



# THE Central Valley Chapter PRISM

Volume 2, Issue 3

May 2012

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Rich Brown



**Date:** May 23, 2012

**Time:** 6:30 p.m.

**Location:** Perko's @ 901 North Carpenter Road, Modesto

**Speaker:** Ray Mathe, BPELSG

**Topic:** New Monument Preservation Requirements

**Date:** June 27, 2012

**Time:** 6:30 p.m.

**Location:** Perko's @ 901 North Carpenter Road, Modesto

**Speaker:** Tom Taylor, CLSA Vice President

**Topic:** Joint meeting with Mother Lode Chapter

## Announcements

### Conference a HUGE Success for Foundation

The recent 2012 CLSA/NALS Conference in Reno, NV was a huge success for the Education Foundation. Approximately \$45,000 was raised towards the CLSA/NALS Education Foundations this year.

### Security Issues Cause Cancellation of Examination

The April 12, 2012 State Civil Engineering Surveying exam was cancelled due to a printing error in many of the examination booklets. Board staff quickly determined that there were an insufficient number of correctly printed booklets available and in all fairness to everyone, the entire Engineering Surveying examination was cancelled. All candidates will be contacted by the Board as soon as possible to reschedule. Please click [here](#) for the latest information.

### Chapter Waives 2012 Dues for Unemployed Members

At the October, 2011 meeting the Central Valley Chapter voted to waive 2012 chapter dues for any members (or new members) who have become victims of the current economic downturn and are unemployed. Please fill out the Membership Application, enter "Unemployed" on Line 7 for the Name of Firm, Agency or College, submit your application, and your 2012 Dues are waived.

[Click here for the 2012 Membership Application](#)

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## Classes, training, and continuing education

### Survey Summit

The ACSM Annual Conference  
July 21-24, 2012  
Manchester Grand Hyatt San Diego



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- Bridge the gap between trusted methods and current best practices



### CAD Masters — AutoCAD Level I — [Register here](#)

June 11, 2012, Walnut Creek  
June 25, 2012, Sacramento  
July 9, 2012, Walnut Creek  
July 23, 2012, Sacramento

### CAD Masters — AutoCAD Level II — [Register here](#)

June 18, 2012, Walnut Creek  
July 9, 2012, Sacramento  
July 30, 2012, Walnut Creek

### CAD Masters — Civil 3D Introduction — [Register here](#)

June 4, 2012, Walnut Creek  
June 18, 2012, Sacramento  
July 16, 2012, Sacramento  
July 30, 2012, Walnut Creek

### Land Use Navigators — Subdivision Map Act in California

June 21, 2012, Bakersfield — [Register here](#)  
July 19, 2012, Costa Mesa — [Register here](#)

### ACSM Annual Conference — Survey Summit

July 21-24, 2012, San Diego — [Register here](#)

If you have information about a training or class, please submit to: [editor@californiacentralvalleysurveyors.org](mailto:editor@californiacentralvalleysurveyors.org)

## Editor's Message

### A beginners guide to the Annual Conference

I was privileged enough this year to be able to attend the Annual CLSA/NALS Conference in Reno, NV. Not having attended before, I really did not know what to expect. So I went into the week wanting to take in as much information as I could. There was so much going on, that I quickly realized that I would have to pick and choose what I was going to be able to do, and what I would have to leave out. Even though I did not get to do everything, I feel that what lectures I did get to attend was so very rewarding. I think that the organizers should be very proud of the results of this years event. So when I look back at the week of submersion into the Surveyor's world the thing I think I would tell first time attendees is, go into the conference looking to have some fun, meet some wonderful people and above all, enjoy the atmosphere.

