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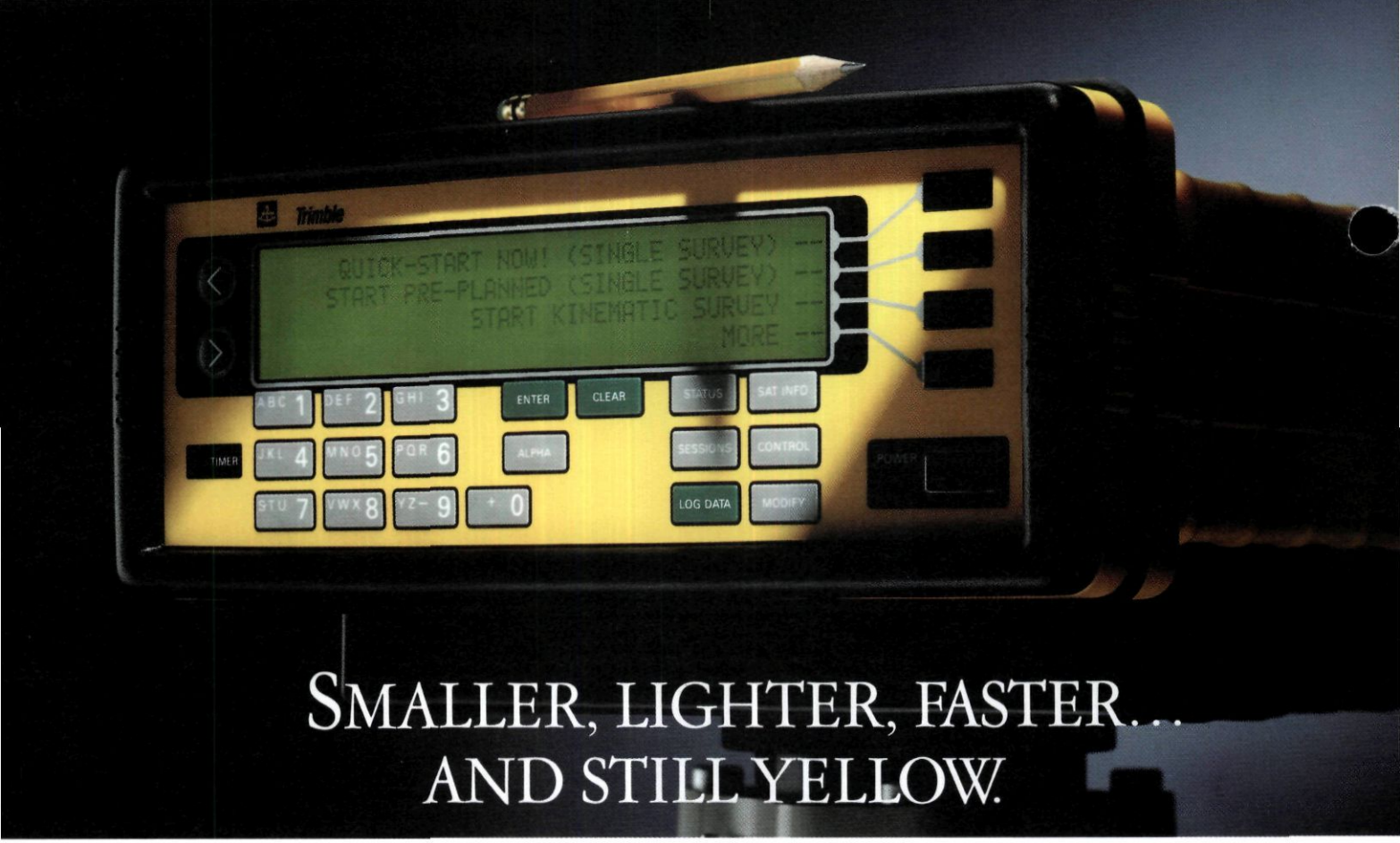
The California Surveyor

No. 98 The Voice of the Land Surveyors of California FALL 1992

ADVANCED TECHNOLOGIES ISSUE

Lot Line Adjustments Legal Battles

A Guide to Safe Contracting



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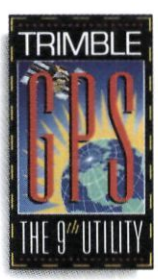

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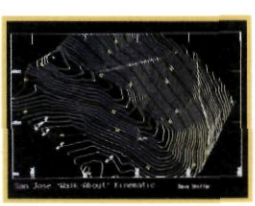

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The California Surveyor

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

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

"The purpose of this organization is to promote the common good and welfare of its members in their activities in the profession 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 the Land Surveyors and their work."

PERSONNEL

OWNER
California Land Surveyors Association, Inc.
CENTRAL OFFICE
P.O. Box 9098, Santa Rosa, CA 95405-9990
EDITOR
Thomas B. Mastin, P.L.S.
ASSISTANT EDITORS
Michael McGee, P.L.S. - Linda Richardson, L.S.I.T.

ADVERTISING

Commercial advertising is accepted by The California Surveyor. Advertising rates and information can be obtained by contacting CLSA Central Office, P.O. Box 9098, Santa Rosa, CA 95405, (707) 578-6016, Fax (707) 578-4406. Circulation: 4,800.

SUSTAINING MEMBERSHIP

Membership in the California Land Surveyors Association, Inc. as a sustaining member is open to any individual, company, or corporation who, by their interest in the land surveying profession, is desirous of supporting the purposes and objectives of this association. For information regarding sustaining membership, contact CLSA Central Office, P.O. Box 9098, Santa Rosa, CA 95405, (707) 578-6016, Fax (707) 578-4406.

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 submitted on floppy diskette medium is encouraged. For compatibility, disks should be 5.25 or 3.5 inch, MSDOS (IBM compatible) format. We can accept ASCII text files or word processor files from the following programs: WordPerfect, Microsoft Word, Windows Write, Multimate, DCA (Displaywrite 111 and IV), Wordstar, Xerox Writer, and Xywrite.

EDITOR'S ADDRESS

Thomas B. Mastin, P.L.S. • The California Surveyor
4115 Broad Street, San Luis Obispo, CA 93401

DEADLINE DATES

Winter.....October 10, 1992 Summer.....April 10, 1993
Spring.....January 10, 1993 Fall.....July 10, 1993

COVER PHOTO:

A GPS Antenna and receiver continually monitor satellite transmissions with the snow capped Mt. Shasta keeping an eye on things in the background. PHOTO BY: Michael McGee

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

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CORRECTION

Last issue we forgot to credit the Cover photo. The credit was *David Paul Johnson, PLS; GPS Project Surveyor for Greiner, Inc. surveys against the backdrop of the Long Beach skyline. Photo by Sam Snow.* We regret any inconvenience this omission has caused. Many of you know David Paul Johnson, PLS from the excellent GPS seminar he gave at the Sparks conference in March of 1992.

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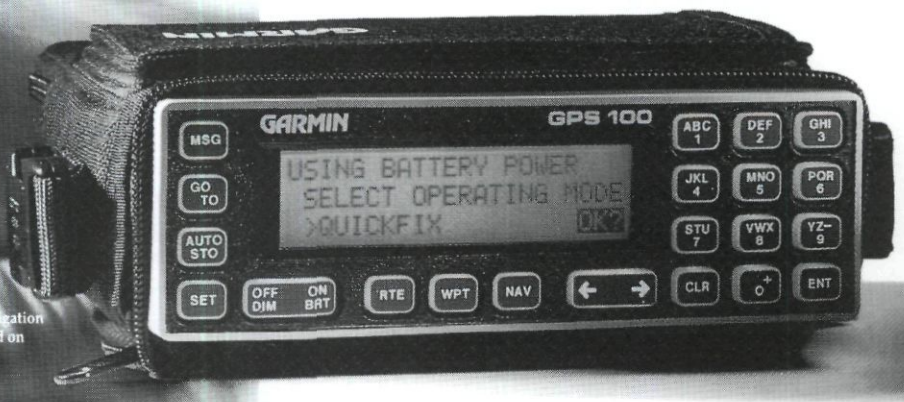

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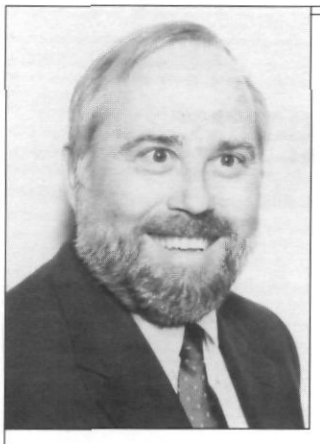


PRESIDENT'S MESSAGE

By LeRoy C. "Lee" Hennes, PLS

This issue of the Cal Surveyor will feature several articles on advanced technologies. Our profession has come a long way. In recent times we have seen more advancement in the way we do our craft than in all the time since those early Babylonian surveyors set their first boundary stones. When many of us started our careers, we used an open-faced transit and a steel tape to make measurements and did our calculations by hand using logarithmic trig tables. We felt that we understood what we were measuring, how the tools that we used functioned, and the nature of our calculations. Today we measure distance indirectly with an EDM, spanning miles by measuring the travel time of light waves and our calculations are done within computer microchips, whose inner workings are unseen and mysterious. Our measurements and computations are assumed correct more as an act of faith than an observation of physical reality.

These changes probably started in 1959 when Coordinate Geometry (COGO) was devised by Dr. Charles Miller at M.I.T. as a systematic way of doing roadway design computations on a relatively new gadget called an electronic computer. His COGO program ran on an IBM 1620 mainframe, a machine that filled a room and could store 99 points within its 8000 bytes of memory. Today's handheld calculator can greatly outperform that first machine. Computers took the drudgery out of computation and measurement, but somewhere along the way some of us lost our ability to understand the meaning of the results so easily produce. We now get answers to 14 decimal places, assume their indisputable accuracy, and proceed to call the 2-inch iron pipe set by another surveyor as being 1\100 of a foot out of position.

When we chained in the position of a pipe by hand, we "felt" the measurement and when it was close to the recorded distance, common sense prevailed and the position of the monument was accepted. In the computer age, we can no longer "feel" our measurements. With the relative ease of calculations, we tend to compute before thinking. Decisions that were once intuitive must now be based upon error theory and statistics, academic subjects not included in our out-dated apprenticeship system of training surveyors. We now seem to teach only how to push the buttons and not how to professionally evaluate results.

In the nineteenth century it was thought that any town that wanted to be of consequence had to have a blacksmith. He designed, built, and repaired all the gadgets the people needed. A blacksmith was an integral and respected member of the community. Times changed and so has technology. The "Village Smithy" has vanished. He was replaced by machines he did not understand, technologies that made him irrelevant.

Ever more imposing technologies are within the grasp of surveyors like Land Information Systems and the Global Positioning System.

These technologies are being developed by other professions. We, as surveyors, should be taking the lead, but we as a group lack the necessary scientific training. Our collective stubbornness and pride will not permit us to accept that a college level education is needed if we are to provide leaders who can develop new technologies and practitioners who can advise others on their use. Sure, we can learn to push the buttons, but that is really the role of a technician, not a professional. We should not be relying on others to define our future.

In order for us to define the buttons to be pushed, we must, like many other states, redefine ourselves as a truly learned profession and embrace the necessity of a college level education to give us a good foundation and continued professional development to update our skills. Surveyors should not be the blacksmiths of this century. We should not allow our tools to replace us. After all, you could think of the first mechanical engineer as being a blacksmith with vision. Will we have the collective vision and will to remold our profession?

"Surveyors should not be the blacksmiths of this century. We should not allow our tools to replace us."

LETTERS TO THE EDITOR

◆ LS EXAM BLUES

Imagine this. You want to become a Licensed Professional Surveyor. You don't pass the exam the first time you take it so you start to study again. You fork out the $175 examination fee (just before Christmas) again and wait for your notice of acceptance.

The notice finally arrives. You are to report to FRESNO; 150 miles from home! Okay, you can deal with this. You arrange a place to stay in Fresno the night before the exam. You say goodbye to your wife and kids and hit the road.

After arriving in Fresno you receive a telephone call that has tracked you all over the state. It seems that it took the State Board of Registration until the night before the exam to find out and notify you that you did indeed pass the exam last year due to a regrading of the exams.

This did not happen to me. It happened to my coworker, Keith McMillan (LS 6729). He was so happy that evening to be able to have dinner with me and several other suffering examinees and then go home! Now that the euphoria has worn off I'm sure he's starting to wonder why it took until the very last moment to stay his execu... I mean tell him he didn't have to retake the exam. And why didn't they refund his exam fee when they sent his notification to him. Haven't they already had it long enough? I admit I wouldn't have minded having this happen to me. I'm very happy for Keith but it doesn't seem the whole episode was handled very well.

One fellow at the exam had his books and notes and No. 2 pencils all spread out and was waiting with a churning stomach for the exam to be passed out when he was informed that he passed the exam TWO YEARS AGO and that our State Board of Registration had been unable to locate him. I guess they didn't notice his application and check last December for this exam. I guess they're busy.

I hope I'm not one that gets lost in the shuffle this year.

Linda M. Richardson, L.S.I.T.

◆ FROM BAD TO WORSE

I had a problem understanding why I (and many others) had to travel to Fresno to take the Licensed Surveyor's Examination. Besides the expense, it really puts one off balance. I was lucky enough, this time, to find another woman taking the exam that was willing to share expenses, and more importantly, share company on the trip.

She traveled from Nipomo to my house in Morro Bay and I drove us on to Fresno. We stayed at the Holiday Inn in a very pleasant room at a reasonable price and managed (unlike others) to sleep through the night club act in the showroom and the "Big Band" dance in the courtyard. (Lobby for those of you who remember lobbies.)

Remembering a prior exam where most of the cars in the parking lot had their tires slashed the night before the exam, I parked in an attended lot. (I thought.) When I picked up my car in the morning there wasn't another soul (or car for that matter) in sight. I had the advantage of having a pregnant lady with me so I received special treatment. I was allowed to drive all the way up to the exam area to unload our books and my passenger then remove my car to a designated parking area. I was very pleased with my good fortune.

Actually, the only real complaint I had about the exam was the weather conditions. We were warned that the number of people in the building would definitely require that the air conditioning be turned on. Nobody had a problem with that. We were also warned that the air conditioner caused an inordinate amount of wind, however, they would turn on the air on one side for a period of time then apply equal time to the other side so that all were tortured equally. (I should have known.)

Having previously tested in Paso Robles I (thought I) was used to that. *Not.*

About an hour into the exam the air was turned on. Not only did my hair blow from the back of my neck, over my head, and into my eyes, and the pages on the reference book I was using turn to the end of the book, but every loose paper on my desk began to migrate toward the front of the examination room. My biggest concern was for my exam entrance slip ("To be kept in front of you at all times") which finally landed four rows ahead of me under someone's foot. (He was kind enough to take time out from his exam to pass it back, row after row, to finally reach me.) Distracting? No. It was all of my pencils blowing to the person next to me that caused my panic! (Without my No. 2's I couldn't hope to finish the exam.)

Those were returned as well. After about two minutes (which seemed like two hours!) I was able to figure out which question it was that I was trying to answer. I admit that I was wishing that I was taking the exam in Paso Robles at the fair grounds with their noisy (but unmolesting) air conditioners. Then I found out what the people taking exams there had to go through. It seems there were motorcycle qualifying runs going on during their exam.

I'm sure it is difficult (to say the least) to set up exam sites but it seems to me that they could be a bit better planned. Perhaps they need more volunteer help to set it up. Or perhaps the $175 exam fee could be better applied toward making the exam more of an exam than a test of ones stamina. If I'm out of line please let me know.

Linda M. Richardson L.S.I.T.

◆ MORE ON CONTINUING EDUCATION

An article from the Los Angeles Times, dated February 16, 1992, that deals with fellow professional (Attorneys) concerns and problems with the mandated continuing education program. Without restating the entire article, I list below some highlights for fellow surveyors to consider.

1. The educational program requires 36 hours of courses over a three year period. Ten hours are mandatory subjects with the remaining 26 hours elective. In this elective arena the problems appear.

2. Opponents worry that the Bar is not adequately screening courses and/or providers of the courses.

3. Courses such as "Cruisin' for Credit" on a cruise ship to Canada, or a course on acting "Enhancing Your Communication Skills" are being offered. What is the motive behind these type of courses?

4. Federal and State officials, law professors and retired judges are exempt. I trust that we Professional Surveyors will not allow that to happen with our program, or we would perhaps see a rush to become surveying instructors?

5. Lawyers will be expected to certify-under penalty of perjury-that they have taken the required hours. Why not turn in receipts from instructors, or cruise ship captains? In one course the article states that the lawyers were given certificates before the class began. Obviously this area needs study.

6. In summary, quoting Martin Omoto, legislative director of a Sacramento coalition, "No one should be convinced that the program maintains, promotes or tests the competency of attorneys. The public is in no way protected." Can we substitute Surveyors for attorneys?

Glen L. Aalbers P.L.S.

◆ RECORD OF SURVEY CHECKING REQUIREMENTS

Recently, the California Land Surveyors Association introduced legislation that will allow a surveyor to file his record of survey maps directly with the county recorders office. This legislation would allow the licensed surveyor the option of avoiding the cost and time required for the process of checking maps by the County Surveyors Office. Consider the following comments.

Some County Surveyors have been known to make demands that exceed the requirements, as stated in the Land Surveyor's Act, for a Record of Survey Map. In so doing does the County Surveyor assume any responsibility or liability for the

map. I believe the answer is no. Licensed surveyors are ultimately responsible for their professional judgments. The County Surveyor, in such a case, may have taken on an unnecessary burden that increases their costs and in fact may increase the liability of the surveyor.

The trend throughout the state is that checking fees are and will continue to increase. This trend does not encourage the filing of survey information in the public records. The burden of cost added to the recording of a map by the checking process is not justified when compared with the added benefits if more information is more often made available to the public. It behooves the profession and the public to remove as many impediments as possible to the filing process.

There is a benefit in having a disinterested party review record of survey maps for clarity and obvious omissions prior to recording. This can continue in the form of a peer review system.

