Central Valley Chapter - California Land Surveyors Association
www.californiacentralvalleysurveyors.org

Central Valley Chapter THE PRISM

Volume 3, Issue 5 September 2013

2013 Chapter Officers

President: Bill Koch
Vice President: Kevin Genasci
Secretary: Rich Brown
Treasurer: Bill Jones
Chapter Rep: Keith Spencer
Chapter Rep: Landon Blake
Alt. Chapter Rep: Mike Turnrose
Alt. Chapter Rep: Bill Koch

2013 Chapter Committees

By-Laws Committee:
Keith Spencer
Construction Committee:
Landon Blake (Chairman)
Education Committee:
Kevin Genasci (Chairman)
Membership Committee:
Keith Spencer (Chairman)
Monument Preservation Committee:
Mike Quartaroli (Chairman)
Newsletter:
Rich Brown (Editor)
Professional Practices Committee:
Josh Elson (Chairman)
San Joaquin County Liaison Committee:
Kevin Genasci (Chairman)
Stanislaus County Liaison Committee:
Rich Fultz (Chairman)
Website Committee:
Keith Spencer (Web Master)

2013 Chapter Programs

Boy Scout Merit Badge:
Scott DeLaMare (Coordinator)
TrigStar:
Bill Koch (Coordinator)
Workshops:
Chris Martin (Coordinator)

Table of Contents

Up Coming Meetings!

Date: September 25, 2013
Time: 6:30 p.m.
Location: Bel Piatto Cucina Italiana @ 1000 Kansas Avenue, Modesto
Speaker: Evan Page, PLS - State Lands Commission
Topic: Role, History, & Records of the State Lands Commission

---

Date: October 23, 2013
Time: 6:30 p.m.
Location: Perko's @ 901 North Carpenter Road, Modesto
Speaker: David E. Woolley, PLS - D. Woolley & Associates, Inc.
Topic: Survey Contracts, Part 2

Announcements

Upcoming October Exam Schedule

FS Exam	October 26, 2013
PS Exam	October 25, 2013
State LS	October 28, 2013

City of Modesto announces new LLA Submittal Requirements

As of July 11, 2013, the City of Modesto has updated their requirements for submitting a Lot Line Adjustment. The submittal requirements are available on the City's website at **http://modestogov.com/ced/forms/planning.asp**

David E. Woolley is coming to Modesto in October

The Central Valley Chapter of CLSA presents David E. Woolley, October 23rd, in Modesto. Mr. Woolley will be speaking on 3 topics in two 1/2 day seminars.
Morning Session - Land Surveyor Liability
Afternoon Session - Land Surveying Ethics/The Future of Land Surveying
More **information and Registration** is available on the Chapter Web Site.

NCEES Exam Site Changed

NCEES has changed the location of the October NCEES exams that were previously scheduled to be administered in San Mateo to:

Alameda County Fairgrounds
4501 Pleasanton Avenue
Pleasanton, CA 94566

This location will be on candidates' Exam Authorization. NCEES will email instruction on downloading and printing Exam Authorization notices 2-3 weeks prior to the exam dates.

Central Valley Chapter of CLSA Presents:

David E. Woolley, PLS
October 23, 2013
1010 10th Street, B300
Modesto, CA

Topics: Morning Session—Land Surveyor Liability
Afternoon Session - Land Surveying Ethics/The Future of Land Surveying

Classes, training, and continuing education

CAD Masters — AutoCAD Level I (3-Day Course)
October 15-17, 2013, Sacramento
October 28-30, 2013, Walnut Creek
November 12-14, 2013, Sacramento
December 2-4, 2013, Fremont
December 9-11, 2013, Walnut Creek
December 9-11, 2013, Sacramento **Register here**

CAD Masters — AutoCAD Level II (2-Day Course)
October 28-29, 2013, Sacramento
November 5-6, 2013, Walnut Creek
December 12-13, 2013, Sacramento
December 19-20, 2013, Fremont **Register here**

CAD Masters — AutoCAD Level III
November 15, 2013, Walnut Creek **Register here**