If you would like to comment on this topic or suggest another, please submit it to:

[editor@californiacentralvalleysurveyors.org](mailto:editor@californiacentralvalleysurveyors.org)

## State News

### When the Earth Quakes, *By John Stenmark, L.S.*

*Excerpts taken from the April 2012 Edition of Professional Surveyors Magazine*

The U.S. Geological Survey ([USGS](#)) reported that in 2011 we experienced more than 2,420 earthquakes of magnitude 5.0 or larger worldwide. That's 10% more than in 2010 and more than 30% higher than the average over the previous 10-year period. At the same time, global population has increasingly concentrated in urban centers, many of which are located in known hazard zones. Aging infrastructure in many urban centers increases the potential impact of any hazardous event. To mitigate the risk, scientists are using GNSS to develop an increased understanding of the motion of Earth's tectonic plates. This knowledge enables emergency managers to reduce damage and improve emergency response.

### Earthquakes in California

Over the past decade, the increasingly dense GNSS networks have enabled deeper understanding of seismic activity on the faults and plate boundaries. Researchers combine GNSS data with historical reports of past earthquakes to make calculations on stresses accumulating on the faults. From there, it's possible to develop estimates on the strength of future quakes. These estimates, often presented as seismic hazard maps, indicate the amount of surface shaking from an earthquake at various probability levels. But there is no way to predict when or where an earthquake will occur with any useful certainty. The best we can do is to understand the risk and be prepared for the unexpected. An agency in California is doing just that.

The California Emergency Management Agency ([CalEMA](#)) is tasked to enhance safety and preparedness against natural disasters. California faces threats from multiple natural sources including earthquakes, wildfires, landslides, and tsunamis. Cal EMA works closely with emergency managers, scientists, and engineers to understand risks and plan for emergency response. With hundreds of CORS providing real-time data, California is one of the most closely monitored locations on the planet.

Cal EMA program deputy Kate Long said that the seismic research helps reduce casualties and damage from earthquakes. It's no accident that Cal EMA's Earthquake and Tsunami (ET) program office is housed at the California Institute of Technology (Caltech), alongside the USGS and other seismic experts. "We need the information for planning," Long said. "If the scientists are seeing areas of significant displacement, we are interested in that."

Jim Goltz, who recently retired as ET program manager and still works at the Caltech facility, described how a group of nine scientists, called the California Earthquake Prediction Evaluation Council (CEPEC), uses the information. Any time there is anomalous seismic activity in the state, Cal EMA can consult with CEPEC to look at the data and consider the risks.

When an earthquake does strike, Cal EMA increases its reliance on GNSS data. Long and Goltz are part of the emergency mobilization center at Caltech where they see the seismic and GNSS information as soon as it is available. Their job is to translate the science into actionable data for decision makers. "The response from the geodetic network has its greatest value in the first few minutes and hours after an event," Goltz said.

During an earthquake, the largest motion may not occur along the fault. Landslides, subsidence, and liquefac-