This is an opportunity for the profession to take responsibility for its practice. Some will be concerned that less than adequate maps will be filed and the record will be cluttered with less than professional work. I suggest those who practice their profession honorably will likely do an even better job. Those who would do less than an adequate job will come under the scrutiny of their local professional practices committees and the Board of Registration.

Michael R. McGee, PLS

◆ BLM RESPONDS TO METHOD OF DOUBLE PROPORTION MEASUREMENT

Editor's Note: This letter is a response to a letter to BLM asking what the correct method for double proportion measurement.

The Manual of Surveying Instructions 1973 is very explicit on the methods used in proportioning. Section 5-25 states "Length of proportioned lines are comparable only when reduced to their cardinal equivalents". Segment of lines are proportional only when the lines being apportioned are essentially straight lines (eg. cardinal lines), and those segments must have intercept lines that are parallel (eg. cardinal lines). Attempting to apportion lines that are broken with angle breaks can not be apportionate unless the desired end product results in angle breaks exact in angular variation with the line being apportioned from. This desired end results is virtually impossible under a double proportionate scenario (eg township and in interior section corners). Hence, the Manual requirement for reducing both lines to cardinal equivalents.

Your understanding of the methodology is correct, but if the bearing does not deviate from cardinal severely then the error or performing a proportion using the actual distance of the line will not be enough to be of major concern. It is good practice, however, to use the cardinal equivalents in your calculations in order to avoid errors that can develop from these angular breaks.

Applying a correction for the convergency of the meridians is required when proportioning on a east-west township boundary. As per the Manual of Surveying Instructions 1973, Section 5-31, "Proper adjustment is made on an east-west line to secure the latitudinal curve". The Bureau of Land Management requires that every surveyor account for the correction due to convergence. The BLM has new software available to the public call CMM (Cadastral Measurement Management). This new software is used by a few of our surveyors and corrects for the latitudinal curve automatically.

I hope this letter adequately answered your questions. If there are any further questions please don't hesitate to write.

Clifford A. Robinson
Acting Chief, Branch of Cadastral Survey.

◆ NEW AND APPROVED PLATS

This letter is to inform you of cadastral survey plats approved by the Chief, Cadastral Surveyor for California during the first half of FY92 (October 1, 1991 thru March 31, 1992).

These plats are now on file in the Survey Records Office, Bureau of Land Management, California State Office, 2800 Cottage Way, Room E-2841, Sacramento, California 95825.

TP/RG/MER	APPROVAL DATE	TYPE OF SURVEY/ PLAT
T. 6 S., R. 32 E., MD	10/31/91	Dependent Resurvey
T. 27 S., R. 22 E., MD	12/17/91	Dependent Resurvey
T. 6 S., R. 18 E., SB	01/24/92	Dependent Resurvey
T. 32 N., R. 11 E., MD	01/31/92	Dependent Resurvey
T. 1 S., R. 18 W., SB	02/04/92	Metes & Bounds
T. 9 N., R. 22 E., SB	02/18/92	Dependent Resurvey
T. 14 N., R. 17 E., SB	03/16/92	Supplemental Plat
T. 3 S., R. 27 E., MD	03/18/92	Dependent Resurvey
T. 17 S., R. 38 E., MD	03/18/92	Dependent Resurvey
T. 18 S., R. 10 E., MD	03/18/92	Dependent Resurvey
T. 30 S., R. 40 E., MD	03/19/92	Dependent Resurvey
T. 8 S., R. 1 E., SB	03/30/92	Supplemental Plat

Clifford A. Robinson
(Acting) Chief, Branch of Cadastral Survey.

◆ IN RESPONSE

Having just read my friend Glen Aalbers' letter in the Cal Surveyor regarding the 1992 CLSA/NALS/ACSM Conference, I feel sort of like a heel since he plied me, and my family with alcohol on the flight from L.A. to Reno, however, I've been called what he is going to call me many times before.

DRESS CODE: Moderators and speakers should be properly adorned, however, attendees should be comfortable and made to feel at home. I don't think Sparks, Nevada is the fashion capital of the universe. Be clean, comfortable and try not to smell too bad.

ABSENCE OF LEADERS: Attendance at sessions is determined by the perceived quality and interest factor of the various topics, not by the appearance of the illustrious "inner circle" or the dreaded "Santa Rosa Bunch." Meetings are called based on need and scheduled before sessions begin so that the "leaders" can attend both. All meetings are announced at prior sessions so that the "average" surveyor can attend. All you have to do is get your ham-hocks out of bed on time.

DOOR PRIZES: I seem to recall a variety of door prizes presented by the chapters over the years such as belt buckles, HP 41's, Knott's Berry Farm food packs, surveying books, wine, hats, shirts, a dead rat and a skate key. What's the problem?

DINNER SHOW: This event is held as close to the end of the sessions as possible so that everyone isn't spread all over hell's-half-acre and have to be herded back together for a late show. The event is also suppose to provide a means of entertainment for those who don't want to entertain themselves and it is a good way of getting attendees to meet one another and make new friends. Besides I've never been to a dinner show that didn't include dinner.

Thanks for caring about the conference to speak your piece. Love ya, Big Guy.

Paul A. Cuomo

◆ RECORD OF SURVEY MAP CHECKING FEE

Apparently, all that the Riverside County Surveyor feels is necessary to defend high checking fees for Records of Survey (Raymond Mathe, California Surveyor, Summer, 1992) is to lay out the history of how the fees in Riverside County came about, and to claim that critics of the high fees present only one sided arguments.

Maybe a view from a smaller county up north would help round out the argument a little.

I'll make my position clear from the beginning: A fee structure that allows up to $2,235.00 to be charged for checking a Record of Survey is an obscene affront to the entire concept of what a Record of Survey has always been.

Mr. Mathe details the actions that went into the decision to raise his county's fees *from a flat $600.00 per map to the com*plicated fee structure they now have which allows up to $735.00 to be charged on a one sheet map, and up to $2,235.00 for a multi-sheet map.

I'm sorry, but Riverside County was charging too much before they raised the fee. If a county cannot check a map for under $600.00 then that county is misconstruing their role as a map checker and, for whatever justification, overcharging the public for what should be a nominal

fee to have an important document recorded.

Rather than focus on the history of the fee increase, a rather self-serving line of argument, Mr. Mathe should focus on the historical importance of the Record of Survey itself. The modern requirement that a Record of Survey be prepared and recorded pursuant to doing a field survey is grounded in the realization that to not do so only encourages mass confusion for the public and for surveyors. It simply is an unworkable situation to have countless surveyors out there performing surveys that cannot be easily be tracked down and verified. To make a long story short, it became obvious that the public was not being well served to allow surveys to be done without some standardized manner of documenting how they were done and by whom.

I maintain that this is the paramount purpose of a Record of Survey, and that any discussion about county checking fees should be directly tied to this fact. The checking fee should never be allowed to get so high as to adversely effect the client's decision about having the survey done. The fee, in the mind of the client, should be on the order of a small addition to the cost of the project. To allow it to become any more than that is to allow the government to be in the position of discouraging a service that only benefits us all. The entire process should be geared to the idea that the Record of Survey should be kept as simple as possible.

The fee, in the mind of the county, is unfortunately another matter, in some cases. Riverside County feels that $45.77 per hour is a necessary fee for the checking of a map. At an average cost of $647.19 per every multi-sheet map, that means that the county is, on average, spending over 14 hours to check their maps. This is at worst, ridiculous, and at best a major distortion of what the county is required to do by law.

Reading Section 8766 of the Land Surveyor's Act, I find nothing to justify that many hours for the checking of even a difficult map. What the county is required to do is to make sure that the basic facts are stated on the map and that it is mathematically correct. In the age of computers the math portion should take about 20 minutes. As for the rest of the process, I would allow, say, a maximum of 3 or 4 hours to complete the job. I have been preparing and checking maps for almost 20 years, and I cannot fathom how it should take 14 hours, on average, to check a map. Either Riverside County employees are not efficiently performing their jobs, or they are grossly inflating the very concept of what it is they are supposed to be doing.

As for the idea that the county is liable for what they do, and therefore should dramatically raise fees as some sort of protection or justification, this is a questionable line of thinking. If this is really a problem (and exactly what is the extent of this problem, anyway?) then the approach to be taken is to rewrite the Land Surveyor's Act to remove such liability for the county, not to begin a never ending policy of raising fees out of some misguided idea that a higher fee charged by the government will somehow remove that liability, or make it more acceptable.

Mr. Mathe accuses his critics of one-sided arguments. Did it occur to him that perhaps it really is a one-sided debate? Given the purpose for a record of survey, there is no legitimate argument for spending 14 hours to check a map and charging thousands of dollars to do so.

The record of survey is becoming more of an issue in California, along with the Lot Line Adjustment. I hereby suggest that the surveying organizations, along with governmental bodies across the state, formally set a date for a combined conference to discuss these two important issues and take steps to insure that the public's use of them is not discouraged.

Land divisions are already well regulated. Lot Line Adjustments and Records of Survey are less well taken care of in state law. Perhaps it is time to carefully look at these projects on the lesser end of the surveying scale to make sure that they remain what they were intended to be from the beginning, simple solutions for simple surveying projects. To allow them to evolve into expensive propositions is to negate their intended role.

Lee Hixson ❑

California's New High Precision Geodetic Network

By Michael Stephens

HPGN What is it?

A high precision geodetic network (HPGN) or similarly a high accuracy reference network (HARN) is a group of stations uniformly spaced usually 25 to 100 km (15 to 60 miles) from one another, whose horizontal positions relative to each other and to the NAD83 reference coordinate system, are known to a very high degree of accuracy. The California HPGN is only one of several already existing HPGN's which have been established in other states.

What is the impetus for HPGN Why do it?

The two main problems addressed and mitigated by the existence and utilization of an HPGN for satellite surveying purposes are: (1) the difficulties associated with the use of existing NGRS (National Geodetic Reference System) stations for satellite data collection, and (2) the manifest difficulties in trying to adjust a high accuracy GPS survey to a less accurate existing NGRS network established by conventional methods.

Two main complaints that have been made by users of the existing NGRS reference stations with respect to GPS survey network design and data collection have been: (1) the lack of easy accessibility of many of the stations, and (2) the unsuitability of many of the stations for use because of surrounding obstructions. The establishment of an HPGN alleviates these problems by making all stations that are a part of the network easily accessible to road vehicles and by placing them in areas that have a 360 degree unobstructed view of the sky from about 15 degrees above the horizon on up allowing incoming satellite signals to reach the receiver without being blocked, deflected, or distorted.

Difficulties are continually arising when GPS survey networks are adjusted to NGRS reference stations. One of the main reasons for this is because of the level of error in NAD83 positions of existing reference network stations. It is not uncommon to find errors of up to a few decimeters in some of the NAD83 stations in California. This has often led to problems when performing a least squares adjustment of the highly accurate GPS derived baselines holding 1st or 2nd order NGS stations. Numerous least squares adjustments have often been required to determine whether poor statistical solutions within an adjusted network (i.e., high residuals on individual baselines or a high overall variance factor) were a result of unsatisfactory coordinate positions of the NGRS station(s) being held fixed as control, or whether they were a result of the data collected on or design of the survey network being adjusted. Furthermore, if the poor solutions were a result of unsatisfactory control then additional adjustments and analysis is of the survey network were often required to determine which NGRS station(s) had an unsatisfactory position.

Since the underlying objective of an HPGN is to eliminate as much as possible any existing distortion in the positions assigned to NAD83 reference network stations many of the current problems associated with analyzing and adjusting a GPS survey into an existing network will be minimized.

Relation To NGS Control

The existence of an HPGN does not supersede the current NGS Triangulation Network for control (also known as the National Geodetic Reference System—NGRS). What will eventually happen (perhaps within the next year or two) is that the current NGS network will be adjusted into the HPGN network. This will be done to minimize the amount of distortion in the NGS net. This will slightly change the currently published NAD83 coordinate values assigned to some of the stations.

Stations of the California HPGN

The California HPGN consists of 244 stations spaced somewhat evenly approximately 40 miles apart throughout the entire length of the state.

Most of the stations are located off of major state or interstate highways and are easily accessible by car *(see Figure 1).*

Most of the set HPGN stations are a modification of the NGS three dimensional Class A monument. The HPGN stations set this way basically consist of a 2" dia aluminum monument cap stamped with the station name and date set. The aluminum cap is set on top of an aluminum rod driven to refusal and is surrounded by a 6" PVC casing and concrete collar and covered by an aluminum frame and top. A few of the HPGN monuments consist of a cap set directly in solid rock or existing concrete. The remaining HPGN stations consist of existing NGRS network monuments near proposed station locations which met the HPGN project criteria *(see Table 1).*

HPGN Relation to State Plane Coordinates

All points within the HPGN will be recognized as a basis for SPC as defined in the Public Resources Code dealing with the California State Plane Coordinate system. The latitude and longitude positions of all HPGN points will have NAD83 state plane coordinate values assigned to them.

HPGN Positional Accuracy

The National Geodetic Survey's geometric relative positioning accuracy standards for three-dimensional surveys using space system techniques are broken down into four levels or categories of order as follows:

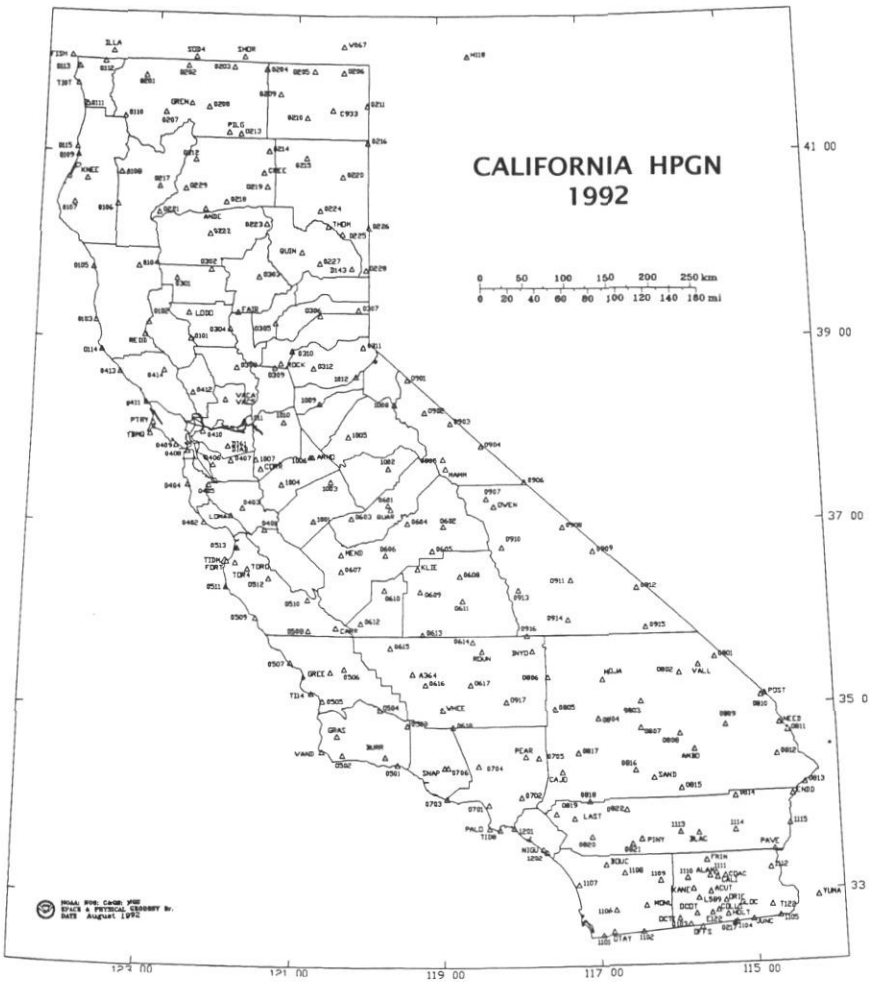
- **Order A** 3mm+1:100,000,000. Used for global & regional geodynamics (i.e., plate tectonics movements) and deformation measurements (i.e, seismic movement).
- **Order AA** 5mm+1:10,000,000. Used for NGRS "primary" networks; regional & local geodynamics; seismic measurements.
- **Order B** 8mm+1:1,000,000. Used for "secondary" networks; connections between the "primary" NGRS network; local geodynamics; seismic measurements; high precision engineering surveys.
- **Order C**

1st	1cm + 1:100,000
2nd-I	2cm + 1: 50,000
2nd-II	3cm + 1: 20,000
3rd	5cm + 1: 10,000

Used for meeting mapping; land information; engineering requirements.

The California HPGN project was designed to produce a level of accuracy of at least Order B as defined by the FGCS (Federal Geodetic Control Subcommittee) specifications. FGCS Order B specifications stipulate that the vector components of each station within the network shall have a minimum accuracy of 8mm + 1:1,000,000 at the 95% confidence level. For example, at 40 mile spacing (about 60 km) the expected accuracy is 8mm + 60mm = 68mm (0.22 feet) for each of the components of the resultant vectors. The procecedures used to establish the California HPGN, however, were intended to guarantee accuracies as close to Order A as defined by the FGCS as was practical. In other words, stations within the California HPGN will have coordinate values assigned to them which will be at least 10 times more precise than those currently assigned to existing 1st order NGRS network stations.

Figure 1
California HPGN Station Placement



HPGN Stations Relation to NGS Triangulation Stations

Satellite data was collected on at least one NGS horizontal control station (usually 1st order but occasionally 2nd order) within a one degree by one degree area throughout the entire length of the state simultaneously with data being collected on surrounding HPGN stations. This was enough to tie the existing NGRS reference network into the HPGN. Those NGS points that were occupied concurrently with the HPGN points will be assigned revised NAD83 coordinate values at the same time the NAD83 coordinate values for the newly established HPGN points are published (the middle of May 1992). The ties that were made between the existing NGRS reference network and the newly established HPGN will enable NGS to determine the amount of adjustment (if any) that will be necessary to the remaining 16,000 or so 1st, 2nd, and 3rd order stations within this network. A least squares adjustment will be performed at a later and as yet unspecified date which will be used to

determine the amount of adjustment to be made to the remaining existing network stations. The results of the adjustment (i.e., the newly arrived at coordinate values for the remaining NGRS stations) may not be published for a few years.