CAD Masters — Civil 3D for Surveyors (2-Day Course)
November 25-26, 2013, Sacramento **Register here**

Central Valley CLSA — Presents David Woolley
Land Surveyor Liability
Land Surveying Ethics/The Future of Land Surveying
October 23, 2013, Modesto **Register Here**

State CLSA — Processing static GPS Networks w/CORS and PBO Data
September 18, 2013, Webinar **Register Here**

State CLSA — Copyright Law for Surveyors & Engineers
November 15, 2013, Webinar **Register Here**

CLSA-NALS Conference 2014 **Registration Opening Soon**
April 12-16, 2014, San Diego, CA

If you have information about a training or class, please submit to: **editor@californiacentralvalleysurveyors.org**

Thoughts from the Editor

Wondering Thoughts...

In every edition of our newsletter, I put down my thoughts on the current HOT Topics, what's in the news or what is going on in the Valley. Most of the time, this is pretty easy for me. There is usually something to say about something. I am finding that on this particular night, that is not the case. Right now, I feel like Dug from the Disney movie "SQUIRREL!!!".

Now, where was I? So much going through my head right now, just none of it seems to be working together. How secure is my job? Are the cars going to keep running? How are we financially? Does my daughter have everything she needs for high school? Am I going to be able to keep up with my 3 year old? SQUIRREL!!!!

Where was I? You know what? I don't think it matters. I think that if you worry about everything, then nothing will make you happy. I think that there should be only 3 things that high on your plate. GOD, Family and Country! In that order. You stick to that and the rest will work themselves out. Till next time, enjoy life while you can.

If you would like to comment on this topic or suggest another, please submit it to:
editor@californiacentralvalleysurveyors.org

National News

A New Datum

Written by Dave Doyle

In 2008, the NGS released the publication of a ten-year operating plan that, among other things, called for efforts to replace NAD 83 and NAVD 88, the official horizontal and vertical geodetic datums of the United States. (Note that in addition to NAVD 88, the proposed plan would replace the official vertical datums of the various United States island areas of Hawaii, American Samoa, Guam, Northern Marianas, Puerto Rico, and the U.S. Virgin Islands.) This and a following article will examine the rationale behind these planned changes and the potential impact on horizontal positions, ellipsoid, and orthometric heights across the country. (See the sidebar on page 15 for the full names of all acronyms in this story, in their order of appearance.)

Leading to NAD 83

Since at least the mid-1960s, the USC&GS, renamed NGS in 1970, has been playing catch-up to developments in electronic measurement and positioning technology. The introduction of a cheap, easy-to-use EDMI by Hewlett Packard, the HP 3800, in 1971 finally put EDMI technology in the hands of many surveyors. Although EDMIs had been around since the late 1950s, they had generally been quite large and expensive, requiring specially trained operators, and were not useful for the needs of the average land surveyor. The HP 3800 dramatically changed all that. The modest cost and ease of operation of this instrument meant that for the first time local surveyors were able to perform distance measurements that were on par with those that could previously have been feasible only for surveys performed by federal geodetic surveying agencies such as USC&GS/NGS, the USGS, and the various Department of Defense, Army, and Air Force surveys. Significant advancements in electronic computing technology also allowed private surveyors to discover distortions in positions related to NAD 27. In addition, island areas of the United States such as Hawaii, American Samoa, Guam, Northern Marianas, Puerto Rico, and the U.S. Virgin Islands were defined by their own local horizontal datums that were not connected to NAD 27. Responding to these changes and to the nearly simultaneous development of the U.S. Navy's Transit Doppler space-based positioning system ultimately led NGS to collaborate with the federal geodetic survey agencies of Canada and Mexico to undertake the development of a replacement datum, NAD 83.

This effort, which required nearly 10 years of intensive programming and data automation and hundreds of employee-years of technical support, led to several significant firsts. When it was finally released in mid-1986, NAD 83 was the first civilian horizontal datum anywhere to have the origin of the coordinate system defined as close to Earth geocenter as the technology would allow, rather than as a specific survey mark in the middle of a field somewhere. In addition, it was the first horizontal datum to use the recently adopted (1979) international standard ellipsoid GRS80, which was best fitting globally, as compared to the previously used Clarke 1866, which was best fitting just for North America.