*Continued on page 7*

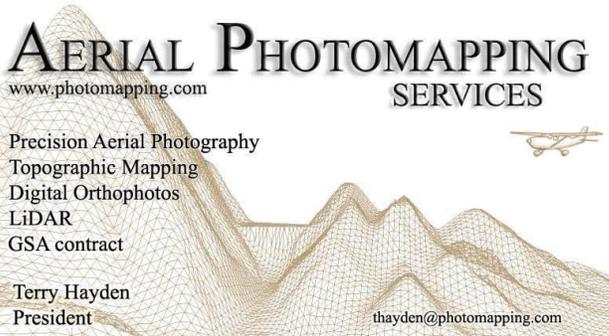


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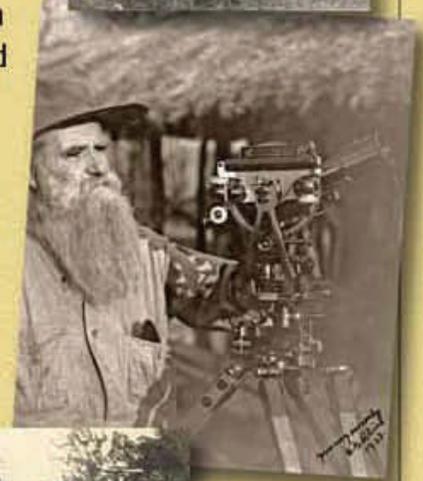
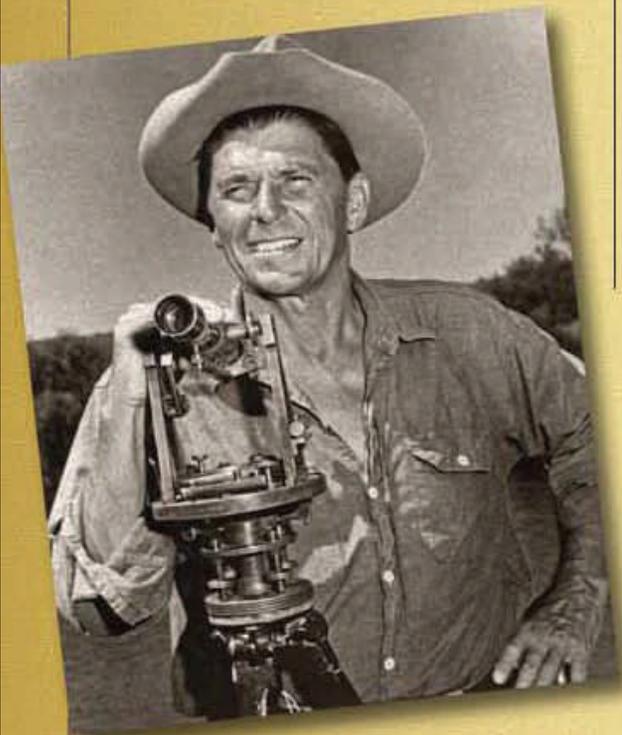
## *Land Surveying Photo Gallery*

**Unique Historic Photos Now Available for Purchase! Order Today!**



Proceeds from the sale of photos benefit California Land Surveyors Association Education Foundation (CLSA EF) and will be used to fund scholarships for land surveying students.

CLSA would like to thank Bryant Sturgess for generously donating his collection of historic images.



Order online at: [clsaphotos.smugmug.com](http://clsaphotos.smugmug.com)

# National News

## Frames for the Future

**New Datum Definitions for Modernization of the U.S. National Spatial Reference System (Part 2):**  
*By David H. Minkel and Michael L. Dennis*

### Background

Assuming funding allows the planned schedule, a new gravity geopotential-based vertical datum to replace NAVD 88 could be defined and nationally adopted by 2022 (since this is highly dependent on funding availability, the reader should consider this date somewhat tentative). This datum will reference a purely gravimetric geoid model, rather than a hybrid geoid model like GEOID09 and its precursors (this difference is discussed later). Like NAVD 88, the heights will be orthometric heights but, unlike NAVD 88, leveling data and other data on passive marks (such as gravity observations) will not be the primary observational data set used to define the datum. In fact, the role of leveling in defining the new datum has not yet been fully determined (Smith, 2011). The relationship between orthometric height, ellipsoid height, and geoid height is shown in Figure 5.

Strictly speaking, the reader should note that NAVD 88 is not purely an orthometric height system. The primary parameters, determined when NAVD 88 was first defined, were geopotential numbers determined from leveling and the nationwide NAVD 88 surface gravity model (derived from surface gravity measurements). For NAVD 88, a specific approximation to true orthometric heights, known as "Helmert orthometric heights" were computed from the geopotential numbers and the NAVD 88 surface gravity model (dynamic heights were also computed from the geopotential numbers, and required no surface gravity). Although NAVD 88 is based on geopotential numbers which can in turn be used to compute other types of heights (such as dynamic heights), it is common to equate NAVD 88 with orthometric heights, and that typical usage will be followed for the remainder of this paper.

Note: for ease of reading, for the remainder of this paper the new datums will be called the National Geometric Datum (NGD) and the National Vertical Datum (NVD). However, please note that the names of the new datums have not yet been determined.