Survey Specifics of HPGN System

The California HPGN was a joint project developed and completed by both the California Department of Transportation (CALTRANS) and the National Geodetic Survey (NGS). The way in which the survey was planned out and completed may best be explained if broken down into three components consisting of the network design, project reconnaissance, and data acquisition.

Network Design

The initial network design for the HPGN was planned out on a California state highway road map by the Headquarters Surveys office of CALTRANS in Sacramento. Since one of the main reasons for establishing an HPGN was to allow easy accessibility to control stations, the initial approximate locations for the stations were selected (for the most part) within state highway rights-of-ways along state highway corridors. The stations were plotted out on the road map at approximately 30 to 40 mile spacing in a grid pattern throughout the entire state. The final network layout provided for about 170 new stations excluding ties to existing horizontal and vertical control within California or near its borders.

Project Reconnaissance

Copies of the road map consisting of the plotted locations of the proposed new HPGN stations were given to each of the 12 CALTRANS districts so that each could go out into the field and select specific points in the vicinity of the station locations indicated on the map. Each district was responsible for selecting station sites within their own district boundaries. In addition to the new stations being set along the California state Highway rights-of-ways, network design guidelines and project reconnaissance called for the inclusion of 5 other existing groups of stations. These groups were as follows:

1) All California stations in the National Geodetic Survey's National Crustal Motion Network (NCMN). These are order A stations (10 times more accurate than HPGN stations) and were used as control for the HPGN adjustment.

2) Ties to an existing NGRS horizontal control station in each one degree by one degree latitude and longitude block to ensure an interrelationship between the HPGN and the existing 16,000 horizontal control stations.

3) Ties to the existing NGRS vertical control network to provide information for orthometric height determinations throughout the network.

4) Ties to tidal bench marks to provide an accurate interrelationship between the geodetic and tidal datums.

5) Ties to the southern tier of stations in the Oregon HPGN project near the California-Oregon border.

Data Acquistion

GPS satellite data was collected by both CALTRANS and NGS crews using two primary types of dual frequency receivers. These were the Ashtech L XII and the Trimble 4000 SST. Additionally, data collected from four fixed receiver sites located at the Mojave CIGNET station, JPL in Pasadena, Scripps Institution at La Jolla, and at Pinyon Flat was incorporated into the project.

Satellite data was collected on all stations in the network for 6 hours; and each station was occupied on at least two different days. All NCMN stations were occupied on three separate days and approximately one fourth of the total number of HPGN stations excluding the NCMN stations were occupied three times.

Data for the project began to be collected on April 5, 1991 and it ended about 4 months later on August 13, 1991. Baseline data reductions were performed by NGS personnel in San Diego and in Sacramento by in house NGS written software (OMNI). The baselines were then sent back east to Maryland where they were reprocessed using a precise ephemeris for additional accuracy. A least squares adjustment was then performed on all the baselines by NGS and the final coordinate values released in mid May 1992.

Table 1
California HPGN Network Stations

DISTRICT	CALTRANS STATIONS	CALTRANS NGRS STATIONS	NETWORK (NGRS) TIES	NCMN STATIONS	TIDAL BENCH
01	15	0	2	0	1
02	25	4	6	2	0
03	9	3	3	0	0
04	12	2	2	1	1
05	13	0	5	2	2
06	15	3	6	0	0
07	6	0	0	3	1
08	16	6	6	2	0
09	7	10	1	2	0
10	12	0	3	1	0
11	15	0	4	5	0
12	2	0	1	0	0
TOTAL	147	28	39	18	5

Data Availability

NAD83 coordinate values for all HPGN stations as well as to-reach descriptions for them will be made available to anyone interested by CALTRANS headquarters in Sacramento. Both paper and electronic files will be obtainable including a search and extraction program to locate specific HPGN stations. All to-reach descriptions have been standardized and were input into a database using DDPROC (an NGS database program) *(See SEARCH.EXE sidebar).*

Persons interested in finding out more about the HPGN or obtaining paper or electronic files of station descriptions and coordinates can contact CALTRANS headquarters at (916) 739-4504 or 739-4506.

Additionally, information can be obtained by contacting the NGS information center in Rockville Maryland at (301) 443-8631.

HPGN Densification

NGS has left all maintenance and any upgrading or densification to be done on the HPGN up to CALTRANS. At this stage there is still some discussion as to how frequently the HPGN stations should be inspected and also whether each district should maintain the HPGN stations in their respective areas or whether CALTRANS headquarters
should maintain all the HPGN stations throughout the state. Right now the general consensus is that there should be some form of on site physical inspection of all stations on an annual basis; and if any of the inspected stations seem to have been disturbed or destroyed (i.e., by seismic activity) then it will be up to CALTRANS to physically repair or replace the station if necessary and then to establish new coordinates on the station by collecting satellite data over the new or replaced station for six hours concurrently with two other nearby existing HPGN stations so as to establish a basis for re-adjusting the new station into the network. There is also some discussion as to having a continuous ongoing verification of the coordinate positions of all HPGN stations irrespective of whether or not they appear to be physically damaged or to have moved.

The HPGN will slowly be densified by CALTRANS as well as by other public agencies (i.e., San Diego, Imperial, and Riverside counties) mainly as GPS control projects come on line. There are some exceptions however. For example, CALTRANS district 7 (which covers Los Angeles county and nearby surrounding counties) has decided to densify the entire district to the point of having an HPGN station every 10 miles or so. This particular densification project should be completed sometime in the near future. As new HPGN stations are established and adjusted into the network their location descriptions and coordinate values will be added to the existing HPGN database in Sacramento.

The HPGN does not lend itself readily to being utilized for conventional surveys at this particular time. At present there are no azimuth pair stations within the network which could serve as a basis of bearing for the surveyor using conventional surveying equipment. As the network stands right now it mainly benefits users of GPS satellite technology.

Mike Stephens has a BS degree in Surveying Engineering from Fresno State University. He has worked extensively on all facets of GPS surveying with CALTRANS Headquarters in Sacramento since May of 1989. Mike has designed, coordinated the data collection, and adjusted numerous GPS surveys for CALTRANS. He worked closely with Don D'onofrio (the head NGS coordinator for the California HPGN) during all phases of the planning and development of the HPGN. ❑

SEARCH.EXE

by Steve Vaughn

The program is designed to extract descriptions and other related information about stations which were observed as a part of the recently completed California High Precision Geodetic Network.

After invoking the SEARCH command, the screen will display a screen describing the program. After striking the Enter key a brief menu will be displayed on the screen (see below). Strike the F3 key "Utilize an existing REFORMAT.DAT file."

DDPROC DESCRIPTION SEARCH

F1 Reformat a *.HA file to a *.LST file.
F2 Reformat a *.LST file to a REFORMAT.DAT file.
F3 Utilize an existing REFORMAT.DAT file.
F4 Quit.

An OPTION MATRIX is now displayed. Select the function key for the data base has been searched you will note the number of stations FOUND. You may then VIEW or PRINT the descriptions or LIST the stations following the guidelines in the matrix. (See below.)

SEARCHED 245 • FOUND 1	SEARCH d-base	VIEW desc	PRINT desc	LIST stations
DESIGNATION	F1	SHIFT/F1	CNTRL/F1	ALT/F1
COUNTY	F2	SHIFT/F2	CNTRL/F2	ALT/F2
LAT & LONG	F3	SHIFT/F3	CNTRL/F3	ALT/F3
ELEVATION	F4	SHIFT/F4	CNTRL/F4	ALT/F4
QUIT	F5	choose your selection		

EXIT the program as indicated.

A Role for the Land Surveyor in GIS?

By George N. Dumas, PLS

Introduction

Over the last several years we have seen the role of the land surveyor being expanded, and diminished, in its many components. Technologies such as Geographic Information System (GIS) and Global Positioning System (GPS) were originally thought to be avenues to more involvement and more business. They have, in many instances, resulted in less work for the surveyor. As these systems have developed and matured, their use has been incorporated by other disciplines. Often lay people, who don't understand the basic principles of mapping or measurement, etc. are used for the actual work.

Is there a role for the surveyor in the future of GIS other than providing ground control for aerial mapping or adjustment networks or as a consultant to a GIS vendor? In the following we will examine one possibility.

Background

GIS is not new. The technology has been available for many years. Over that time there has been a large amount of interest generated in GIS by the academic community and public entities. As a result there have been significant advances in the capabilities of these systems as well as a resulting emphasis on goals that cover a wide spectrum. Without computers GIS, a complex application, would not be practical. Without the dramatic increases in the power of computers and the dramatic reduction of hardware costs, GIS would not be available to most entities.

Because of the high cost of computer hardware in the early days, the systems were also very expensive. There were many cities, counties and some special districts that were able to budget for, and spend, the necessary money to buy the hardware and software. Unfortunately, in many, if not most cases there wasn't adequate budget, resources, or the understanding of the need for high quality data entry for the base map information. Because of this, often corners were cut by digitizing or scanning this information and then rubber-sheeting to force objects to fit together. This resulted in inaccurate base maps that became difficult to maintain and update. Base maps are defined as the property lines, street and road center and right of way lines as well as attribute information describing them. While accurate base maps were understood to be a requirement for a Land Information System (LIS), most GIS designers didn't see the need for them. Now, after the above problems have been surfacing, the thinking is changing, and more entities are requiring better base maps.

In other areas GIS were not completed because they were trying to input this data by more traditional but time consuming methods such as coordinate geometry. They didn't employ good methods to insure rapid input and accurate results. Many of these systems have become "white elephants." They continue to cost the governing body a lot of money and have little or no productive use. There are some procedures and systems being developed to meet these challenges. The following describes one. Land Records Method DMC.

Overview

The past two years has seen an emergence of a system being built by a small software company in Southern California. This system provides for the collection and input of data into a GIS. It answers some main problems of the past. It includes two main parts, the first of which is the software. Second, even more important, are procedures for the research and correlation of record data before its conversion to electronic form. This system has resulted in the ability to create highly accurate maps. This is done in the same amount of time that it takes to create less accurate digitized or scanned maps.

The system, known as Land Records Method DMC, was developed by Czerwonka Software. It is being used by two companies (Earth Industries of Ridgecrest, CA and Vectuscan of Santa Paula, CA) to produce accurate base and facility maps for cities and utility companies. The map data entry function of the system uses efficient coordinate geometry routines that are designed specifically for this use. These routines, which run on an IBM-PC or compatible, use AutoCAD for the graphics display and Paradox as the data base. Once the base maps are built, the remaining map and attribute information for the facilities is added with strong reliability.

The system has been created to produce maps that not only can be used in a GIS but maps that can be used to do design work as well. "We built the system," says Larry Czerwonka, designer of the system, "to provide surveyors and engineers with something more than pretty pictures. It has been my experience that most GIS applications don't work well with lots that overlap or parcels that don't close. But that's

the real world and the minute you rubber-sheet your data to make it fit, you lose all accuracy." It is this loss of accuracy that has kept most surveyors from trusting GIS. It has caused so many of the headaches that arise when firms attempt to enter data from different sources in their GIS.

By starting with base maps that reflect the real world (record of surveys, parcel maps and subdivision maps), the Land Records Method

"We built the system to provide surveyors and engineers with something more than pretty pictures."

DMC allows the surveyor to see how the parcels really fit together both visually and by quantified positional differences. He, or she, can determine where there are bad closures, gaps or overlaps. For the GIS world, the system also can be used to create an Adjusted Map. In the adjusted map, tracts and parcels are closed, rotated, merged and adjusted by least squares into a seamless map. This map is of little use to an engineer or surveyor but an essential step if the map is to be used by today's GIS software. The system actually retains both the record and adjusted information and a system audit log is maintained that tracks the input and adjustments. This allows the ability to determine what and how adjustments have been made. If new control information becomes available, it is possible to readjust the original data to fit the new control.

Czerwonka Software is now developing a GIS that will work with real world data and not require the lots or parcels to close. Traditional GIS software requires that the parcels close. Since the only reason for this at the parcel level is area calculation, it is an unnecessary step.

Data Research and Entry

As mentioned above, specific procedures have been established for the research and correlation of record data. People without a surveying background are trained to follow these procedures.

Can a surveyor have a worthwhile advantage in this area? We know how to research and compile record data for a boundary survey. For this application we have to throw out some of our training. An example is that we are normally interested in the chain of title starting from the original transaction. For efficient data conversion for a GIS, we usually need to concentrate on the latest data first. If we can change our thinking for this application, we can become very efficient quickly. Can we be cost effective enough to compete with vendors using trained technicians? Is this an area that will be challenging and interesting to the land surveyor? Time and experience will give us the answer.

Correlation Decisions

Again our experience in analyzing record data for a boundary survey should give us an advantage in correlating adjacent surveys for a GIS. In most situations the solution is obvious but in several the expertise of a surveyor could expedite the process.

Surveyors' Use of GIS in Traditional Areas

Can a system such as this be a direct benefit to the surveyor in his or her current practice. Yes, it can! With some modification, it possibly can be used to create a graphical data base model of a particular piece of property and all it's related maps and deeds of record, etc., which can then be a tool for boundary analysis.

Summary

So what do we do now? It is obvious that we cannot stand pat and continue our practices as they have been over many years. Surveying, as well as other disciplines, continue to evolve as new technology and new needs emerge. We changed our approach to much of our traditional work as calculators, computers, EDM's, total stations, data collectors, digital plotters, etc., came on the scene. Now, however, we have to look at the work we do and realize that many of the new tools enable others possibly to do some work we feel traditionally should be ours.

We have the background necessary to learn to use the new tools for new applications. We must have the interest, and take the time, to find out about these tools. Making an investment of our time and some dollars is necessary for us to know if this is a right area for us. Software such as this is available. (Land Records Method DTM is available for $250 per module. The modules are Base Map, Adjustment, Water, Sewer, Gas, etc. A demonstration package is not available now.) What can we produce and sell? We can do quality data entry and conversion. We can do the maintenance and updating. Can we do it economically? Can we market it to our local entities (cities, counties, special districts)? Can they understand its potential benefits? Can they afford it? The cop out, which won't work anyway, is to try to legislate for controls to allow us to do it exclusively. What we really need to do is be aware early on what new technology can bring forward, prepare ourselves to use it and let the public know about our capabilities. These capabilities can be expanding, not contracting, if we keep alert and responsive.

George N. Dumas, PLS is a former principal, executive vice-president and chief of surveying, mapping and computing in a large multi-disciplined engineering and surveying firm in Santa Barbara, CA. After selling his interest in that firm in 1989, he formed Dumas Land Systems (DLS). DLS has been offering consulting services to firms involved in civil engineering, land surveying, CAD and GIS. ❑

North American Vertical Datum of 1988

By Gregory A. Helmer, PLS

Introduction

What would you do if you discovered that your local benchmarks were two and a half feet off and that the only vertical control suitable for your project was 20 miles away? This hypothetical situation is today the reality which presents a challenging dilemma for the surveying and mapping community. The challenge is the implementation of the North American Vertical Datum of 1988 (NAVD 88), and the dilemma is the serious lack of NAVD 88 benchmarks in many regions of the country (e.g. most of California).

Surveyors are now well acquainted with a transition from the NAD 27 to NAD 83 horizontal datum. This transition, although complicated and painful to many, was greatly simplified by the fact that precise horizontal control surveying in NAD 27 was limited primarily to the geodetic community. Also, the publication of NAD 83 in 1986 coincided with the advancement of practical and affordable GPS surveying - thereby providing a general upgrading of the precision and importance of horizontal control. Precise automatic levels have been in the surveyor's equipment locker since the early 1960's, and the profession has been accustomed to relatively sophisticated vertical control surveying as a result. A datum change of 90 cm will not go unnoticed by the profession.

If we as plane surveyors are to effectively deal with a transition from the National Geodetic Vertical Datum of 1929 (NGVD 29) to NAVD 88, we need to begin with a basic understanding of geodetic height systems. What made NGVD 29 obsolete, and why is NAVD 88 superior? With a little knowledge of geodesy we can at least answer these questions, and begin to understand the reasons for a new datum, even if we resent the intrusiveness of such a change.

Vertical Control

As one stands at a given point on the earth, it is intuitively obvious which direction is up. And it would seem to be a simple matter to measure how far up or down one point is from an other. In fact, this limited concept was for most of us one of our first experiences in surveying, and has served as the basis for a tremendous amount of good quality differential leveling. Plus, H.I., minus, elevation... Within the confines of most surveying practice we are not significantly restricted by this concept; but as we expand our interest to areas of regional and geographic extent, and as we introduce advanced measuring techniques (i.e. GPS), we must consider the dynamics of height systems. Differential leveling is a good place to start. And if we seriously consider what we typically take for granted, a fundamental principal becomes obvious. As a leveling instrument is set up at successive locations, its vertical axis is coincident with the gravity vector at that point, and its line of site is perpendicular to that gravity vector. As the force of gravity changes, the level line changes. Therefore the surface that a level describes is not a plane or a sphere nor any other defined geometric figure, but is an irregular surface which is perpendicular to the force of gravity at every location. This irregular surface is called an equipotential surface. Equipotential means that the potential gravity is the same at all locations. In other words, it requires no energy to overcome the force of gravity as an object moves from one location to an other on an equipotential surface. There are an infinite number of equipotential surfaces surrounding the earth, somewhat like the layers of an onion. Since the earth's gravitational field is quite complex, each of these equipotential surfaces has its own distinct shape (i.e. they are not parallel).