NAD 83 was the first geodetic datum to have all of its supporting observations (directions, distances, astronomic azimuths, etc.) fully translated from the original paper records to digital form—approximately 1.8 million individual observations from the 19th and 20th centuries. Some of the nearly 250,000 stations within the United States extended their legacy to the original 1816-1817 New York City survey performed by the Survey of the Coast under the direction of the organization's first superintendent Ferdinand Hassler, and that was just the portion for the United States.

It was also the first geodetic datum to have the data maintained in an electronic database and the first to be publically available over the Web (although that came years later). By incorporating observations from the Transit Doppler system and VLBI network, it was also the first to incorporate space-based observations.

Two important decisions made by NGS really stand out: the location of the origin of coordinates at Earth geocenter and the adoption of the GRS80 reference ellipsoid. No one at NGS in the late 1970s or early 1980s could fully

Continued on next page

A New Datum, *cont. from page 3*

appreciate how quickly and dramatically the recently launched NAVSTAR GPS would impact geodetic surveying efforts. What the NAD 83 team did know was that the future for positioning would be space-based and that the origin of the national coordinate system should, to the extent possible and practical, be directly coincidental with the Earth's center of mass about which all satellites orbit.

Given the technologies of the time, the location of Earth geocenter was known to approximately 2 meters, an amazing technological feat at the time. Today, with the multitude of advances in GPS and other positioning technologies, the location of Earth geocenter is known to approximately 2-4 cm.

Challenges to NAD 83

Almost from the day NGS released the initial NAD 83 positions, now referenced as NAD 83 (1986), they were again forced to play technological catch-up. This time the cause was the rapid development of GPS. Having conducted the first operational GPS project in 1983, NGS soon abandoned classical triangulation as the primary means to establish horizontal geodetic control. In short order NGS and a few private companies that owned the original Macrometer V-1000 GPS receivers (costing approximately $250,000 each!) (**Figure 1**) noticed that there was residual distortion of slightly less than 1 m remaining in the original NAD 83 coordinates on a regional level.

This time NGS was faced with not just a readjustment of the original triangulation but the need to completely resurvey the country with GPS, because the technology exhibited a level of precision of measurement that far exceeded that which had been, and could be, generally accomplished by classical triangulation and traverse methods.

Beginning in 1989, NGS designed and conducted a nationwide survey effort commonly referred to as HPGN and/or HARN, working in partnership with state departments of transportation, other federal surveying and mapping agencies, and occasionally private surveyors who volunteered personnel and GPS equipment. Between 1989 and 1997, when the last HARN survey was completed, several major advancements in GPS technology and surveying methodology had occurred. These included:

- less expensive, easier-to-use hardware and processing software,
- significant improvements in computing the orbits of the satellites,
- a better understanding of the characteristics of the antenna electronic phase centers,
- development of networks of CORS, and
- methods to improve the vertical component.

By the time the last HARN (Indiana) was completed in 1997, it was already realized that these developments had been significant enough to warrant a second (and final) national resurvey, this time to focus on the improvement of the ellipsoid height component. This new effort was referred to as the FBN/CBN program and was completed in 2004. (For a variety of reasons, Alaska and Hawaii were not included in the resurvey.)

Subsequent to the completion of the FBN/CBN, NGS consolidated all the GPS data that had been submitted over the previous 21 years into a national adjustment that, when completed, was designated as the NAD 83 (2007). This was superseded in 2012 by the NAD 83 (2011), which is the current realization of NAD 83 and was necessitated by the completion by NGS in 2011 of the Multi-Year Solution of the CORS network.

The result of all of these efforts improved the horizontal component of the NSRS to approximately 1-3 cm for passive marks tied to the CORS. Given the accuracy of the reference frame, density of control stations (both CORS and passive marks), and access to the datum with tools such as OPUS, NAD 83 currently meets the needs of virtually all practical surveying, mapping, and charting applications. Note that all the improvements do not change the fact that the official datum is still the same.

