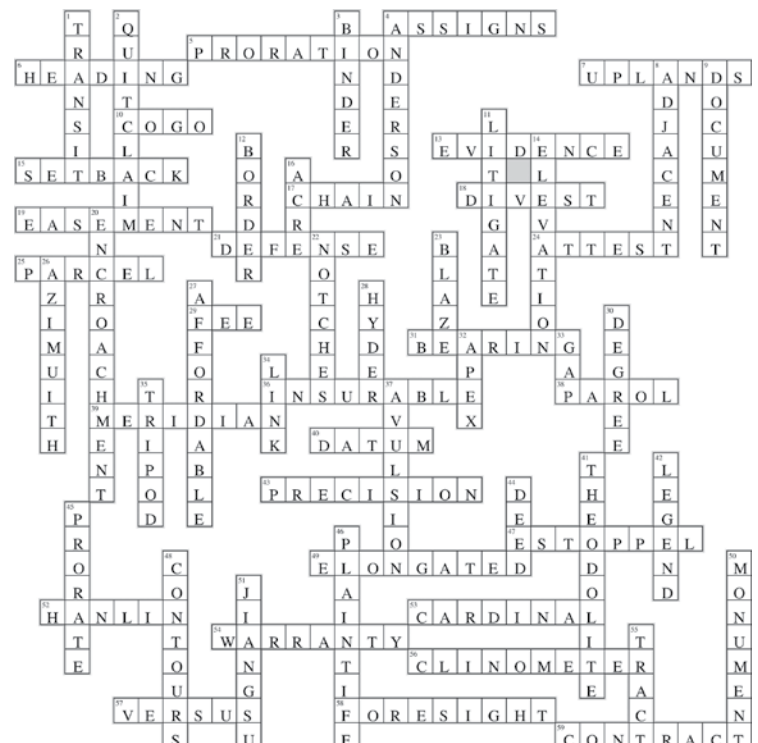
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Key to CLSA Crossword Puzzle # 28

(Surveyor Issue # 175)





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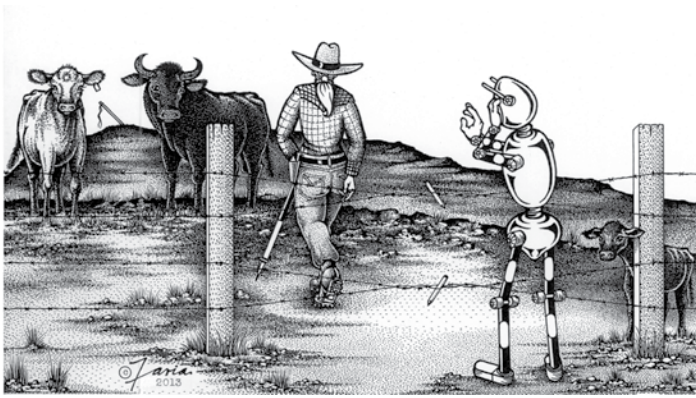


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Top Captions for issue #175



“On the 1st of April 2021 one of the last human survey technicians perished in a cow pasture near Bakersfield, California. The event was recorded by automated survey crew members. Services for the deceased are pending.”

BJ Tucker PE, LS

Submit your caption for the below cartoon to clsa@californiasurveyors.org by April 10th. Our favorite captions will be published in the next issue of the California Surveyor.

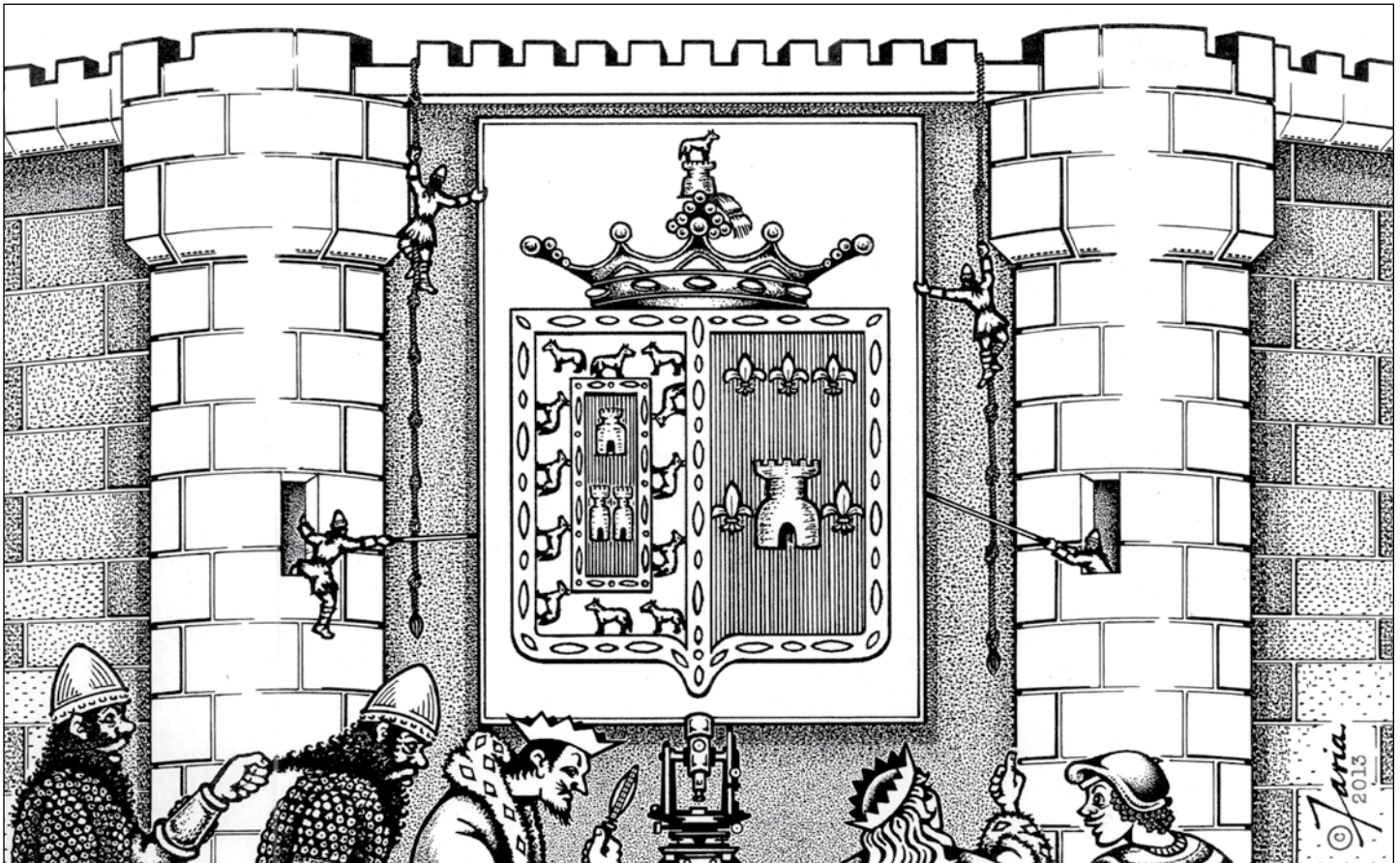
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