The Geoid

The equipotential surface which most closely fits mean sea level is called the geoid. While the concept of mean sea level, and hence the geoid, is easily understood, its realization is much more problematic. Variations in wind patterns, and in ocean currents and salinity are responsible for sea surface topography of a meter or more. Sea surface topography presents a direct ambiguity in the definition of mean sea level. Variations in the earth's gravity field impact the actual shape of the geoid to a far greater magnitude. Geoidal undulations of as much as 100 meters are the result of the uneven distribution of the earth's mass together with the effect of centrifugal force from the earth's rotation. Centrifugal force at the earth's equator effectively reduces the acceleration of gravity by 0.35% compared with gravity at the poles where centrifugal force is zero. The ellipsoidal shape of the planet, having a polar diameter which is 42.8 km. (26.6 mi.) shorter than its equatorial diameter, contributes to a total increase (including the centrifugal effect) in the acceleration of gravity of approximately 0.5% at the poles. The shape of the geoid becomes even more uncertain when we observe the effect of variation in land masses and the density of material within and below the earth's crust. The gravity

vector is drawn toward areas of greater mass and therefore the geoid bends upward in these areas. Conversely, in areas with a deficiency of mass, the geoid bends downward.

In California, geoidal undulations vary by several meters:

Location	Geoid Height	(from OSU 91A)
Near Yuma, AZ	-33.2 m	-109 ft.
Santa Barbara	-36.8 m	-121 ft.
Lone Pine	-26.0 m	-85 ft.
Sacramento	-29.8 m	-98 ft.
Crescent City	-25.2 m	-83 ft.

Undulations of 50 ppm are not uncommon in the mountainous areas of the state. Globally, the geoid height varies +/- 100 meters. One of the greatest challenges remaining for geodetic science is the precise mapping of the detailed undulations of the geoid.

Vertical Datum

Several possibilities exist, and have been used, to define a vertical datum. A tide gauge can locate mean sea level at a particular location by observations of sea level variations over an extended period of time (typically a 19 year cycle). As already discussed, mean sea level at one location is not necessarily on the same equipotential surface as mean sea level at an other location. The NGVD 29 resolved this conflict by constraining the general adjustment at 26 tide gauges. Five sites in Canada, and 21 sites in the U.S.A. were held fixed in the general adjustment of 106,724 km. (66,315 mi.) of leveling. This means that NGVD 29 is neither an equipotential surface nor an accurate approximation of the geoid.

In the definition of NAVD 88, the limitation of a datum surface distorted to fit sea surface topography was considered incompatible with modern surveying technology. Space based geodetic surveying techniques (e.g. GPS, SLR, VLBI) are capable of providing extremely accurate geodetic height differences in terms of height above a reference ellipsoid. The prospect of these methods in conjunction with a precise geoid is too valuable to sacrifice to a distorted datum.

The NAVD 88 was defined by a single least squares adjustment of 1,300,000 km. (808,000 mi.) of leveling data in the U.S.A., Canada, and Mexico. This adjustment was completed in June of 1991 and included 80,000 km. (49,700 mi.) of new leveling in the U.S.A., VLBI height differences, and a total of 709,000 marks. The Coast and Geodetic Survey (formerly the National Geodetic Survey) selected the new International Great Lakes Datum of 1985 (IGLD 85) local mean sea level height at station POINT-AU-PERE (Father Point) / RIMOUSKI as the minimum-constraint datum point for NAVD 88. POINT-AU-PERE/RIMOUSKI is located at the mouth of the St. Lawrence River in Quebec, Canada. It was selected to minimize the impact of NAVD 88 on the national mapping programs of the U.S.A. and Canada, and upon international treaties regarding shipping in the Great Lakes.

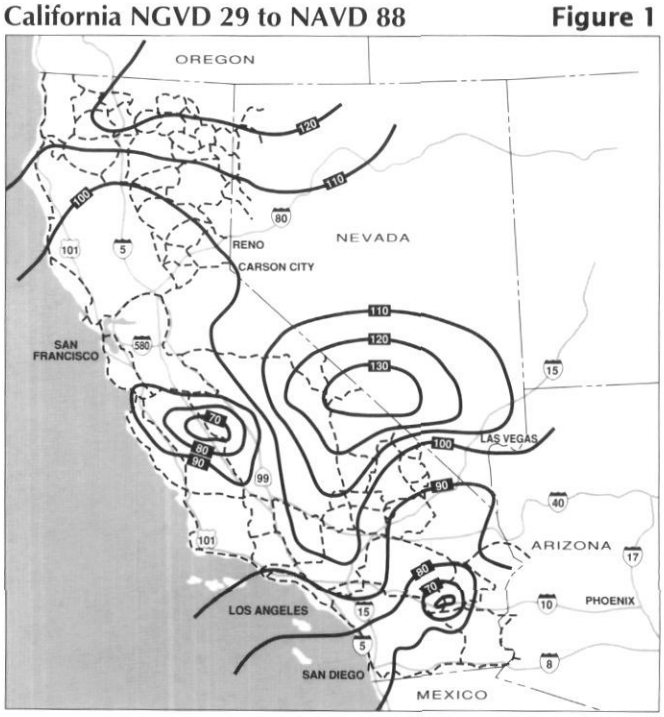
Orthometiric Heights

Examination of the elevation change from NGVD 29 to NAVD 88 in California reveals differences of 60 cm. (1.97 ft.) to 120 cm. (3.94 ft.) *(see Figure 1)*. But the change is not of a uniform slope or curve. Why is it that the elevation change is so irregular? Well, some of the irregularity is attributable to the distortion in NGVD 29 from sea surface topography, and some is from the errors which exist in the NGVD 29 leveling and adjustments, but the majority of the contouring is the result of refinement of a geodetic term known as the orthometric height correction.

As was previously stated, no two equipotential surfaces are parallel. Any line of differential levels naturally passes through an infinite number of equipotential surfaces since it is run on the ground at varying distances from the geoid. The orthometric height correction attempts to compensate for the non-parallism of the equipotential surfaces on which the leveling observations were made. This correction requires precise gravity measurements to be processed simultaneously with the leveling data. The NAVD 88 adjustment utilized improved gravity measurements to accurately model the orthometric height correction. The greatest magnitude for the correction occurs in the mountainous regions where deflection of the vertical is greatest and the NGVD 29 models were most deficient.

CONTINUED ON PAGE 18

California NGVD 29 to NAVD 88 **Figure 1**



CONTINUED FROM PAGE 17

NAVD 88

Since the vast majority of users of NGVD 29 have not been seriously restricted by its deficiencies, there would seem to be little reason to accept such a difficult task as this transition represents. This is especially true since the availability of NAVD 88 marks is so limited. Future plans call for the readjustment of additional data sets into NAVD 88 (i.e. COE, USGS, and from NGVD 29). This is however; questionable for California due to the highly active crustal motion in the State.

So, why would you opt to tie your project into the new datum? How about to conform to FEMA flood plain studies, or what if you're doing federally funded Caltrans work, or Corp of Engineers mapping? All of these agencies have acknowledged NAVD 88 and have either established, or are working on, policies to address its implementation. It is only a matter of time before this trickles down to the local level as did NAD 83. NAVD 88 is already being used and will become a requirement for an increasing number of projects, necessitating extensive vertical control surveys to densify the network. The good news is that a tremendous amount of effort is going into the development of precise geoid models to facilitate GPS leveling. GEOID 90 is a three minute grid of geoid heights developed by C&GS, with an accuracy of 2 - 10 cm. (0.06 - 0.36 ft.). This level of accuracy meets the requirements for many vertical projects where it is being used to great advantage. C&GS has programs underway to study the geoid in much greater detail. One such study is being conducted in conjunction with Caltrans in the San Diego County area with hopes of obtaining accuracy at the 1 - 5 cm. (0.03 - 0.18 ft.) level.

There is no question that NAVD 88 will be accepted as the principal vertical datum. Much work however is needed to facilitate the transition. The work effort required to accomplish this will become the responsibility of those prepared to meet the challenge. ❑

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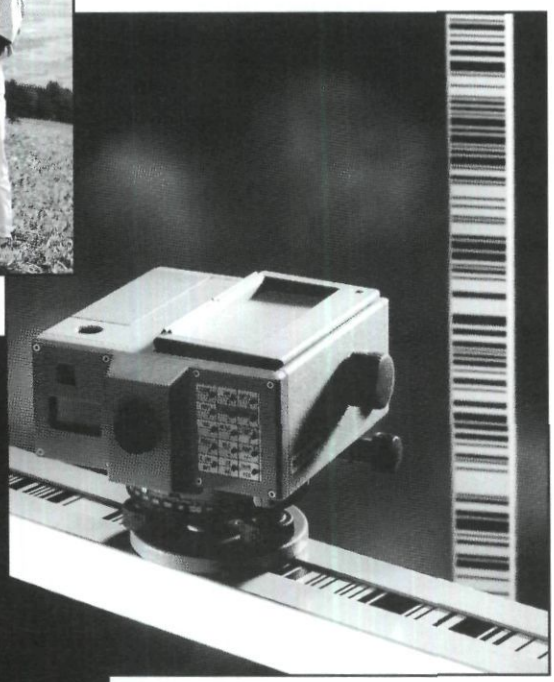

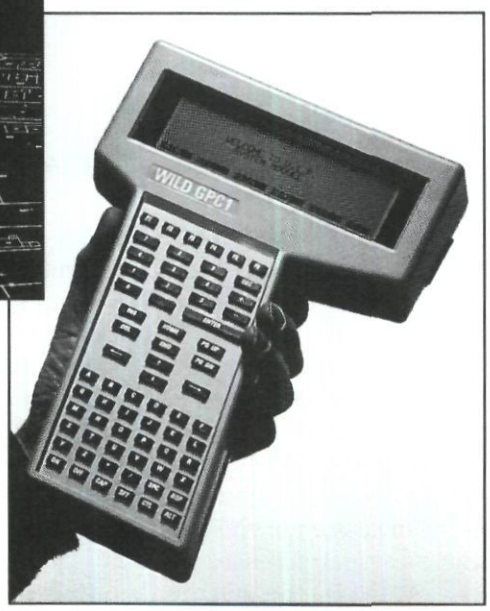

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Report To GIS Task Force

By Joseph W. Betit, PLS

Editor's Note : In 1990 CLSA introduced legislation on GIS/LIS. That legislation was modified to create a statewide Task Force to review and make recommendations on GIS standards and use within the State of California. The Task Force represents a number of state agencies, federal agencies, universities, counties, cities and interested associations. Howard Brunner was appointed by the Governor to represent CLSA. Howard recommended and Joe was appointed to the Data Development Technical Advisory Committee.

The following are some excerpts from Joe's report to the Task Force. This report discusses in detail the implications of GIS systems to surveyors and recommends specific guidelines for implementation in GIS. Although this is a technical report to the Task Force, it contains valuable information for surveyors who are assisting local agencies to establish GIS or are having to provide data to agencies for use within a GIS/LIS.

The lead State agency in GIS/LIS is the Teale Data Center. Although not an agency surveyors are used to dealing with or have even heard of, it is positioned to be the dominant force in GIS/LIS for the State of California. See the article "The Stephen P. Teale Data Center" on page 23 for an overview of this agency.

Legal Considerations for Information Providers

Surveyors think in terms of reliably transmitting information related to land and property rights over long periods of time (often generations) and in terms of liability to their direct client as well as possible third parties subsequent in time to the original performance of work.

The correctness of a map or data is no guarantee against misinterpretation or misapplication of data once the data is in the hands of others. GIS are dynamic systems and the inevitable changes made to the database over time create an environment for errors to occur and propagate, unlike a paper map that is a static data product. Furthermore, if data is sold in any format (paper, digital, etc.) as a product (versus delivered to a sole client for their sole use) and the data is subsequently found unsafe or dangerous for its intended use, United States product liability laws provide for strict liability for the seller of the product. There is case law in which inaccurate graphic representation of accurate text data contained on the same chart was cause for substantial damages. In a GIS environment this would be similar to an inaccurate map composition being plotted along with the accurate data tables on the same sheet.

The current approach in law today is to name anyone even remotely connected with a complaint by a plaintiff and thereby force the reluctant defendants to fight or buy their way out of litigation. This is an expensive process, especially for the innocent professional. If a licensed professional seems overly anxious about possible legal repercussions from the performance of work or delivery of product to other than the immediate client it is for good reasons based on hard experience with our legal system.

Measurement Database Focus vs Coordinate Focus

Coordinates change, measurements don't. Coordinates are a reflection in a desired ellipsoid or projection system of the currently selected or available reduced survey measurements contained in a database. Measurements between two points are often of variable quality (depending on measurement instrumentation used). These differences in quality are indicated by the magnitude of the Standard Error (SE) attribute associated with each data element.

The most practical way to build large survey nets for GIS systems is to use an evolutionary approach based on a measurement database that undergoes periodic least squares adjustment. The general plan for the net should include a timeline for long term remonumentation, monumentation densification and measurement upgrades.

Periodic readjustments of a measurement database will result in new coordinate opinions for existing points. Therefore, the following items should be recorded in the database lineage log as a part of the adjustment record; the time and date of the adjustment, the person supervising the adjustment, the type of adjustment (least squares is not the only rigorous methodology), the parameters (points held fixed, datum used, etc.).

Coordinate based systems are subject to the following problem areas:

1. Flexibility in representing information accurately in different coordinate systems can be difficult, especially if the desired coordinate system is not directly related to the initial coordinate datum (eg. NAD 1927 vs NAD 1983). It is much easier to regenerate new coordinates in the actual new ellipsoid model from raw measurements than it is to try and use a transformation program that uses best fit techniques.
2. The coding scheme for attribute data used to track changes can become cumbersome as coordinate values are updated over time.
3. Integration of coordinate data sets from diverse sources may require cumbersome translation or transformation techniques, as well as rubber sheeting in order to be integrated with the coordinate data within the existing (different) coordinate reference system.

Some of the derived products of a measurement database:

- Generate parcel descriptions directly.
- Generate annotations typical for each type of map use automatically.

- Base maps of project areas can be extracted for proposed project area and the SE analyzed to determine if existing survey data is of sufficient quality to justify avoiding resurvey.
- Indices to adjacent survey and title data can be generated
- Parcel history can be compiled using tabular & graphic outputs.
- Evolutionary survey measurement and polygon database production.

Some other uses of a GIS survey database advocated by the Bureau of Land Management would be researching original survey work, correlating patterns and quality of work accomplishment, reliability estimates of positional and measurement data, and providing supporting control network and graphic representation.

Finally, as pointed out by BLM writers, any measuring system must be tightly coupled to supporting documentation (original material and summaries) to maintain the integrity of the measurements and provide future generations with a basis to judge the quality and value of the work.

Such things as the character of the found or set monument, the procedures and type of equipment used, who performed the work and their qualifications are all important data that needs to be associated with each point measurement.

Need for GIS to Distinguish between Measurements vs "Psuedomeasurements"

A GIS has the ability to create, manipulate and query polygons. Parcel boundaries, easements and other property descriptions are actually derived mathematically (pseudomeasurements). That is, parcel dimensions are derived from survey field measurement ties made to found or set survey boundary monuments (angle points in parcel polygon). These field survey ties are made from the control points of the survey control network.

Lines are very seldom run directly between monuments using today's field procedures. Instead, inverses are later computed in the office between the appropriate survey point coordinate data. These inverses then become the sides of the closed polygons (legal descriptions) constituting legal parcels.

During the subdivision design process further fragmentation (streets, lots, etc.) of the primary polygons are created, and these created parcel lines are also pseudomeasurements. Furthermore, a boundary survey can have multiple opinions (all valid), depending on the found evidence held and the particular application sequence and weight assigned to the rules of legislative law and court case law that are applied. It is therefore critical that any supporting control survey layer be 'read only' and subject to change or modification only with the full knowledge and participation of the land surveyors managing and/or providing the information to the system.

At the local level, the individual land parcels and descriptions of rights in land impacting those parcels are of primary concern. Interestingly, the configuration of the many types of polygons and the attributes attached to the polygons are derived from the primary pseudomeasurements (primary parcel boundaries), which are directly linked to the survey control layer.

Many of these subsequent polygons are a result of map analysis using predetermined criteria or a result of the application of rules concerning legally defined spheres of influence. These subsequent polygons are subject to legislative or ministerial change outside of the normal land transfer or subdivision process. Therefore a hierarchy of polygon data needs to be established in a GIS with the land ownership polygon system being the primary polygon base and the most protected from unauthorized change.

The integrity of the spatial database link to the information base, that is the extent to which any real world feature is actually located at the absolute position represented on a paper map or computer graphics equivalent, may affect the ability of the jurisdiction to rely on spatial queries and analysis for decision making processes.

Audit Trails for Survey Control Layer of GI

Consider using a keyboard and input device command capture buffer to log operator commands to the system as a way to monitor changes made to original data sets. The current practice of simply backing up a changed data set does not reflect how and where and when changes were made and requires large amounts of redundant storage space. Storing operator commands would then require that only three files be saved. The original data sets (archived), the command log and the current state of the database. All other intermediate states can be regenerated if necessary by automated reprocessing of the operator commands to the point in time that is of interest.

Small changes to a GIS are often difficult to retrace or even find, especially when polygons have been dissolved and rebuilt. A change log would be much easier to decipher than the GIS database itself.

Need for Use of True Geodetic Coordinate Systems in a GIS

Current GIS software treats coordinate data as 'flat world', or plane coordinates and this is inappropriate for larger GIS such as for regional, and statewide systems (Office of Planning and Research, CalTrans). The failure to use true geodetic coordinates for large areas will result in poor correlation between the survey point coordinates and related physical features due to scaling distortions.

The Public Resources code needs to be changed to require the use of true geodetic coordinates (latitude and longitude) for GIS that encompass areas larger than one county, or that incorporate areas of multiple counties or that adjoin other states (Oregon, Nevada, Arizona) or other countries (Mexico).

If State Plane Coordinates or Universal Transverse Mercator

coordinates are used for a GIS, the software must handle the ellipsoid rigorously. This means carrying adequate terms beyond the first term in the computation equations and using adequate floating point settings in computer hardware and software to ensure accurate computations.

True geodetic coordinates should be based on the North America Datum 1983 (NAD 83) which is in turn based on the World Geodetic System 1984 (WGS 84).

Other reasons for shifting to latitude and longitude have to do with the end users of GIS, the public, and the coming dominance of GPS as the positioning system of choice for both the public and surveyors.