Click for Complete Article

Reprinted with the permission of Professional Surveyor Magazine — Vol. 33, No. 8

State News

Surveying the Southern California Coast, Pt. 1

Retracing the Thirty-Ninth Parallel...

By Jay Satalich, P.S.

During 2011, the California Department of Transportation (Caltrans) District 7 in Los Angeles completed several GNSS densification surveys to upgrade the geodetic control system in Los Angeles and Ventura Counties, along with nearby surrounding areas. These surveys are a part of the regional transportation program to support ongoing project delivery throughout District 7. During these surveys, the District also sought to perpetuate the positions of the oldest triangulation stations in the region.

This article is a brief history of four historic triangulation stations established in the 1800s and occupied by Caltrans during the 2011 densification surveys. Two of the stations (CONEJO RESET and SANTA CLARA) are located in Ventura County while the others (SAN JUAN and LOS ANGELES SE BASE) are located in the County of Orange. All four control stations played an important role during the `Thirty-Ninth Parallel to United States-Mexico Boundary Arc' of primary triangulation. Completed during the late 1800s, this arc of triangulation was the primary horizontal control survey that connected most of California to the United States until the end of the classical era of geodetic surveying.

CONEJO RESET (NGS PID EW7504)

First established in 1857 by Mr. William E. Greenwell of the United States Coast Survey (USCS) shortly after California statehood, CONEJO RESET was first positioned during the earliest triangulation surveys completed by the Federal government in California. This triangulation station was established to support coastal charting and navigation in southern California during the mid-1800s and was part of a local system, the Channel Islands Datum, which pre-dates any national horizontal control system in California. Although CONEJO RESET was initially used for the network of coastal triangulation, it later became a supplemental triangulation station supporting the primary arc of triangulation along the California coast.

Conejo is the Spanish word for "rabbit" and hikers in the hills surrounding this triangulation station can still see rabbits hopping along these hillsides during springtime. Caltrans District 7 occupied CONEJO RESET during a previous GNSS survey in 1991, so it was a familiar station.

CONEJO RESET is located in the community of Newbury Park, just north of U.S. Highway 101. Although this station has been in continuous existence since 1857, there have been three different station marks over the years, along with numerous reference marks. CONEJO RESET was the first geodetic station established by the USCS in the County of Ventura and is quite possibly the oldest geodetic station in continuous existence located in southern California.

The original station mark set by Assistant Greenwell in 1857 was a "... granite slab, 5 inches square sunk into the ground. Top of stone was marked with two intersecting lines and letters U.S.C.S. Four live oak stubs, 6 inches in diameter, with nails in center were driven into the ground. Those to the north, south, and east were distant 4 feet 5 inches. And one to the west, 3 feet 10 inches."

In 1948, Mr. C.L. Pitt, a surveyor from the U.S. Geological Survey (USGS), recovered the station mark set by Greenwell in 1857. Pitt observed that the "... original station mark was a piece of granite buried in the ground and found in poor condition. The piece of granite was removed and replaced with standard tablet by C.L. Pitt, 1948." Pitt tells us that he set a "... standard tablet stamped `CONEJO 1948' set in solid rock buried in the ground." Pitt also admitted that he stamped the mark in error and that the monument should have been stamped "CONEJO 1857 1948", the standard naming convention used in geodetic surveying when remarking a horizontal control station located in the same position.

No mention was made by Pitt of the live oak stubs set by Greenwell in 1857. Pitt also set reference marks 1 and 2 at that time. It does not appear that USGS formally notified the U.S. Coast and Geodetic Survey (USC&GS) that the original station mark was replaced by that agency in 1948.