The intent of the new NVD is to allow the conversion of ellipsoid heights--determined by GNSS observations referenced to the new NGD--to orthometric heights with an accuracy of 2 cm (at 95% confidence). This accuracy statement incorporates both the expected 2022 geoid model and GNSS-based ellipsoid height accuracies of 1-2 cm, for a total combined accuracy of approximately 2 cm for orthometric heights. To achieve this will require a geoid model accuracy approaching 1 cm, which likely will only be achievable in coastal, eastern, and mid-western portions of the United States. Expected accuracies are still being evaluated for the geoid model in the mountainous western states, Alaska, Hawaii, and U.S. possessions.

### Hybrid Geoid Models

A hybrid geoid model is a product developed by NGS in 1996 specifically designed to convert ellipsoid heights in NAD 83 to orthometric heights in NAVD 88. It differs from a gravimetric geoid in that it incorporates the systematic errors of the official datums of the United States, NAD 83 and NAVD 88. The two primary systematic errors are the lack of geocentricity of NAD 83 and the approximately one-meter "slope" of NAVD 88 across the country; both issues will be discussed later.

In short, a hybrid geoid model is constructed by taking a gravimetric geoid model and "adjusting" it to best fit the surface of orthometric heights in NAVD 88 that also have accurate NAD 83 ellipsoid heights. As shown in Figure 6, the resultant surface is the hybrid geoid model (e.g., GEOID09; see Roman, et al., 2010b). GEOID09 was created from the gravimetric geoid model USGG2009 (U.S. Gravimetric Geoid of 2009; see Roman, et al., 2010a), which was derived in part from EGM2008 (Earth Gravitational Model 2008; see Pavlis, et al., 2008). Generating the hybrid model introduces additional uncertainty on the resul-



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## Chapter News

### The First Recipients are...

Through the generosity of our members and sponsors the Central Valley Chapter was able to award the Chuck Kincaid Memorial Scholarship and through the efforts of Howard Brunner, help sponsor the Jesse Stanley Memorial Scholarship.

The recipient of the 1st Annual Jesse Stanley Memorial Scholarship was Antonio Westerlund. Antonio is a senior at California State University, Fresno. He is the President of two student clubs at Fresno State, Lambda Sigma (Geomatics Honors Society) and CLSA. Antonio is also an active member of ASPRS & ACSM Nor-CAL Section. He has been involved with the CLSA/NALS for the past 3 years, and as the President of CLSA for the past two years he was responsible for coordinating student volunteers. He is also involved with the Fresno State GME Conferences over the past 3. This year he sits as chair of speakers. Antonio is heavily involved with the promotion of the surveying profession, all while maintaining a 3.0+ GPA. Antonio will graduate this spring with a B.S. degree in Geomatics Engineering.

The 1st Annual Chuck Kincaid Memorial Scholarship was awarded to Analisa Gonzales. Ms. Gonzales was raised in Sonora, graduating from Sonora High School in 2008. She is currently a senior in the Geomatics Engineering Program, and a sophomore in standing in the Civil Engineering Program at California State University, Fresno. Analisa is an active member in the student chapter of



*Pictured Left to Right: Howard Brunner & Antonio Westerlund @ CLSA/NALS 2012 State Conference in Reno, NV*

*Continued on page 8*

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## When the Earth Quakes, *cont. from page 3*

tion can produce larger displacements than those observed along a fault line. Real-time GNSS networks can indentify the motion and deliver the data to emergency teams. That information is used to make decisions on deployment of emergency resources. For example, Cal EMA can direct reconnaissance teams to specific locations to check for damage to lifelines such as water and gas mains, roadways, and communications facilities. "In the first few hours, we need to cut through the confusion," Long said. "We need to establish ground truth in the affected areas. Then we can pinpoint and deploy resources to the most acute problems."

### A Stable Future

Both Goltz and Beavan look to an increased role of GNSS in earthquake studies and mitigation. One promising application uses GNSS to issue early warnings for tsunamis. A series of GNSS sensors along a coastline can detect an earthquake offshore, even if it isn't felt by local residents. The GNSS data can let officials issue alerts quickly after a tsunami-generating quake, giving residents valuable time to move to higher ground.