1. The concept of latitude and longitude is easily explained to layman and decision makers, the state plane coordinate projection systems are not.
2. The concept of latitude and longitude is not associated with coordinate geometry by the layman. They associate it with their geography and history classes, unlike coordinate geometry which is associated with their high school mathematics classes. Why build in resistance to GIS because of the use of certain types of esoteric coordinate systems when the whole problem can be avoided.
3. The layman will be quite familiar with latitude and longitude from using GPS in their cars, boats and airplanes, in fact the operating range of these common vehicles will necessitate using a latitude-longitude system because state plane coordinate systems are designed for relatively limited geographic areas.
4. Latitude and longitude are associated with exploration and adventure, a GIS in latitude and longitude will relate to the entire globe rather than a limited island on it.
5. Modern computers make rigorous latitude and longitude computations an easy task to perform. The reason for the development of state plane coordinate systems in the 1940's was due to the lack of computation machines capable of handling geodetic latitude and longitude. The state plane systems have served us well for almost fifty years, but it is time to leave them behind for mapping. Surveyors will continue to use the system for smaller projects because the units relate to construction and local boundary solutions more directly (feet or meters rather than degrees, minutes and seconds), but the conversion back and forth is easily accomplished by surveyors and is of little concern to the layman.

The North American Vertical Datum of 1988 (NAVD 88) should be adopted as quickly as possible, however, only 25% of NGS control in California has been upgraded from the 1929 adjustment. Very little of the USGS and none of the Corps of Engr. vertical control has been included. This is an area that must be approached with caution since there is roughly a meter difference between the two datums in many parts of California.

All coordinate sets must clearly state the datum and date of readjustment as a permanent part of the record.

To properly fit measurements into a three dimensional geodetic coordinate system (ellipsoid), especially elevations, control station heights, heights of instruments, heights of targets, prisms or antennas must be included as part of the measurement database or be derived from processing measurements in the database.

GIS project internal primary survey control points should at least meet 1st or 2nd order FGCC distance precision ratios (depending on the distance between points which is a function of the degree of densification the survey control net has undergone). However, the exterior of the project polygon should have its primary stations tied to the GPS High Precision Geodetic Network (HPGN) to ensure accurate matching (edge matching) to adjoining GIS projects. The HPGN is many degrees of precision beyond 1st order (a standard developed for conventional survey instruments). Tieing to the HPGN will allow the blocking out of geographic areas by coordinate definition as spheres of influence for each project with assurance that later attempts to merge data will have a minimum of fit problems.

Applying FGCC and Other National Agency Standards

Great care must be used in phrasing referral in legislation to the FGCC accuracy classification standards and specifications. Few surveyors and/or laymen or decision makers are aware that these standards and specifications encompass far more than simple precision ratios (1:50,000 etc.). The FGCC standards and specifications are based on over a hundred years experience building and maintaining a vast continental survey control network. It is an industrial grade document meant to produce control measurements and control stations that will endure for generations and as such it is far beyond the needs of the average GIS in its totality.

The FGCC accuracy standard encompasses minimum distance precision ratios between any two points, it is intended primarily for survey networks (extensive cross connections between points) not traverses, sets forth minimum distances between any two points according to which accuracy class is specified, specifies monument standards for accuracy classes, indicates the form of station descriptions and specifications for reference monuments, specifies minimum procedures for each type of measurement instrumentation, specifies data formats and the method of data reduction and adjustment including the parameters that must be included during geodetic least squares adjustment of conventional or GPS data.

Even a third order point is an

expensive proposition using FGCC criteria. Most projects cannot bear this kind of in depth process. Sufficient latitude for professional judgment must be incorporated in any legislation to allow extracting that which is suitable from the FGCC specifications to accomplish the task at hand in an economical and efficient manner.

Clarification of "Standard" vs Standard Error

Standards have to be implemented by well crafted laws, supported by adequately detailed regulations and effective enforcement mechanisms. There is a great deal of confusion about the relationship of 'map standards' as used in the compilation of paper maps versus the new domain of digital mapping.

The following discussion about geodetic specifications and standards draws heavily on the writings of Dr. Dennis Milbert of NOAA and the FGCC manuals themselves.

A classification standard is a more or less arbitrary rule used to classify geodetic control and is based on accuracy. Standards arise from the need to define the quality of a coordinate or dataset and are simply a mechanism for quality assurance and have the interesting quality that they are completely general and can be used to classify new types of instruments and techniques. Standards define accuracy, and the comparison of data obtained by different types of instrumentation is used to measure opinions of accuracy. The problem is therefore to quantify opinions about quality. Standards are defined as the minimum accuracy necessary to meet specific objectives.

Specifications are field methods designed to meet a required standard and typically control the precision of measurements. Therefore specifications are a distillation of experience with procedures that have been followed which produced surveys of particular desirable qualities and are rules of thumb combined with analysis of error propagation. Specifications vary

CONTINUED ON PAGE 36

THE STEPHEN P. TEALE DATA CENTER

By Will Finfrock PLS

Last year I was flattered by a call from a local consultant who specializes in General Plan amendments and other long range planning concerns. He requested my presence at a planning session for an upcoming project in which he hoped our company would care to participate. In particular, he hoped to tap our tools and expertise to generate a digital base map for a specific county in California. Suffice it to say I didn't hesitate.

I arrived at the meeting, was seated comfortably at the proverbial round table, unpacked my notepad, listened to the Who's Who of education and experience assembled there. There were opening formalities describing the project in broad strokes. Following this was a discussion on the details garnished with a blizzard of acronyms, abbreviations, and buzzwords. I did my best to sift through the banter, collecting what I didn't know, identifying the important from the not so important, noting subjects for further research. Fortunately, most of what I did not know, I did not need to know, but there was one exception worth passing along: The Stephen P. Teale Data Center.

Now for those of you that know more then me, this is where you get off. But for those of you that don't know about the Teale Data Center, I have an interesting tidbit for you. Contrary to popular pundits, our government does contain some clever, efficiency-minded people and the Teale Data Center is a fine example of this position.

In brief, the Teale Data Center is a computing center for the government of the State of California. In an effort to combat the waste of redundant systems, Teale was conceived as a self-supporting, independent entity providing diverse computing services to many branches of government. Too, it was intended to be a central collection point for all the diverse information generated in these separate agencies, making Teale an ideal place to experiment with integrating the disparate information these separate agencies produce. So what's all this got to do with me?, you may ask. All this spells G.I.S. and that is the main thrust of this article: The Stephen P. Teale Data Center is the center of State-based G.I.S. information and the place to watch for what's to come as well as the focal point for professional input.

To pay for my sins of ignorance, I did a little research: I called the Public Relations officer and said, "send me everything you've got printed on the Teale Data Center." Easy enough penance...till the parcel arrived. I waded through it and the gist of it is this: Get the Pocket Guide to the Stephen P. Teale Data Center and save yourself the extra reading. If I may quote a bit at you from the Handbook:

"The Teale Data Center is the largest data center within California State Government. Established in 1972, we provide a wide range of data processing services. Our Clients number nearly 180 and represent most of the agencies of the State with the exception of a few that operate their own computer centers. With the large number of diversified users and applications spanning the length and breadth of the nation's most populous state, Teale has developed into a major complex data center. It is recognized worldwide as a leader in Technology and is bringing the benefits of this technology to its clients. The end result is greater efficiency and lowered costs for the State..."

"Teale offers a variety of Geographic Information System (GIS) services including consulting, training, data entry, data management and data output (plotting). A data library of digital mapped information is being built that can be accessed by clients via graphics workstations. A GIS lab is available for demonstrations and education."

More specifically, the GIS at present is an ARCINFO installation and has been consuming digitized information based USGS mapping for some time. This is linked, at least in theory, to sundry databases including census and transportation information. This information is available as plotted output, as advertised in the Pocket Guide, but what is not told here is that this information is also available in a DXF format... with some limitations.

As to the relative merits of this information, I will leave that to the editorial page. What is important about this is that it exists, that you know about, and consider the ramifications of what will become of this emerging technology if left unmonitored or unsupported by professionals such as yourselves. Particularly those of you in the Sacramento area, for on page 27 of the Pocket Guide is opportunity in print: Under the heading of User Subgroup Meetings, subheading Geographic Information System (GIS) is this blurb:

"The Geographic Information System (GIS) Subgroup provides a forum for effective uses of geographic information from many sources that can be shared across many departments. The GIS Subgroup meets on the 3rd Thursday of every other month."

The point is this: Though the mapping is primarily graphic at this point in time, though the control is negligible and datum limited, and though the information not necessarily the venue of Land Surveyors per se, it is only a matter of time until that changes, until information that does bear on our professional practice begins to find its way into that computing system, only a matter of time until boundaries and questions of accuracy and title, and who is qualified to judge "just-exactly-where-is-that-really" come to bear in a mapping system that covers the entire state, just a matter of time until other end users begin to make their own assumptions about what is right and what is not. The Teale Data Center, or any other entity dealing in the emerging technology of GIS, is a subject that Land Surveyors cannot overlook. We must be participants, supporters and influential in our field of expertise. So anyone interested in snooping?

TO REQUEST COPIES OF THE POCKET GUIDE TO THE STEPHEN P. TEALE DATA CENTER
CALL THE TEALE TECHNICAL LIBRARY AT (916) 920-7263
OR WRITE MARY SCOTT AT THE TEALE PROCESSING STANDARDS UNIT.

Here's Some Important Information About CLSA

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

Representation

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

Education Opportunities

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

Business and Professional Services

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

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☐ $ 13.20 STUDENT MEMBER: A student in a college or university actively pursuing the study of land surveying.
☐ $264.00 SUSTAINING MEMBER: Any individual, company, or corporation desirous of supporting the association.

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A Guide To Safe Contracting

By Lloyd J. Cook, PLS

Does this sound familiar? You land a great job with the deposit paid and a fixed price signed contract and off you go.

Your contract states, "Office and field work necessary to re-establish the deed or lot lines of the subject site. Map showing points found or set and method of establishment is included".

The first day at the site you discover 80% of the control has vanished and you will need to invest three field days and one office day of additional time to replace the control.

The contract was probably prepared under the assumption that control was in place, the crew would have the ability to gain access to all corners and errors do not exist in the deed or tract map. Thanks to these presumptions and a little bit of Murphy's Law your super job turns into a lemon. These false assumptions can be very costly. Unfortunately, most of us find it impossible to visit, research and precalculate the property for each proposal we prepare.

I have a suggested solution which our firm has successfully employed for three years. We discovered that spelling out assumptions in our contract is most beneficial. An assumption is a statement of condition, accepted or supposed true without proof. We tailored our contracts to reflect unknown facts. A project next to an existing job would probably require very few assumptions as opposed to a project in an unfamiliar area. I have included a copy of one of our typical Exhibits *(See Figure 1)* with assumptions, and our Failed Assumption Report *(See Figure 2)* for your review.

CONTINUED ON PAGE 26

Figure 1
Custom Architectural Survey: With On-Site Details With Boundary Corners Set

EXHIBIT A

C.W. Cook Co., Inc. will furnish the following:

1. Locate the footprint and roof caves of the existing structures on site, trees 6 inches or larger, walkways, retaining walls if 2 feet or higher, fences, walls, above ground utilities and other improvements on site.
2. Locate improvements in the street parkway and sidewalk areas, including signs, meters, poles, pull boxes, trees, driveways, etc.
3. Elevations on site, adjacent property and up to 5 feet beyond at sufficient intervals to accurately reflect the slope of the property. Top of curb, flow line and back of side walk elevations (if any) to be measured at 25 foot intervals on the street frontages.
4. A City or County bench mark will be used whenever possible and all elevations will be shown in feet above sea level.
5. Contours will be drawn at an interval that is appropriate to the scale of the map and topography of the site; 1 foot minimum spacing, ten foot maximum spacing.
6. Boundary survey of the deed or lot lines. Set 1 survey marker on each main corner of the property.
7. Public Utilities per city records will be shown in street right-of-way.
8. Easements, as included in the title report furnished by client, will be shown.
9. Map to be drafted in ink at an appropriate scale to fit a standard sheet size (maximum scale 1"=8' and max. sheet 36' x 48').

EXHIBIT B

The client will furnish the following:

1. A current title report describing the property to be surveyed.
2. Any previous surveys of the property or part of the property. (IF ANY).
3. Details of any/all previous or pending litigation on the property to be surveyed.
4. An authorization letter from the owner of record if the client is not the owner of record.

EXHIBIT C

Fee Payment Schedule:

1. 50% deposit. The balance to be paid upon completion of the job, prior to delivery of the product.
2. In addition to the above fee, C.W. Cook Co., Inc. shall be paid for reimbursable expenses such as prints, travel and parking expenses, long distance telephone calls and other expenses incurred as a result of this job at cost plus 15%; 35 cents per mile, 25 cents for photo copies and $1.00 per microfilm or fax copy.

EXHIBIT D

Fee quotes for services are based on the following assumptions:

1. The property will be reasonably free of visually obstructing vegetation or objects.
2. The subject site will be open and readily available for our entry without delay. (No dogs or locks).
3. The dimensions of the subject block and lot close mathematically, within one part in ten thousand.
4. 75% of the controlling survey monuments will be readily available and in their proper locations.
5. The existing structures to be mapped (house, garage etc.) are comprised of no more than 20 sides and that all angles of said structures are 90 or 45 degrees.
6. Details such as hose bibs, trees under 6" in diameter as measured 4' above the ground, drip lines of trees, or minor improvements on site will not be shown.
7. There are no more than two easements and all lines describing said casements are parallel to the property lines.
8. Preparation and filing of a "Record of Survey" map (if required by state law Business & Professions Code Section 8762) is not included.
9. When it is necessary to show elevations and culture outside of the subject site, the adjacent area shall be readily accessible to our field personnel (no locks, no dogs). We assume neighbors will provide immediate access upon our request.

CLIENT INITIALS _____ C.W.C. INITIALS _____

(CONTINUED FROM PAGE 25)

For example, I can cite many past listed 30 easements. If I estimated my fee for a map that needed to show easements, I would either need a copy of the title report to know what I am dealing with, or lacking the report, assume that there were no more than two easements. One or two days of work can be underestimated very easily, just in easements. Most fees are given out without ever knowing how many easements there are.

We had a project last year that included our assumptions in the Exhibit portion of the contract. The site was located in a familiar area where I had worked ten years earlier. The client had paid the required 50% deposit, the job was prepared and the field crew had been sent to the site. I received a call from the party chief advising me there were no centerline points or ties anywhere within two blocks of the site. I advised the crew to return to the office. I called the client and explained the "failed assumption" of no control and an extra day of field and half day of office time would be required under an "extra work order" to continue the project. The client chose not to continue the project, but we were paid for our work to date and able to refund him any funds left over from the deposit.

In explaining the assumption that, "75% of the controlling monuments will be in" or "the number of easements in the title report will be limited" has failed, we eliminate the problem of explaining why the job cannot be completed for the fee stated in the contract. Some of you may feel using assumptions is unfair. The majority of our clients response to this method has been good. It allows good communication with our clients before budgets are blown and tempers have flared.

Be creative using assumptions in your next contract. With good projects in which the title report communication, everyone wins!

Lloyd J. Cook is the Director of the Survey Department of C.W. Cook Co., Inc., a Land Surveying, Civil Engineering and Land Entitlements firm serving the City of Los Angeles since 1911. ❑

Figure 2
The Following Assumptions Have Failed

JOB # _____ SITE _____
DATE _____ BY _____

_____ TIME _____ [ ] Used [ ] Estimated
REASON _____

_____ TIME _____ [ ] Used [ ]Estimated
REASON _____

_____ TIME _____ [ ] Used [ ]Estimated
REASON _____

Field Notes Attached: [ ] Yes [ ] No

DISPOSITION

[ ] PROJECT HELD
Obtain authorization for $ _____ deposit of $ _____
[ ] PROJECT CONTINUING
Obtain authorization for $ _____ *deposit of* $ _____
[ ] NOTIFY CLIENT: Extra charges of $ _____ will be added to invoice
[ ] PROJECT COMPLETE
Include explanation for extra charges of $ _____ with invoice
[ ] Hold Plans [ ] Release Plans

Mount Diablo Surveyors Historical Society

By Herb Kilmer

Editor's Note: The following is a reprint, with permission, of some of the articles from the First Edition of the Mount Diablo Surveyors Historical Society Newsletter. Anyone interested on joining the Historical Society or wanting more information should contact Don Marcott at the address below.

The Mount Diablo Surveyors Historical Society and its members from California and Nevada invite you to join us in realizing some very worthy objectives.

Our profession, born at the dawn of civilization, has passed through 50 centuries nearly unchanged in purpose. Sadly, most of our ancient history and artifacts have been lost. If we fail to preserve that which is left to us we will surely be the poorer and forget who we were and from whence we came.

Our Society was founded by members of the profession to preserve the past and the present for tomorrow. We are a nonprofit corporation directed by volunteers. The Society spends most of its funds on the purchase and display of rare and distinctive instruments, maps and publications. The Society is also approved by the IRS to receive charitable donations of money, grants and artifacts, as a nonprofit, tax-exempt entity.

The Society needs and solicits your support and participation to help track the footsteps of the past. As a member you are offered the opportunity to participate in Society activities and most important, you will be helping to preserve the heritage of surveying and mapping for your children and grandchildren.

We have members who are acknowledged experts in the preservation, restoration and identification of surveying artifacts. Any request for information will be forwarded to them so they may answer you directly.

Please join us today in this important work!

Board of Directors:

Norman Payne
Eugene Phipps
Don Marcott
Myron Lewis
Kristy Davis

MOTTO: COLLECT, PRESERVE, DISPLAY

Historical Biographical Note

William J. Lewis (born in Chester County, Penn., April 5, 1812) First elected County Surveyor of Santa Clara County, California, 1852-1855...

His father was a teacher of the Quaker denomination, skilled in mathematics. William inherited this skill and became a Surveyor/Engineer and worked for various railroads throughout the eastern states until 1842, at which time he then taught in Philadelphia for six years.