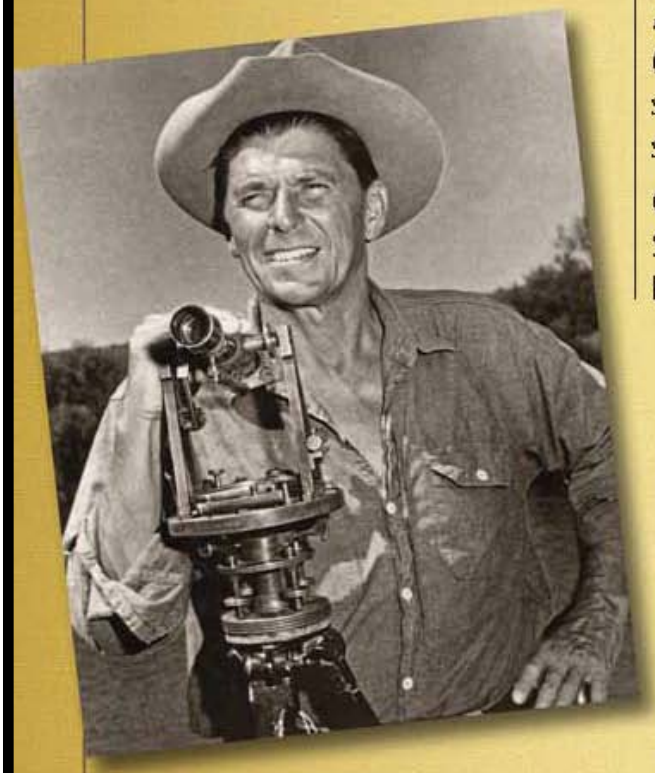
Click for Complete Article

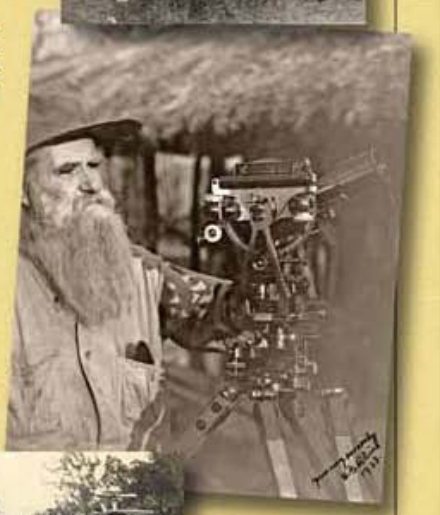
Reprinted with the permission of American Surveyor Magazine — Vol. 10, No. 7

CLSA EDUCATION FOUNDATION

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

It's In There

Black's Law Dictionary

Easement
A legal of equitable right acquired by the owner of one piece of land (the *dominant estate*) to use another's land (the *servient estate*) for a special purpose, such as to drive through it to reach a road; unlike a lease of license, an easement lasts forever, but it does not give the owner a right to sell or improve the land.

Dominant Estate
An estate benefiting from an easement.—Also termed *dominant tenement*

Servient Estate
An estate burdened by an easement.—Also termed *servient tenement*

Prescriptive Easement
An easement created from an open, adverse, and continuous use over a statutory period.—Also termed *easement by prescription; adverse easement*

If there is a section in the Professional Land Surveyors Act or Subdivision Map Act that you would like to have discussed or you have a comment on, please send your request to:

editor@californiacentralvalleysurveyors.org

CAD Tips & Tweaks

Design of the SurveyLISP Route Alignment Manager: Part 1

By Landon Blake, PLS

Introduction

In this installment of CAD Tips and Tweaks we are going to take a break from coding to do some software planning. In the next several articles in CAD Tips and Tweaks we will be attempting to build a route alignment manager in AutoLISP. Our route manager software will be called the "SurveyLISP Route Manager". (This route alignment manager will be somewhat similar to the one included with Autodesk Civil 3D, but some different functionality. It will also run in any CAD program that will execute AutoLISP scripts.) In this article we will discuss following:

1. The goals for our route alignment manager.
2. Software design factors that we will want to consider in the design of our AutoLISP program.

Goals for the SurveyLISP Route Manager

To begin the software planning process we want to define some basic goals for our program. This will help us start to sketch out the program design. The goals will eventually guide our implementation of the program in AutoLISP code.