While the knowledge base of plate tectonics and seismic activity continues to grow, it remains impossible to predict when or where an earthquake will strike. "There is no certainty," Beavan said. "The best we can do is to say there is an x percent probability that a magnitude y quake will occur in a certain geographic region in the next n years." While this seems quite nebulous, it is a big improvement over years past. We can't predict earthquakes, but we can certainly be better prepared for them.

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Excerpts taken from the April 2012 Edition ([Click for Complete Article](#))*

# THE SUBDIVISION MAP ACT

*A One-Day Seminar in Several Locations*

This seminar provides guidelines for effective use of the Subdivision Map Act.

- New Legislative and Judicial developments in 2012
- Relationship of Map Act to other planning, zoning and development laws, and to CEQA
- When the Map Act applies (and when not)
- What kind of Map (tentative/final or parcel map) to use
- Certificates of Compliance, Lot Line Adjustments, Contiguity, Remainder Parcels
- Exemptions and Exceptions under the Map Act
- Life of Tentative Map
- Getting the most out of Vested Rights (incl. Vesting Maps, Development Agreements and Common Law Vesting)
- Conditions of Approval/Exactions/Dedications/Fees
- Creative mapping approaches
- Appeals/Judicial Actions

#### WHO SHOULD ATTEND?

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## Technology & Info

### What next?

By Ilse Genovese

The FCC's decision in mid-February to yank its support from LightSquared ends one of the most intense battles I have witnessed to preserve high-precision GPS. All the surveyors in our ranks and our friends in industry need to be congratulated for pursuing the issue with so much determination and passion. FCC acted rashly by putting the LightSquared project on the fast track without first conducting sufficiently rigorous scientific tests to verify that users of high-precision GPS would not be negatively impacted by LightSquared's ultrafast mobile satellite service in the L-band. The danger to our GPS has been staved off, for a time. Demand for broadband is likely to go up, not down, as more and more people turn to the airwaves with their smartphones, tablets, and "all-in-one" computers for both personal and business purposes. Communication technology is unmistakably heading towards georeferenced, wireless sharing of data and information. Once it was discovered how to locate people "in place" and track their activities on mobile devices with GPS, the GPS used by our military, the airlines, surveying, agriculture, and others became a "populist" technology, a kind of "citizen georeferencing" helping businesses and private individuals to conduct business much faster and more efficiently. LightSquared may not be viable after the major setback it has been dealt by FCC early this year, but FCC has not abandoned the idea of providing satellite-based communications. Indeed, a proposal for universal broadband coverage was unveiled in October last year. And only days after withdrawing its support for LightSquared, FCC announced the largest sale of broadband airwaves for decades. It could take many years to make broadband available to all potential users in the U.S., but all the recent actions by FCC, as well as the big wireless services providers (AT&T and Verizon), suggest that while the battle was won, the fight continues, and this time, everybody who relies on this scarce resource, the airwaves, will need to be technologically ready to share it. There is a challenge in that which I know we're more than ready to meet head-on.

*Reprinted with the permission of ACSM Bulletin, Issue February 2012 #255*

### The First Recipients are..., cont. from page 6

CLSA, Lambda Sigma (Geomatics Honors Society), Tau Beta Pi (Engineering Honors Society) and the Student Association of Geomatics Engineers (SAGE). Currently she was elected to serve as the chapter Vice President of CLSA. This year she was also Co-chair for the Geomatics Department's 51st Annual Conference. This past summer Analisa worked for the Engineering/Surveying Firm Penfield & Smith. During her time with the firm, Analisa was able to work on construction sites, draft projects and perform adjustment computations. Analisa currently has a 3.3 GPA at Cal State Fresno. She has plans to graduate in the spring of 2014 with two Bachelor degrees, in Geomatics and Civil Engineering., with the goal of sitting for both the L.S. and C.E. Exams.

Click [here](#) to see Analisa's thank you letter.