In 1849 he came to California and spent a short time mining in Tuolumne County, finally settling in Santa Clara County where he farmed a small tract near San Jose with Captain Winslow and Mr. Hathaway. In 1850 he opened a surveying/engineering office in San Jose and from 1852-1855 served the County as its surveyor. His surveys were accurate, impartial and his maps neat and reliable.

In 1855 he accepted the office of City Surveyor in San Francisco and subsequently surveyed the line of the San Francisco-San Jose Railroad, Benicia-Marysville Railroad, Western Pacific Line from San Jose to Sacramento and the San Jose-Gilroy Extension. In 1853 he was also a U.S. Deputy Surveyor and in this capacity also surveyed many large ranches and Mexican Grants, among them the famous 'Panoche Grande'. From 1867-1870 he was Chief Engineer for the construction of the San Francisco Seawall. A Proud Heritage!

Next issue: A copy of his report to the Mayor and Council of Placerville for a railroad to Sacramento.

Past Activities

The Society displays surveying artifacts for the general public. For the past two years we have displayed at the annual Living History Days, at the San Jose Historical Museum. The museum strives continually to provide programs of educational benefit to the community. We plan to continue to participate.

To commemorate National Surveyors Week and Surveyors Week in Santa Clara County, during March and April, 1991, we displayed surveying equipment, historical maps, old photographs and artifacts at the County Government Center in San Jose.

In March, 1991, the community also saw our display at the Pioneer/Settlers Days Celebration held at Evergreen Junior College in San Jose. It was a very well received one-day showing.

FRESNO: In January 1991 and January 1992, we displayed at the 30th and 31st Annual Surveying and Engineering Conference sponsored by California State University, Fresno... a smashing success!

NEVADA: In March, 1992, still another display was set up at the California Land Surveyors Association and Nevada Association of Land Surveyors joint conference in Sparks... We're EVERYWHERE!!!

Membership Invitation

The Mount Diablo Surveyors Historical Society (MDSHS) is created to enrich the general public by collecting, preserving and displaying the knowledge, technology and artifacts of the land surveying profession. Any person who has an interest in our purpose is eligible for membership. For more information contact:

Mount Diablo Surveyors
Historical Society
5042 Amethyst Court
San Jose, CA 95136-2601
Attn: Don Marcott, Secy/Treas ❑

Lot Line Adjustments Defined by Recent Court Case

By Michael J. Pallamary

The California Land Surveyors Association recently served a vital role in an important lawsuit on the issue of the lot line adjustment process. The effects will be felt statewide and would establish case law on the subject.

History

Contained within section 66412 (d) of the California Subdivision Map Act (SMA) is the exclusion of lot line adjustment procedures which was the result of a bill originally sponsored by the California Council of Civil Engineers and Land Surveyors. At the time of its inception, members of CLSA reviewed the bill and contributed to the language used therein. The Association also provided support for the passage of the milestone legislation.

Spurred by an overall effort by both organizations to "clean up" certain provisions of the SMA as well as to isolate those items not subject to discretionary review by local agencies and cities, the exclusions severely restricted the ability of cities and counties across the state from imposing needless and costly regulations to what is an otherwise benign procedure.

In 1985, prior to the passage of the legislation, the language within Section 66412 (d) of the SMA stated:

"This division (SMA) shall be inapplicable to...A lot line adjustment between two or more existing adjacent parcels, where the land taken from one parcel is added to an adjacent parcel, and where a greater number of parcels than originally existed is not thereby created, provided the lot line adjustment is approved by the local agency, or advisory agency."

As a result the legislation, carried by Senator Greene, amended the SMA by adding the section which was subsequently challenged by the several cities across the state. Appended to the original provisions within the SMA, the legislation was revised as follows:"

A local agency or advisory agency shall limit its review and approval to determination of whether or not the parcels resulting from the lot line adjustment will conform to local zoning and building ordinances. An advisory agency or local agency shall not impose conditions or exactions on its approval of a lot line adjustment except to conform to local zoning and building ordinances, or except to facilitate the relocation of existing utilities, infrastructure, or easements. No tentative map, parcel map, or final map shall be required as a condition to the approval of a lot line adjustment. The lot line adjustment shall be reflected in a deed or record of survey which shall be recorded."

A subsequent revision included the passage that "No record of survey shall be required for a lot line adjustment unless required by section 8762 of the Business and Professions Code."

The 1986 revision was perceived by its sponsors, CLSA and the legislature as being clear in its intent to strictly limit the extent of discretionary approval allowed by local agencies to impose conventional subdivision requirements for lot line adjustments.

Objections to the legislation were lodged by the League of California Cities, the County Supervisors Association of California, and the American Planning Association. Others objected to the bill including Lassen County Engineer/Surveyor John D. Mitchell who argued:"...The proposed language would expand the spectrum of the lot line adjustment with further limitation on the local agency to control its use....The sale or conveyance of lots and parcels described or depicted on United States government survey maps would open the door for land butchers to sell any sectionalized land without review by the local agency's approval. This would be disastrous in the rural counties."

David Schricker, City Attorney for Redwood City argued that the proposed amendment would "...set a bad precedent of inhibiting local agency review."

Nonetheless in spite of the opposition the legislation was adopted and on January 1, 1986 was codified as state law.

City of San Diego's Approach

Still dissatisfied with the limitations placed on their governing actions, several cities and counties adopted "revised" procedures for the processing and approval of a boundary line adjustment plat, including the City of San Diego. In its "revision" to their local requirements the City of San Diego provided for two "optional methods" for the processing of lot line adjustments. One allowed for the filing of a conventional parcel map without requiring the processing of a tentative parcel map. All that was required in the way of planning review was an approval as to the zoning setback location of the existing structures as well as an

approval of zoning area requirements.

The second "alternative" involved the processing of a "Lot Line Adjustment Plat". In order to satisfy the conditions of this option, compliance had to be met with seven pages of processing, planning, engineering, building, and mapping requirements including the necessity to submit a hefty fee "deposit" for the review and approval of the various departments examining the submittal. Included with this examination was the review of traverse closures, title reports, and associated "engineering" endeavors. The plat was required to be prepared on mylar with ink in addition to being the same size as a standard parcel map. A comparison with the mapping standards and submittal requirements for city parcel maps revealed that the requirements were identical including all of the codified peculiarities associated with that document such as scale accuracy, Lambert Coordinate indexes, standardized lettering, information regarding surrounding surveys, maps, etc. Also required was a vicinity map, the accurate location of all easements, rights of way, public utility easements, "...together with indications of dimensions and nature of said rights-of-way, property or easements."

The plat was also required to show the location of "all structures and parking lots". Upon recordation of required trust deed modification documents, when the material was "found to be satisfactory" by the city engineering department the package was forwarded to the planning Director for the processing of a Certificate of Compliance by that department. In the event monuments were to be set, a record of survey map was to be submitted to the County of San Diego and that document was processed in accordance with that agency's requirements.

As a result of the onerous regulations mandated by the second "alternative" most practitioners opted for the filing of the parcel map especially when monuments were to be set.

Michael Pallamary, a member of the San Diego chapter of CLSA immediately questioned the city's newly adopted procedure in light of the limitations imposed by the legislature by its revision to Section 66412 (d). In a letter to the city engineering department accompanying a lot line adjustment being processed by Pallamary, the alternative parcel map was submitted under protest. In the process Pallamary questioned the city's new policy.

Unable to elicit a response from the city engineer's office, a letter was sent to City Attorney John Witt, in which Pallamary wrote:

"I have had some difficulty in advising my clients as to what procedures are to be employed while attempting to process a boundary line adjustment within the city. This is due to the fact that the conditions imposed upon one seeking to process a boundary adjustment are as demanding if not more demanding that those conditions required for a parcel map or final map."

Pallamary also questioned the redundant processing requirements with the city planning, building and engineering departments.

Six weeks later on August 22, 1986 Deputy City Attorney Frederick Conrad responded to Pallamary by noting: "...it is my opinion that the procedure that has been established is consistent with California Government Code Section 66412 (d)."

The County of Santa Cruz Looks at Lot Line Adjustments

Several years later in Santa Cruz County, the Board of Supervisors in that region began to tinker with their local ordinance in an effort to extract exactions on lot line adjustments within that jurisdiction.

In the summer of 1990, the County of Santa Cruz Planning Commission in response to earlier actions of the Board of Supervisors drafted a new ordinance. Objections were immediately filed by local practitioners under the opinion that the operative language was quite "clear" as to intent.

The proposed revisions to County Code Chapter 14.01 would have established a new entity to be known as a "Parcel Reconfiguration" which, according to practitioner Robert Dewitt, were "...supposed to govern lot line adjustments that have been deemed to be something else."

In addition Section 14.01.105-L proposed that a myriad of conditions were to be met before even simple lot lines could be "reoriented" as opposed to being "relocated". Included within the new regulations was a requirement that in order to qualify for a lot line adjustment there had to be problems with the property. Also a limitation was placed on a property so that in the event more than 3% of the net area was adjusted or when a boundary line was reoriented more then 15 degrees than a lot line adjustment would not be allowed and the property would be subject to the newly proposed regulations imposed by the "parcel reconfiguration". The proposed ordinance also disallowed the "creation" of "additional building sites."

In the event a parcel was "reconfigured", then a parcel map would be required while "lot line adjustments" did not require the filing of a parcel map.

Also required were the approval and conformance with the county's general plan as well as restrictive coastal development regulations when the property was located within the coastal zone. As a result of environmental concerns a subsequent amendment allowed for "technical studies" in the event compliance with building sites under existing regulations was needed by the city.

Summarizing his objections, DeWitt noted:

"...the attempt to impose additional requirements on approval of lot line adjustments contrary to State law does not make for good government. Recognize that this County has a plenitude of regulations governing the actual development of parcels and the presence or lack of a lot line adjustment does not guarantee a building or development

permit....the Commission should send this item back for staff preparation of an ordinance that conforms to State law."

In a public hearing held on the matter on September 26, 1990, staff entertained the input of local practitioners. Several benign revisions were made. Despite the numerous objections, the County planning department presented their recommendation to adopt the newly drafted ordinance to the council. In yet another amendment staff included a restriction that in the event the property was located within an area where the average slope exceeded 20% or more then the application would be subject to the county's environmental review guidelines. Also a "Parcel Reconfiguration" was not eligible for a categorical exemption under the county's environmental regulations.

Chagrined with the county's failure to adequately respond to his concerns, DeWitt and local practitioners contacted Executive Director Paul Meyer with the California Council of Civil Engineers and Land Surveyors (CCCE&LS). Meyer forwarded DeWitt's concerns to Jim Corn, the Council's legislative representative. Agreeing with DeWitt's position, Corn offered his assistance on behalf of the council.

"What they are doing," wrote Corn, "is turning the lot line adjustment procedure into a parcel map procedure..."

On October 10, 1990, at the monthly meeting of the Monterey Bay Chapter of CCCE&LS, the 28 members in attendance voted unanimously to endorse DeWitt's position while concurrently requesting legal counsel be retained on behalf of the council to challenge the newly proposed ordinance.

Regardless of local concerns, the planning department forwarded the ordinance on to the Board of Supervisors for a public hearing to be held on May 7, 1991.

On behalf of the Bay Chapter DeWitt filed another objection noting that the proposed ordinance "...does not conform to the requirements of the State Subdivision Map Act." On June 4, 1991, the Board of supervisors unanimously adopted ordinance 4132 complete with its nine pages of detailed regulations governing parcel reconfiguration and lot line adjustments.

George Dunbar, a longtime practitioner in Santa Cruz grew as dismayed as DeWitt and in the process filed a letter of concern and protest with both CCCE&LS and CLSA. In response to a total disregard for his concerns and those expressed by local practitioners, Dunbar contacted State Senator Henry Mello of the seventeenth Senatorial District in an effort to seek his assistance in obtaining a State Attorney General's opinion.

In response to Dunbar's efforts, on January 10, 1992 Senator Mello requested a legislative legal opinion regarding the validity of the Santa Cruz ordinance. On the same day Paul Meyer, requested that Jim Corn communicate with the Chief Legislative Counsel Bion Gregory to provide input and background into Senator Mello's request.

Corn's letter reiterated what was now becoming a common theme. That is that "Ordinance No. 4132 is inconsistent with the Subdivision Map Act and, therefore is invalid...Reading all of the statutes together compels the conclusion that any local ordinance which requires the filing of a tentative and parcel, or tentative and final map as a condition of a lot line adjustment violates state law which specifically indicates that Subdivision Map Act compliance is not required other than the approval of the lot line adjustment."

Corn also noted that "The whole purpose of the lot line adjustment was to have an inexpensive and speedy remedy for a lot owner who wishes to reconfigure the lot lines in a parcel subject to the limitations in section 66412 (d)."

The Project

Meanwhile in San Diego the city attorney's office advised the planning department to scrutinize and deny the submittal and processing of any lot line adjustments deemed to be "major".

The property that precipitated the city attorney's new policy was located at the mouth of the river just to the east of Interstate Route 5 where it runs alongside the Del Mar Racetrack. On the south edge of the river lay 189 acres of land held by a consortium of property owners who had been attempting for years to develop the property. Over the years preceding the city's rejection of its latest plans for readjusting lot lines, the owners had been denied countless processing efforts and attempts to extend utility lines and conventional planning mechanisms. According to the property owners "It was clear the city was not going to let them do anything with their property."

The City had plans for the acquisition of all the property bordering the river in the hopes of establishing a City Park. Over the years, the owners offered to sell the property to the city for fair market value in an effort to accomplish this goal. Each time they refused.

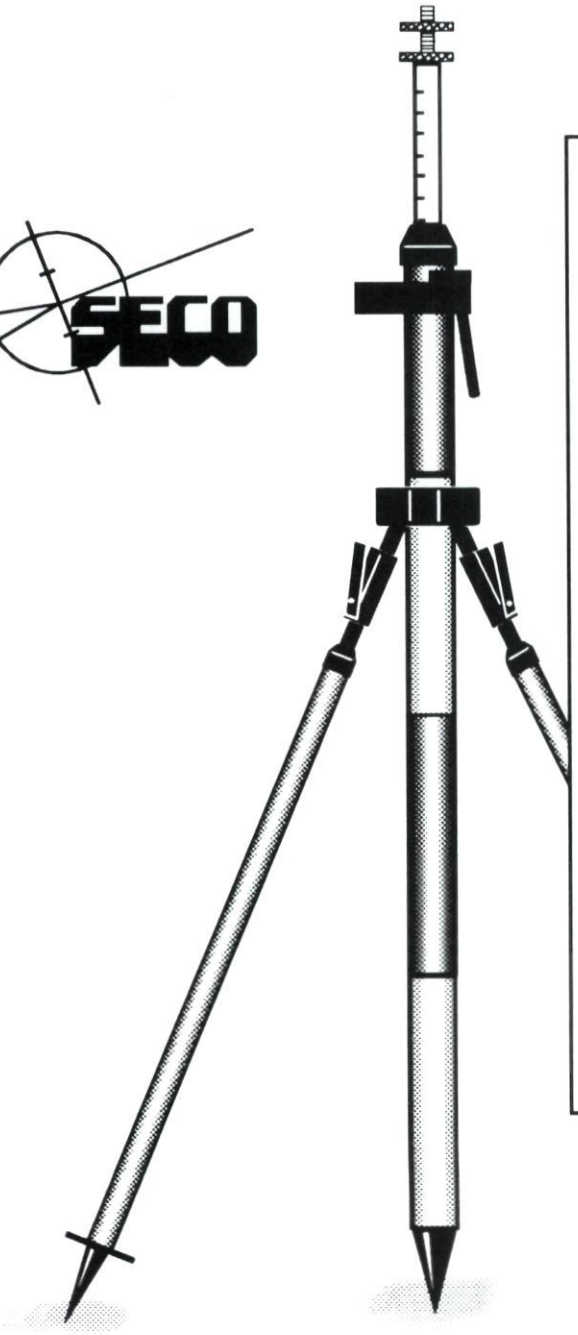
Along the property's eastern boundary the city continued in its efforts to accommodate the region's burgeoning development by relocating a primary artery, El Camino Real. The realignment involved a series of hostile condemnations and by the time the dust had settled, the 189 acre parcel and the surrounding properties had their boundaries modified in order to accommodate the city's new roadway.

With the relocation of El Camino Real, and a desire to better utilize the land, the owners elected to reconfigure their property, composed of nine separate parcels so as to provide direct access onto the recently relocated roadway. Accordingly they retained Rick Engineering, a local engineering firm, highly respected for their planning and engineering expertise, to process their application.

The plan called for the reconfiguration of nine parcels of land located within a consortium to be known as "Stallions Crossing", owing to its proximity to the racetrack and the Fairbanks Ranch Polo Club. The existing parcels had

CONTINUED ON PAGE 32

California Combo



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(CONTINUED FROM PAGE 30)
originally been created by the conventional quarter-quartering associated with sectionized lands. With regards to the legality of the parcels, each was individually recognized as a legal lot either by its compliance with state and city subdivision ordinances or by the previous issuance of a Certificate of Compliance by the city's planning department.

When the map was prepared, the city "strongly suggested" that the map be labeled as a "Parcel Map". Roy Collins, heading the consortium refused to submit the document in that format, recognizing that to do so would make him vulnerable to the provisions delineated by the SMA. Collins, quite familiar with the SMA and particularly suspect of the city outlined a meticulous plan with Rick to assure full and complete compliance with the provisions of the SMA. Together with Rick's knowledgeable input, the proposed "Lot Line Adjustment Plat" was submitted to the city planning department where, under the direction of Deputy City Attorney Conrad, the application was rejected. Conrad opined that the project as submitted constituted a "major" lot line adjustment as opposed to a "minor" lot line adjustment and as such could not be processed. Furthermore he stated that a tentative subdivision map would have to be submitted and the project would have to be subjected to conventional subdivision scrutiny. According to Collins, "It was obvious they wanted to force us to go through the subdivision process so that they could take our land as open space, thus circumventing their obligation to purchase the land."

With no success in processing the map, Collins, on behalf of his partners, the San Dieguito Partnership petitioned the Superior Court for a preemptory writ of mandate in the hopes of persuading the court to compel the city to accept the lot line adjustment map for filing. The partnership retained the respected firm of Worley, Schwartz, Garfield & Rice to make the filing. Attorney Donald Worley filed the necessary paperwork.