We'd like our SurveyLISP Route Manager to allow the CAD user to complete the following tasks:

1. Define route alignments from CAD geometry.
2. Create CAD geometry (points and lines) from station/offset pairs.
3. Determine the station/offset pairs from CAD geometry.

The goals are simple. We can add additional capabilities to our program in the future, like the ability to relate to route profiles and cross-sections. However, I find it best to start the software design process with simple and readily achievable goals for the program being designed.

Software Design Factors

There are many different software design factors that can be considered in the development of a program. We are just going to consider the following four (4) design principles in our design and implementation of the SurveyLISP Route Manager:

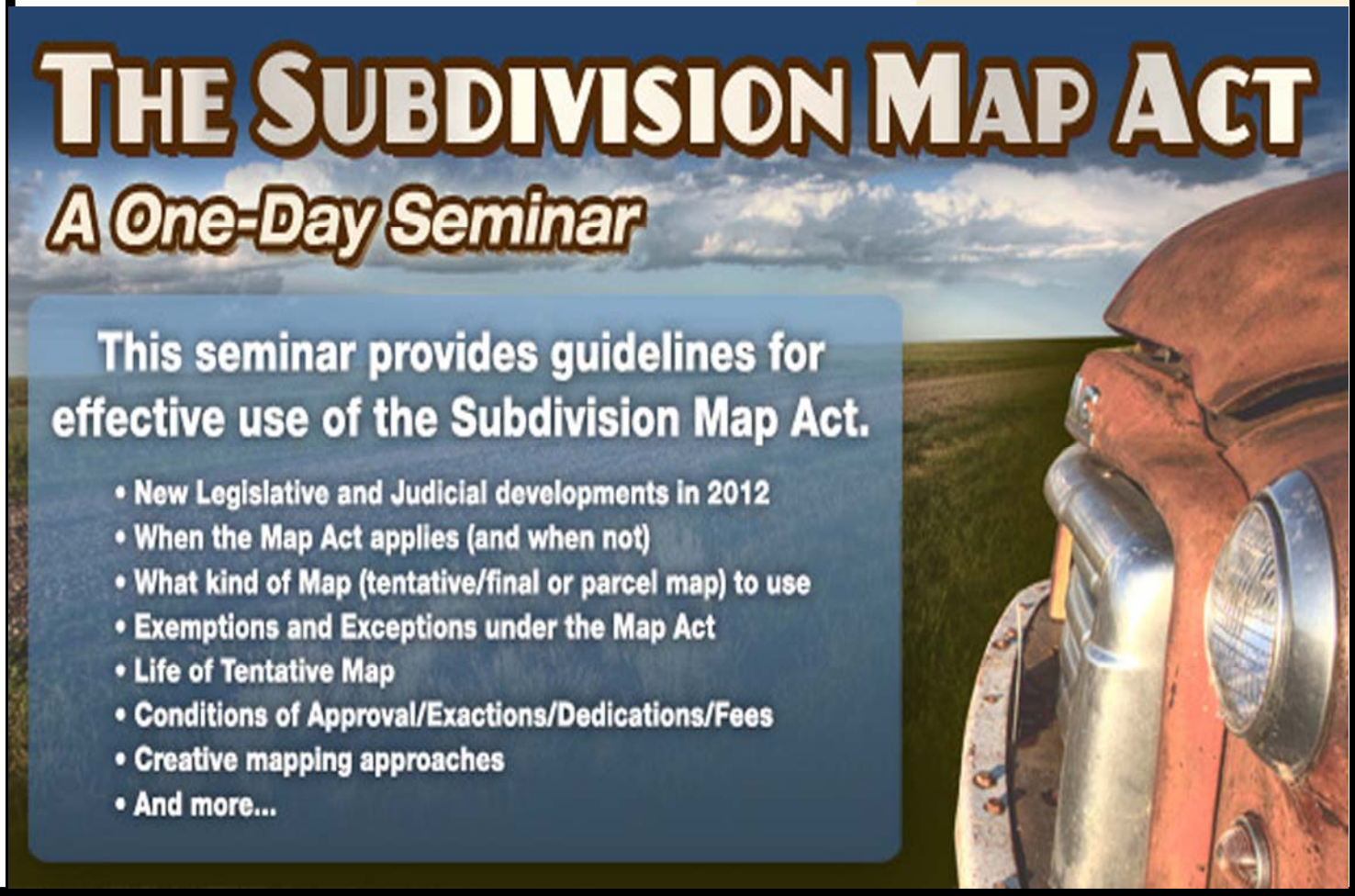
1. Memory Footprint: We want to consider how our program will consume RAM or random access memory in the computer running the host CAD software. This means we will need to think about how much data we store in AutoLISP memory versus data we store in simple text files on disk.
2. Data Transfer/Interoperability: It always stinks when you can easily share your data with other professionals, or when you can move data between software used by your own organization or even on your own computer. We will want to think about how we store and transfer our route alignment data. We want to do this in a way that makes it easy for other programmers and professionals to use and edit our data.
3. Ease of Extension: We will want to make sure that our design can be easily extended. For example: We will want to allow other programmers to add functions that can work with our route alignment data and to even extend the data associated with a route.
4. Ease of Use: We want to make sure our route manager is easy to use. This means we will need to think about: A) How we can provide standard graphical user interfaces for the route alignment manager tools. B) What our typical user workflows might look like. C) How we will integrate our toolkit into our CAD program.