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## Frames for the Future

### New Datum Definitions ...cont from page 5

tant orthometric heights and, therefore, diminishes the accuracy and efficiency of GNSS in determining orthometric heights.

By defining a geometric datum that is truly geocentric and a vertical datum based on a purely gravimetric geoid model, the need for a hybrid model will no longer exist. The resultant GNSS-derived orthometric heights will be more accurate on a national basis with respect to mean sea level (as represented by the gravimetric geoid). One of the main reasons for this improved nationwide accuracy is that the new vertical datum will not be defined by differential leveling, and so the datum definition will not be subjected to the systematic errors that accumulate in large (continental) scale leveling. Note that this new approach requires consistent, modern, high-accuracy gravity observations along with other high-quality geospatial data (e.g. high-resolution terrain models) not available until recently. The NVD will be determined by high-resolution airborne gravity data collected across the U.S. and its possessions. Flights, to date, have been performed in Alaska, the U.S. Virgin Islands, Puerto Rico, the Great Lakes, and portions of the Gulf Coast, Texas, and California. This program is called GRAV-D (Gravity for the Redefinition of the American Vertical Datum). GRAV-D is expected to require twelve years to yield the data needed to completely redefine the U.S. vertical datum. More information on the GRAV-D project is provided in NGS (2007) and at [www.geodesy.noaa.gov/grav-d](http://www.geodesy.noaa.gov/grav-d).

In the meantime, NGS expects to continue to define hybrid geoid models on an as-needed cycle until NVD is defined and adopted. Note that NVD will not be released until a complete (full U.S. coverage) system is defined. Therefore, the continued acquisition of GNSS observations on leveled NAVD 88 bench marks, resulting in so-called GPSBMs (Global Positioning System Bench Marks) is encouraged, especially in areas with sparse distribution of GPSBMs. Additional GPSBMs will improve the reliability of subsequent hybrid geoid models, thereby providing more accurate conversion of NAD 83 ellipsoid heights to NAVD 88 orthometric heights.

## Classifieds

### Project Surveyor

O'Dell Engineering is currently seeking a Project Surveyor to join their our staff. Our firm, which serves municipal and development clients, seeks the services of an energetic and creative individual to become a member of an outstanding multi-discipline design firm.

The applicant must demonstrate a strong knowledge of land surveying principals and practice, possess strong organizational skills, and strong verbal and written communication skills. AutoCAD proficiency is required. Duties include preparation of maps, legal descriptions, exhibits, boundary resolution, research, and close interaction with field crews and clients. A minimum of 3 years' experience in land surveying and possession of an L.S.I.T. is required, P.L.S. is preferred.

Salary for the position is based on education, knowledge, skills, attitude and experience.

Please download an [application](#) and email to: [careers@odellengineering.com](mailto:careers@odellengineering.com)

### Designer/Drafter

DeLaMare-Fultz Engineering & Surveying is looking for a Designer/Drafter; Preferably with an Associates Degree or higher in Surveying/Engineering with three or more years of experience and the ability to operate AutoCAD software/Civil 3D with effective drafting presentation skills.

Please forward resume to [dfengineering@dfengineering.com](mailto:dfengineering@dfengineering.com)

### Forest Service Seasonal Hiring Outreach

The USDA Forest Service Intermountain Region's Boundary and Title Management Program is currently advertising temporary seasonal (three to six month) employment opportunities for the 2012 field season throughout the region. The openings include Surveying Aids, Surveying Technicians, and Lead Surveying Technicians. Please review the [attachment](#) for specifics and how to apply.

**Have equipment to sell? Looking for a great deal? Check out the [CLSA Forums!](#)**



### Picture of the Issue

#### Verdi East Base - Verdi, Nevada

Established:	1872 (USCGS)
Re-established	2011 (NALS/CLSA)
Location:	Verdi, NV near the 120th Meridian
Description:	This granite column once marked the eastern terminus of a trigonometric base line originally measured in the summer of 1872 by English-born surveyor George Davidson. Working for the U.S. Coast Survey, Davidson established numerous survey stations in the area north and west of this site to determine the 120th Meridian, the boundary between Nevada and California. From Verdi East Base the surveyors had a connection with the railroad telegraph which provided accurate time for determination of longitude. The original 1872 instrument pier was later destroyed and this column was set in its place in 1897. Davidson's work provided the basis for the resurvey of the state line which began later in 1872 by A. W. von Schmidt.