The Lawsuit

The matter was heard on November 7, 1990 by the Honorable Michael I. Greer, Judge presiding. Both sides presented the usual briefs supplemented by oral arguments in support of their respective positions.

The city's primary argument was based on the contention that according to the SMA it was "...clear that there is a limit to the number of lots which may be adjusted under the exemption provided in section 66412 (d)....and that this exemption was intended to permit only minor changes in parcel lines without requiring the processing of an entire subdivision map."

Before Judge Greer, the city's arguments prevailed finding "that the normal precepts of statutory construction support the administrative decision of the city's planning department" and that the Partnership's proposed lot line adjustment "'created" more than five lots and therefore "required the filing of a tentative map and final map."

"Here," wrote Greer, "I find that the proposed multiple lot line adjustments, which would create 9 reconfigured parcels involving over 189 acres in an environmentally sensitive area, is not a minor change in parcel lines." With Greer's decision before them, Collins, Worley and Rick regrouped and decided to submit a lot line adjustment which took into consideration each of the points raised by Greer. In February 1991, a very simple lot line adjustment was resubmitted to the city. Concurrently an appeal was filed by the Partnership with the Fourth District Court of Appeals.

The two lot line application was similarly rejected by the city. According to Conrad, by allowing the simple two lot lot-line adjustment to be processed would allow for a step by step adjustment to achieve the objective sought by the nine lot application.

On April 17, 1991, Conrad notified Collins that because of the "percentage" of land that was being adjusted, that it was evident that the adjustment was not "minor" and as such was rejected.

Attorney Worley responded by arguing that the two lot adjustment should be considered on its own merits and that it was presumptuous for the city to assume that other adjustments would follow. Conrad again denied the application and another appeal was made to the Superior Court. On August 19, 1991, the Honorable Lawrence Kapiloff heard the matter. In the ensuing hearing, Kapiloff sustained the city's position on the basis that because an appeal had been filed with the Fourth Circuit, it would be premature for him to rule on the case as it was inextricably intertwined with the matter pending before the Appellate Court.

Meanwhile, as a result of the pending lawsuit, the city began denying all lot line adjustments deemed to be "major" by the city's unpublished and unknown guidelines. Over the months to follow about one third of the projects submitted were rejected.

One of the applications denied was one submitted by Pallamary. His application was for a reconfiguration of four lots located in a densely developed neighborhood of 50 foot by 100 foot lots. Up until the fall of 1990, the lots had been developed with single family homes existent since the 1940's. Two of the lots had irregular boundaries and fronted on a busy street while two others were substandard in width. Pallamary attempted to realign the boundaries in order to bring the lots into conformance with existing zoning regulations as well as to make access safer to the lots.

His client had recently sought out Pallamary's assistance after her husband had died leaving her the property. He had plans to donate the property for a school site for his congregation but with his untimely death, the project was abandoned. The widow had been advised by Pallamary and her realtor that the lots as currently configured were unsafe and that in order to make them safer and more marketable, the lot lines should be readjusted.

Pallamary assured his client that he could process the lot line adjust-

ment as he had just processed an identical one three months earlier. He had also been processing similar adjustments on a regular basis since 1983. Nonetheless as a result of the pending litigation, Pallamary's adjustment was denied.

In the course of his inquiries into the basis for the denial, Pallamary learned of the Partnership project and the pending litigation. Like Worley, Pallamary argued that his application must be viewed independent from the pending matter.

In a subsequent communication with Conrad, Pallamary continued his discussions of five years earlier. Conrad opined that the existing legislation was "flawed" and was a very poorly written piece of legislation. He also stated that one could not adjust a boundary line if the parcels to be adjusted were only in contact at one point. Because a point had no dimension, he argued, it could not be adjusted.

In response to Conrad's opinion, On December 6, 1991, Pallamary sent Conrad a lengthy letter outlining the history of the legislation as well as his roll, that of CCCE&LS and CLSA in sponsoring, reviewing and lobbying for the legislation.

Two weeks later, Conrad responded to Pallamary, informing him that as used in the context of the SMA, "adjacent" meant "contiguous". "While it may be argued that my position is unduly conservative or restrictive", wrote Conrad, "I believe my position is consistent with the present wording of the section in question."

One week later Pallamary responded by submitting a series of lot line adjustments that had been processed and approved over the five years since the amendment to the SMA. In each selected case, "points", "lines" and "major" lot adjustments had all been approved, all in contradiction with Conrad's ever changing arguments. Meanwhile, faced with financial hardship, Pallamary's client abandoned her adjustment application and proceeded to sell off her oddly shaped lots at a loss. Conrad meantime never responded to Pallamary's concerns.

In the process of debating the subject with the city, Pallamary reinitiated his past communications on the matter and sought out the assistance of CLSA. As a past chapter representative and chapter president, Pallamary began to contact members across the state. He also contacted the partnership attorney, Don Worley to inquire about assisting in the lawsuit. Between the two it was determined that the only avenue available before the court was to file an AMICUS CURIAE, or a "Friend of the Court" on behalf of any surveyor interested in the outcome of the matter. Because of a conflict of interest, Worley was unable to assist in the matter. Instead the well known and respected law firm of McDonald, Hecht & Solberg was consulted and they agreed to represent the surveyors in the lawsuit.

Amicus Curiae

With all parties cognizant of the importance of the lawsuit, it was decided that the best approach was to see if the California Land Surveyors Association could be persuaded to file the lawsuit on behalf of the Surveyors of the state of California. Armed with a stack of legal papers and ordinances, Pallamary flew to Fresno to the January meeting of the Board of Directors of CLSA where he sought the approval and support. Because of the extremely short time frame of the appeal, a decision had to be made immediately and the lawsuit had to be filed within a scant four weeks time. A lot of work needed to be crammed in over the next 28 days.

Pallamary presented his ideas to the Legislative Committee of CLSA. He argued that because this was legislation CLSA had reviewed and played a role in, the organization had an "obligation" to defend its position and understanding of the legislation. After spirited debate, the committee endorsed the idea and agreed to speak in favor of filing the lawsuit in the board meeting which was to follow that afternoon.

Before a crowded room of anxious surveyors, the proposed lawsuit was discussed and again debate followed. The decision had to be made that afternoon and a procedure had to be adopted that would ensure a successful continuance of the board's decision through the filing of the lawsuit.

Upon preparation of the legal papers, the Executive Officers would reserve the decision to proceed with the filing of the lawsuit. A unanimous vote was logged and the work began. It was agreed that the draft would be reviewed by the Executive Committee and that Pallamary would serve as the funnel for information. Over the following week, in an unprecedented act of statewide participation, members from San Diego to Humboldt County crafted the draft language for the lawsuit. Over 500 pages of material were faxed across the state and before the initial paperwork was completed, twenty members and advisors were consulted. Each and every revision was faxed to the advisory committee and each and every member's concerns were addressed, inserted, modified and reworded in order to accommodate everyone's interpretation of section 66412 (d) as well as their desire to comment on the tenure of the lawsuit. Such an extraordinary endeavor proved to be an exemplary example of the Association's ability to respond to a crisis and its phenomenal ability to work together to tackle such a diverse issue. Perhaps more importantly was the universal understanding of the subject and the unwavering opinion of the professional surveying community in understanding the subject.

With just hours to spare, the Association's draft was forwarded to the attorneys and over the next five days, they redrafted the paper. Within hours of the court imposed deadline, the brief was filed.

The Association's arguments relied heavily on the legislative history of the SMA revision. Additionally, Jim Corn and CCCE&LS lent their support in providing historical information on the subject as the bill had been originally sponsored by that organization.

"It is quite clear," argued CLSA, "from the discussion in the analysis generated by SB 756 that the 1985 amendment was an attempt to limit a local entity's review of lot line adjustments and provide for mandatory approval of lot line adjustments if local zoning ordinances and building-type ordinances were satisfied.... In essence, the Court would be repealing the 1985 amendment and permitting the (earlier) 1976 version of 66412 (d) to govern. Such action is more appropriate for the legislative branch, not the judicial branch."

In response, the city argued that CLSA's brief should not be accepted or considered by the court on the basis that the Association's position "reflects a total misunderstanding of the very statute amicus (CLSA) claims responsibility for pushing through the legislature. Amicus' position is irrelevant to the facts of this case."

Furthermore, the city argued that the research material provided by the Association "shed very little light on the issue at hand..." In "sum" argued city attorneys, CLSA's exhibits "are poor examples of "legislative history" and shed no real light on the issue in this case. They should be given little, if any weight."

It was also at this time that both CLSA and CCCE&LS became commonly aware of the San Diego and the Santa Cruz problems and the similarity in the two subjects. Extensive communications commenced immediately between these two cities and information was traded across the state. Statewide, fax lines were again ignited.

In the meantime, because of the unwavering persistence of George Dunbar and his associates in Santa Cruz, Senator Mello's response from the State Legislative Counsel arrived on April 7, 1992 (See Legislative Counsels letter on page 35). In direct response to the issues raised by Dunbar, DeWitt and others within the Monterey Bay area, Bion Gregory, the Legislative Counsel agreed that "Santa Cruz Ordinance No. 4312 violates subdivision (d) of Section 66412 of the Government Code."

Buoyed by the Legislature's confirmation of the intent of the legislation as well as the affirmation of the Monterey Bay area Surveyor's position, everyone waited for the appellate court decision to be handed down.

Appelate Court Decision

On June 22, the Honorable Judges P. J. Todd, J. Froehlich and J. Nares, in a unanimous 21 page decision decisively overturned the lower court ruling and sided with the San Dieguito Partnership and CLSA.

Key to the justice's ruling was their independent interpretation of the importance of the use of the various words utilized in the legislation. Citing Webster's dictionary and numerous established legal authorities on the subject the court opined on the use of the word "adjacent".

"Under this commonly understood meaning of adjacent as near or close to, rather than adjoining, touching or contiguous, all of the parcels involved in the lot line adjustment we consider were "existing adjacent parcels." It literally was a "lot line adjustment between two or more existing adjacent parcels" that resulted in the same number of reconfigured parcels after the adjustment."

"... If the legislature had intended to restrict lot line adjustments to those involving one existing parcel adjusting its lot lines so as to result in only one adjacent parcel having different lot lines with land added only from the first parcel, it surely could have made this specific."

Of particular interest in their decision was the court's use of the word "reconfigure" which they adopted without the benefit of the Santa Cruz debate, thus providing a further testimonial to the validity of the arguments in that county.

Finally the court ruled that "whether particular land is "environmentally sensitive" plays no role in determining the applicability of the statute. If the trial court factored the "environmentally sensitive" aspect into its decision, it erred."

In commenting on CLSA's role in the matter the justices took issue with the city's opinion of the legislative history of the 1985 amendment.

"Amici curiae, California Land Surveyors Association, points out that the Legislature added these three sentences (limitations on local agencies) in 1985. Amici argues these changes were intended to limit local entity review of lot line adjustments and provide mandatory approval of them if local zoning and building ordinances are satisfied. City concedes the "statute prohibits the conditioning of lot line adjustments so as to protect owners from onerous conditions." City argues, however, the statute does not prohibit it "from finding, under proper circumstances, that the lot line adjustment process is not appropriate and a subdivision map is required." In light of the clear statutory language, we cannot accept the City's position that it may require a subdivision map based on its own finding "the lot line adjustment process is not appropriate," apparently by any standard it chooses."

As of the date of this writing (July 1992) the city attorneys were considering filing an appeal with a higher court.

On behalf of the Association it must be noted that special thanks must be extended to Hal Davis, Ernie Pintor, George Dunbar, Michael McGee, Vince Sincek, Joe Betit, Kurtis Hoehn, Billy Martin, Fred Kett, Kenny Fargen, Gary Leonard, Gary Lippincott, Paul Cuomo, Lou Hall, Dorothy Calegari, and Jim Corn for their unwavering commitment and support of this endeavor and CLSA.

Michael J. Pallamary is a California Licensed Surveyor and is the President of Precision Survey and Mapping of San Diego and Land Survey Service of La Jolla. Pallamary's firm specializes in land boundary matters. He is past president of the San Diego Chapter of the California Land Surveyors Association and has been practicing surveying since 1971.

[1]Amicus curiae as defined by blacks law dictionary means literally, friend of the court. A person with strong interest in or view on the subject matter of an action may petition the court for permission to file a brief, obstensibly on behalf of a party but actually to suggest a rationale consistent with its own views. ❑

Legislative Counsel Opinion on Lot Line Adjustment

April 7, 1992
Honorable Henry J. Mello
5108 State Capitol, Sacramento, CA
Subdivision Map Act: Lot Line Adjustment #4470

Editor's Note: The following is a letter from the State's Legislative Counsel's Office in response to a request by Senator Mello concerning the County of Santa Cruz's Lot Line Adjustment Ordinance.

Dear Senator Mello:

Facts: You have submitted to us a copy of Ordinance No. 4132 regarding line adjustments and parcel reconfigurations enacted by the Santa Cruz County Board of Supervisors on June 4, 1991. The ordinance defines a "lot line adjustment" to mean a reorientation of a property line to, among other things, avoid physical obstructions or to correct errors in recorded descriptions, but expressly excludes from that definition, the reorientation of a property line in which either: (1) any parcel would transfer or receive net land area greater than 3 percent of its current land area or (2) any boundary line would be changed in its relationship to a current boundary line by an angle exceeding 1 degrees (subd. (a), Sec. 14.01.105-L, Santa Cruz Co. C.).

In addition, the ordinance authorizes a lot line adjustment when either: (1) a boundary line is changed to cure structural encroachment where the resulting boundary line coincides with the required minimum setbacks from the encroaching structure, or any approved variance therefrom or (2) boundary lines among four or fewer parcels which meet in at least one point or share common boundaries are changed, where all parcels involved are separate legal parcels, all meet the minimum parcel size required by the zoning designation, and each has obtained a determination of buildability, both currently and as adjusted (paras. (1) and (2), subd. (b), Sec. 14.01.105-L, Santa Cruz Co. C.).

The ordinance defines a "parcel reconfiguration" as a change of property line or property lines that does not qualify as a lot line adjustment or require[s] a minor land division or subdivision (Sec. 14.01.105-P, Santa Cruz Co. C.). The ordinance requires, as a condition of approval of a parcel reconfiguration, the filing of a parcel map (subd. (e), Sec. 14.01.107.5, Santa Cruz Co. C.).

Question: Does Santa Cruz County Ordinance No. 4132 violate subdivision (d) of Section 66412 of the Government Code?

Opinion: Santa Cruz County Ordinance No. 4132 violates subdivisions (d) of Section 66412 of the Government Code.

Analysis: Section 66412 of the Government Code 1 is part of the Subdivision Map Act (Div. 2 (commencing with Sec. 66410, Title 7), which establishes a statewide regulatory framework for controlling the subdividing of land. The act requires, generally, that a subdivider submit and have approved by the city or county in whose jurisdiction the land is situated a tentative and a final subdivision map in connection with any division of land creating five or more parcels, and that a parcel map be filed in connection with divisions of land creating four or fewer parcels (see Secs. 66411, 66424, 66426, and 66428). The act prohibits the sale, leasing, or financing of any parcel of real property, or the construction of any building thereon, for which either a final subdivision map or parcel map is required, until a map, in full compliance with the act and any local ordinance enacted pursuant thereto, has been filed for record (Sec. 66499.30).

This approval authority, as well as the authority to enact ordinances supplementing the Subdivision Map Act, enables cities and counties to regulate land uses within their boundaries, to control the design of subdivisions, and to require subdividers to provide various on-site and off-site improvements and to pay fees and dedicate land for specified public purposes, whenever approval is sought for a proposed land division that falls within the scope of the Subdivision Map Act (see Friends of Lake Arrowhead v. Board of Supervisors, 38 Cal. App. 3d 497, 505).

Requirements imposed by the Subdivision Map Act generally apply to subdividers, which the act defines as "[a]ny person, firm, corporation, partnership or association who proposes to divide, divides, or causes to be divided real property into a subdivision for himself or for others" (Sec. 66423).

The term "subdivision" is defined for purposes of the Subdivision Map Act by Section 66424, as follows:

"66424. 'Subdivision' means the division, by any subdivider, of any unit or units of improved or unimproved land, or any portion thereof, shown on the latest equalized county assessment roll as a unit or as contiguous units, for the purpose of sale, lease or financing, whether immediate or future except for leases of agricultural land for agricultural purposes. Property shall be considered as contiguous units, even if it is separated by roads, streets, utility easement or railroad rights-of-way."

A "subdivision", as defined by Section 66424, occurs when a unit or contiguous units of land are divided for the purpose of sale, lease, or financing. Section 66412 provides, in pertinent part, as follows:

"66412. This division [the Subdivision Map Act] shall be inapplicable to:

"(d) A lot line adjustment between two or more existing adjacent parcels, where the land taken from one parcel is added to an adjacent parcel, and where a greater number of parcels than originally existed is not thereby created, provided the lot line adjustment is approved by the local agency, or advisory agency. A local agency or advisory agency shall limit its review and approval to a determination of whether or not the parcels resulting from the lot line adjustment will conform to local zoning and building ordinances. An advisory agency or local agency shall not impose conditions or exactions on its approval of a lot line adjustment except to conform to local zoning and building ordinances, or except to facilitate the relocation of existing utilities, infrastructure, or easements. No tentative map, parcel map, or final map shall be required as a condition to the approval of a lot line adjustment. The lot line adjustment shall be reflected in a deed, which shall be recorded. No record of survey shall be required for a lot line adjustment unless required by Section 8762 of the Business and Professions Code* * *" (Emphasis added.)

Thus, subdivision (d) of Section 66412 exempts from the requirements of the Subdivision Map Act, the adjustment of a line: (1) between two or more existing adjacent parcels, (2) where the land taken from one parcel is added to an adjacent parcel, and (3) a greater number

of parcels than originally existed is not thereby created. Moreover, a local agency may only impose conditions or exactions on lot line adjustments, as defined by subdivision (d) of Section 66412, to conform the parcels to local zoning and building ordinances or to facilitate the relocation of existing utilities, infrastructure, or easements.