Sneak Peak

In our next installment of CAD Tips and Tweaks we will take a look at a couple principles of functional program design (AutoLISP is a functional programming language) and we will examine some of the major data structures we will need in our route alignment manager program.

Just For Laughs

I would like to thank Chase Perryman and Out-Of-Plumb.com for approving the use of his art work.



Classifieds

Field/Office Survey Tech Position Available

Looking to fill Survey Tech position at small Land Surveying Office in Fresno, CA. Position comes with full time work (possible overtime) and full benefits after a standard waiting period.
Pay is based on experience level.

Required Qualifications:
- 2 years of survey experience required
- 1-2 years AutoCAD Civil 3D Experience
- Must be willing to join Local 3 Union

Not Required - "preferred":
- LS or LSIT

Please contact Aundrea Tirapelle at: **atirapelle@guidasurveying.com**

Multiple Positions Available for Surveyors

O'Dell Engineering has positions available in their Modesto and Pleasanton offices.

Project Surveyor - Duties include preparation of maps, legal descriptions, exhibits, boundary resolution, research, and close interaction with field crews, engineering team members, and clients. A minimum of 3 years' experience in land surveying is required, professional registration preferred. 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.

Party Chief - Duties include construction staking, boundary surveying, and topographic surveying. A minimum of 2 years' experience as a Party Chief is required. Projects include very large scale municipal projects (High Speed Rail), large scale master planned land development projects, 3D laser scanning, high precision monitoring, on-call surveying for municipalities, and small residential and commercial developments.

Assistant Surveyor - You will work directly under the supervision of a Licensed Surveyor. Duties include preparation of maps, legal descriptions, exhibits, research, and close interaction with field crews and engineering team members. The applicant must demonstrate knowledge of basic land surveying principals and practice, possess strong organizational skills, and strong verbal and written communication skills. AutoCAD proficiency is required.

Salary for the position is commensurate with qualifications. Positions may be staffed from either the Pleasanton or Modesto office. Please download an application and email to: **careers@odellengineering.com**

Have equipment to sell? Looking for a great deal? Check out the CLSA Forums!

Pictures of the Issue

NGS Benchmark S1125, Del Puerto Canyon Road

Stanislaus County relocating NGS Benchmark S1125 due to removal of cattleguard

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**

CALIFORNIA LAND SURVEYORS ASSOCIATION
CENTRAL VALLEY CHAPTER

C/O Stanislaus County Public Works
1716 Morgan Road
Modesto, CA 95358

SUSTAINING MEMBERS

Keith W. Spencer, L.S. 6406

CORPORATE MEMBERS