If you have a historic or interesting photo you would like to see in a future edition of The Prism, please submit to: [editor@californiacentralvalleysurveyors.org](mailto:editor@californiacentralvalleysurveyors.org)

## Puzzle Page

### A Little Survey Humor

My job as a land surveyor took me to a golf course that was expanding from 9 holes to 18 holes.

Using a machete to clear thick brush in an area I was mapping, I came upon a golf club that an irate player must have tossed away. It was in good condition, so I picked it up and continued on.

When I broke out of the brush onto a putting green, two golfers stared at me in awe. I had a machete in one hand, a golf club in the other, and behind me was a clear-cut swath leading out of the woods.

"There," said one of the golfers, "is a guy who hates to lose his ball!"

Government surveyors came to Ole's farm in the fall and asked if they could do some surveying.

Ole agreed and Lena even served them a nice meal at noon time.

The next spring, the two surveyors stopped by and told Ole, "Because you were so kind to us, we wanted to give you this bad news in person instead of by letter.

Ole replied, "What's the bad news?"

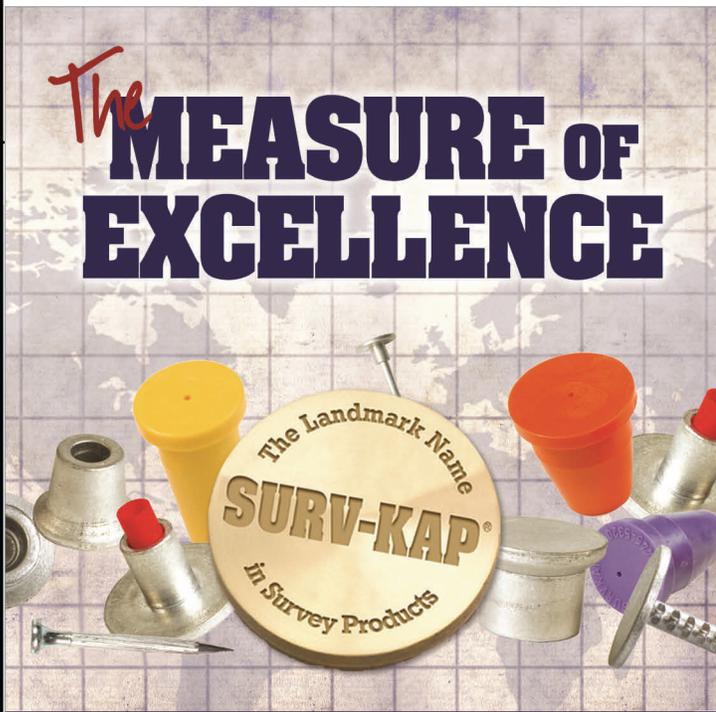
The surveyors stated, "Well, after our work we discovered your farm is not in Iowa, but is actually in South Dakota!"

Ole looked at Lena and said, "That's the best news I have heard in a long time, why I just told Lena this morning, I don't think I can take another winter in Iowa."

On a dam rehab project three or four lifetimes ago, I worked with an old surveyor who said as long as he had just one lath left, he could never get lost. All he had to do was drive the lath into the ground and wait. Within half an hour, an equipment operator would come along and run over it.

### The Solution to March's Puzzle:

9	2	6	8	7	5	3	4	1
5	4	7	1	2	3	9	6	8
1	3	8	9	6	4	2	5	7
8	6	4	3	1	9	5	7	2
7	5	3	4	8	2	6	1	9
2	9	1	7	5	6	4	8	3
3	7	9	6	4	1	8	2	5
4	8	5	2	9	7	1	3	6
6	1	2	5	3	8	7	9	4



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