It is important to note that the exemption provided in subdivision (d) of Section 66412 does not limit the actual percentage of land that may be transferred between adjacent parcels involved in the lot line adjustment. Moreover, that exemption does not limit the change in angle that may occur between lines that are adjusted. Furthermore, the exemption provided in subdivision (d) of Section 66412 does not require a particular reason to be given to apply for a lot line adjustment nor does that exemption impose a limit on the maximum number of parcels that may be involved in the lot line adjustment. Accordingly, an issue is presented as to whether the Santa Cruz County Ordinance No. 4132 conflicts with, and thus is pre-empted by, the Subdivision Map Act.

Under the police power granted by the Constitution, counties and cities have plenary authority to govern, subject only to the limitation that they exercise this power within their territorial limits and subordinate to state law (Sec. 7, Art. XI, Cal. Const.). Apart from this limitation, the "police power [of a county or city] under this provision...is as broad as the police power exercisable by the Legislature itself" (Birkenfeld v. City of Berkeley, 17 Cal. 3d 129, 140).

If otherwise valid local legislation conflicts with state law, it is pre-empted by that law and is void (People ex rel. Deukmejian v. County of Mendocino, 36 Cal. 3d 476, 484). A conflict exists if the local legislation "duplicates, contradicts, or enters an area fully occupied by general law, either expressly or by legislative implication" (Candid Enterprises, Inc. v. Grossmont Union High School Dist., 39 Cal. 3d 878, 885).

The courts have recognized that "[i]f there is a division of land which is not covered by the [Subdivision Map Act], be it for less than five parcels, or for more than five parcels for a purpose not yet contemplated by the Legislature, the local authority may regulate" (City of Tiburon v. Northwestern Pac. R. R. Co., 4 Cal App. 3d 160, 182). However, "[t]he authority to adopt local ordinances containing requirements supplementary to the [Subdivision] Map Act is limited by the terms of the statute" (Id.). The courts have held that "local ordinances which are inconsistent 'with the language and apparent intent of the [Subdivision Map Act]' are invalid" (Friends of Lake Arrowhead vs. Board of Supervisors., 38 Cal. App. 3d 497, 505; see also Sec. 66421).

The language and apparent intent of the exemption specified in subdivision (d) of Section 66412, *is to remove a proposal to adjust the lines between two or more existing adjacent* parcels, where a greater number of parcels than originally existed is not thereby created, from the otherwise lengthy and arduous subdivision map approval process, since the Subdivision Map Act is primarily concerned with subdivisions that create a greater number of parcels or lots than originally existed (see Sec. 66426; tentative and final map required for subdivisions creating five or more parcels).

Although we recognize that subdivision (d) of Section 66412 does authorize local regulation of lot line adjustments to conform the parcels to local zoning and building ordinances or to facilitate the relocation of existing utilities, infrastructure, or easements, we think that the requirements imposed on lot line adjustments by subdivision (a) of Section 14.01.105-L of the Santa Cruz County Code do not fall within that authorization.

In this regard, we think that a local zoning regulation could validly prohibit a proposal to adjust the line between two adjacent parcels, if each parcel had different designated uses under the applicable zoning ordinance. However, we think that if a lot line adjustment was proposed between two adjacent parcels, each having identical designated uses under the applicable zoning ordinance, the limitation on the actual percentage of land that may be transferred between adjacent parcels, or on a boundary line change exceeding a 15 degree angle, as prescribed by subdivision (a) of Section 14.01.105-L of the Santa Cruz County Code, would, in effect, prohibit the proposal from being considered as an exemption under the Subdivision Map Act and thus, would be held invalid by a court. Similar inconsistencies appear between the definition of a lot line adjustment, as specified in subdivision (d) of Section 66412 and the requirements of subdivision (b) of Section 14.01.105-L of the Santa Cruz County Code. No provision of subdivision (d) of Section 66412 requires a particular reason to be given to propose a lot line adjustment nor does that exemption impose a limit on the maximum number of parcels that may be involved. However, the local ordinance *only permits a lot line adjustment to cure a structural encroachment or where boundary* lines among four or fewer parcels meet in at least one point.

Since the local ordinance requires a parcel map to be filed for any proposal that does not meet the requirements of Section 14.01.105-L of the Santa Cruz County Code, we think that a court would find these local regulations to be pre-empted.

Accordingly, it is our conclusion that Santa Cruz County Ordinance No. 4132 violates subdivision (d) of Section 66412 of the Government Code.

Very truly yours,
Bion M. Gregory, Legislative Counsel
By Joe J. Ayala, Deputy Legislative Counsel ❑

Unless otherwise indicated, all statutory references are to provisions of the Government Code comprising the Subdivision Map Act.

(GIS CONTINUED FROM PAGE 23)

with the instruments or measuring systems being used and are essential to promote conduct of field operations and facilitate the classification of surveys. Field reports and experience are the basis for development of specifications. Specifications are developed as part of an evolutionary process and are implemented as a set of rules derived from the experience gained in successful past efforts to achieve a classification standard.

With regards to mapping, the traditional paper map sheet carries little if any information about the raw data from which the map was compiled. Since the end user does not have access to the actual underlying raw data used to create the map, some form of assurance (standard) must be given that there is at least a minimum level of accuracy in the weakest component of the map. The practical result is that the paper map can achieve a classification standard only as high as the least accurate information depicted on the map. Further, the map is incapable of conveying to the user which information depicted may exceed the classification standard of the map. This is typical of any mapping approach (paper or digital) that uses a standards based system of data acquisition. The attempt is to have all measurements meet a uniform minimum accuracy, and all data is automatically classified at the lowest common denominator.

In a digital mapping system with database support it is possible to associate a standard error, or reliability index, with each dataset as an attribute in a table. Databases that contain this fundamental information for each measurement or dataset can safely contain data from varietal sources such as deeds, maps, conventional surveying, GPS, digitizing, etc., and use data filters to separate out inappropriate (lesser accuracy) data for a particular task. Once again, in order to incorporate data from diverse sources, the data must include attributes such as Standard Error, estimates of reliability, etc. In other words the data must pass though a qualification process. ❑

CLSA SOFTWARE SHELF

By Michael McGee and Tom Mastin

The California Land Surveyors Association has available some software that is of benefit to the surveying community. Below is a short description of the available software.

BLM CONVERSIONS

Price $3.50EACH

This is a two disk set that contains a program and the backup files written by The Bureau of Land Management that performs coordinate conversions between Geodetic, State Plane and Universal Transverse
Mercator coordinate systems based on the North American Datum of 1983 (NAD83). The second disk does the same for 1927 datum. These are particularly useful for converting large coordinate files common in digital environments.

These Programs do **NOT** perform datum to datum conversions. They do **NOT** convert between 1983 and 1927 datums. The computations are based on equations and constants provided by the National Geodetic Survey and referenced to the Geodetic Reference System of 1980 ellipsoid.

The program runs on IBM PC, or compatible system with DOS 2.0 or later with a minimum of 256K RAM. Input and output file sizes are limited only by the amount of available disk storage.

Documentation for the program is on the disk.

CADASTRAL SURVEY MEASUREMENT MANAGEMENT (CMM)

$50MBR./$100NMBR.

CLSA has Version 1.02 of the Bureau of Land Management CMM. This series of programs can be used for retracement surveys of the Public Land Survey System. The programs recognize the special geodetic nature of the PLSS, the many special cadastral survey procedures, adjustment, requirements and problems.

A separate 152 page Instruction Manual comes with the program. The program requires an IBM PC or compatible with 640K RAM, a hard disk with at least 3MB free space, and a math coprocessor. A 286 or 386 with and EGA or VGA monitor is preferred. It has its own install program.

In addition to the CMM program, two other disks are included in this set. The first is the Manual of Instructions on Disk, without the graphics, in WordPerfect 5.0 Format, the second disk is the BLM Legal Reference Library in WordPerfect 5.1 Format.

NGS HORIZONTAL CONTROL

$35.00MBR./$70.00NMBR.

Recently CLSA made available to its members, the National Geodetic Survey's horizontal control station data for California. This data can be purchased directly from the National Geodetic Survey (NGS) for about $120 for the entire state. The data consists of about 3 megabytes of control station coordinates and related information. The data comes on a 3.5 inch high density disk, IBM compatible. The information is in ASCII form in a 148 column format. Each station appears as one line of data in alphabetical order. Each data line contains 13 items of information explained as follows:

1) A unique station identifier.
2) The agencies name that established the monument.
3) The station name in alphabetical order.
4,5) The geodetic latitude and longitude in degrees, minutes and seconds to five decimal places.
6,7) The state plane coordinates, north and east in meters. Stations that fall in overlapping state plane coordinate zones appear twice, listing the state plane coordinates for each zone.
8) State plane coordinate zone.
9) Convergence angle at the station.
10) The scale factor for the station.
11) The orthometric height (elevation above sea level).
12) The separation of the geoid from the NAD83 ellipsoid in meters.
13) The positional accuracy of the station given as first, second, third or fourth order.

SEARCH $20MBR./$40NMBR.

Three million bytes of NGS Horizontal Control isn't much help if the stations of interest cannot be found quickly. If a station name is known then the user could use a word processor or some other utility program to search through the file looking for a matching string. The most practical method is to search the file by location. A program called "SEARCH" was developed on behalf of CLSA for this purpose. "SEARCH" is a 57k byte size program that runs on an IBM compatible using the DOS operating system. "SEARCH" allows the user to enter the latitude and longitude at the center of a search area and the number of miles north-south and east-west to be included the search window. All points found within the window are extracted and duplicated in a separate file with the same format as the original file. Information such as a header, the date the file was created, the location and size of the search window are added to the file. A second file is created containing a line number which can double as a point number for reference, the north and east state plane coordinates converted to feet, the stations positional accuracy and the station name. This file can be read directly into the users COGO program for additional calculations or converted into a DXF file by the SEARCH program.

IN THE FUTURE

The Advanced Technologies Committee is working with NGS to provide all the control station information on a digital format for all of California. Due to the size of data, it will most likely be broken down to either County or Zone. It is hoped that this will be available by the Winter of 92. ❑

BENEFITS OF BEING A MEMBER OF C.L.S.A.

Editor's Note: The following are just a few of the responses received to Membership Chairman Lloyd Cook's request for a short letter on what the benefits have been to members by joining CLSA

● I joined CLSA, which was in the process of being formed, when I was licensed in 1966. At that time the land surveying profession was in danger of being torpedoed and it was incumbent upon those who felt that we were a separate profession to stand up and be counted. I helped establish the East Bay Chapter, holding the offices of Secretary-Treasurer and President. I became involved statewide as a member of the Membership Committee, Secretary-Treasurer, Vice-President, member and chairman of the Legislative Committee, Chapter Representative, etc.

Active membership in the Association has provided a means where I have met land surveyors from the farthest reaches of California, as well as other states, and given me the realization that problems in the land surveying practice are not just local but are common to all. An additional benefit to me is the elimination of the "us-them" syndrome between the private practitioner and those in public service. The public counter, instead of forming a barrier, now serves as a place to spread out drawings and resolve differences. (Unfortunately, this is not always true but things are improving. Some government surveyors, particularly those in the smaller agencies, seem to feel that their records are private and that the private surveyor is infringing upon their personal domain by requesting data.) Lest this be considered a diatribe against the public employee, I have been employed by the City of Hayward for 30 years and am the City Surveyor.

Harold (Hal) B. Davis, PLS

● I most benefit from my CLSA membership by spending time with my fellow professionals who practice in the same area and getting to communicate with them on both a professional and personal level which, in my opinion, is very healthy..... not only for my own growth as a professional but also enables me to be a better professional to my clients.

Douglas Scranton. PLS
President, Marin Chapter

● A great opportunity to get to know surveyors all over California. Keeps me informed of changes that directly affect the Surveyor.

Allows me to keep active in local chapter meetings and state conventions. The satisfaction of knowing I am a part of the only organization exclusively concerned with the California Surveyor. The privilege of serving as one of the Directors on the State Board.

Lloyd J. Cook, PLS

● While I still feel like a kid, every now and then I look in the mirror and think, "Maybe that isn't sun-bleached hair after all".

My involvement with CLSA began as totally self-serving and it has served me well. Back in the fall of 1981, I returned home to Sonoma County after a few years in Oregon. My main goal was to study up for the LS exam that October, secondly to find work.

As I had grown up in Sonoma County and worked there for 8 years before I left, I knew of CLSA. I contacted an old friend or two and found that the next chapter meeting was a few days away. I went to that meeting in hopes of obtaining copies of past exams (it was still legal then). I left that meeting with exam copies, current copies of the Map Act and LS Act and several requests to drop off a current resume. Not bad if you remember that the job market was as bad in 1981 as it is now.

After that time, I continued to attend chapter meetings to renew old friendships. This became a major part of my limited social life as, like most surveyors, I tend to immerse myself in my work and forget that I need some playtime too. I kept shooting my mouth off (I think I was told "put up or shut up") and was drafted into chapter offices.

As time has passed and my situations changed, I became known in the local surveying community. A couple employers sought me out and I was able to make some good career moves. A familiar face on your doorstep can go a long way when you are looking to fill a slot.

The above is now a side benefit to my involvement with CLSA. It has also been very enlightening to learn that the political machine that we live in does work. Change never happens fast but it does happen.

What else is there? Food and shelter (job contacts), family and friends (many feel like family now), satisfaction in your work, the good life here in God's country.

Take a little, CLSA has a lot to give. Give a little back to the world in which you live.

There is room for all.
JOIN, PARTICIPATE

Peter H. Ehlert, PLS

● Besides all those frivolous things such as getting to know the surveyors locally and statewide; being able to get a hold of experts in any field of surveying through CLSA, staying abreast of the legislative activities that affect land surveying , having seminars provided to me and for me on each and every subject within land surveying, having a voice to speak generally for me at the national level and having a feeling of community within the profession that I work there are some serious benefits.

No one ever kicks sand in my face at the beach anymore, when the CHP stop me and see the nifty decal on my truck they just wave me on and nowhere would I be able to write as much as CLSA lets me.

Tom Mastin, PLS

CLSA PUBLICATION ORDER FORM	CLSA Member Prices	Non-Member Prices	Quanity	Total
PLS Roster with both alphabetical and numerical sections (1992 publication)	$5.00	$10.00		
PLS Act and Board Rules (1992 publication)	$5.00	$10.00		
Subdivision Map Act (1992 publication)	$6.00	$12.00		
Binder with index tabs for PLS Roster, Pre '82 CEs, PLS Act & Board Rules, Subdivision Map Act, and Misc. Statutes (text of Misc. Statutes will be available at later date)	$6.00	$6.00		
1992 Complete Package including PLS Roster, Pre '82 CE, Numerical Listing, PLS Act & Board Rules, Subdivision Map Act, & Binder	$22.00	$38.00		
California Coordinate Projection Tables - NAD '83	$6.00	$12.00		
Right of Entry Cards *(minimum order is 2)*	2/ $3.00	2/ $6.00		
Corner Record Forms *(min. order is 25)* (Form PWA-102) (8/88)	25/ $10.00	25/ $15.00		
Land Surveying Brochure *(minimum order is 100)*	100/ $15.00	100/ $30.00		
Standard Contract - Agreement for Prof. Services	$6.00/pad of 25	$12.00/pad of 25		
Land Surveying for the Land Owner & Real Estate Professional	$3.00	$6.00		
Easement and Related Land Use Law in California, Second Edition by Donald E. Bender, J.D., L.S.	$20.00	$30.00		
Cadastral Survey Measurement Management System Three-ring binder documentation & three disks	$50.00/set	$100.00/set		
NGS 1983 California Horizontal Control Coordinates, Data Disk	$35.00/set	$70.00/set		
Search Program (for use with NGS data disk)	$20.00	$40.00		
MEMBERSHIP ITEMS (not available to non-members)				
Lapel Pin with CLSA logo	$6.00	not available		
Decal of CLSA logo (minimum order is 2)	2/$1.50	not available		
Shareware Disk #2 - BLM - SPC & UTM Conversion	$3.50	not available		
		Subtotal		
		7 1/2% Sales Tax		
		Shipping Charge		
		TOTAL		$

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*Add 10% to a maximum of $10.00 shipping

- Make your check or money order payable to California Land Surveyors Association (CLSA)
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- Member prices are only available to members of the State California Land Surveyors Association.

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California Land Surveyors Business Transactions

Editor's Note: Under Section 4.07 (b) of the Bylaws of California Land Surveyors Association, Inc.. I am required to "contain a report of general business transacted and resolutions adopted, of all general and special meetings within the prior quarter". The purpose of this column is to fulfil that obligation.

1992 Board of Directors and Executive Committee Meetings up to July 25, 1992

January 4, 1992	Executive Committee Meeting Airport Hilton Hotel, So. San Francisco
January 31, 1992	Executive Committee meeting Holiday Inn, Fresno
February 1, 1992	Board of Directors Meeting Holiday Inn, Fresno
March 13, 1992	Executive Committee Meeting John Ascuaga's Nugget, Sparks
April 24, 1992	Executive Committee Meeting Grosvenor Airport Inn, So. San Francisco
April 25, 1992	Board of Directors Meeting Grosvenor Airport Inn, So. San Francisco
June 20, 1992	Executive Committee Meeting Host Hotel, Sacramento
July 24, 1992	Executive Committee Meeting Airport Hilton Hotel, So. San Francisco
July 25, 1992	Board of Directors Meeting Airport Hilton Hotel, So. San Francisco

1992 Resolutions of Interest

Resolution 92-02	Life Membership to Kenny L Fargen PLS 4597. For his membership since 1976, being licensed as a Land Surveyor since 1978 and in appreciation of his serving as President of CLSA.
Resolution 92-03	Life Membership to Joel Readio PLS 4319. For fulfilling the requirements for life membership, serving as an officer of the Monterey Bay Chapter and striving for the highest professional standards of the land surveying profession.
Resolution 92-04	Life membership of George N. Darling, PLS 3293 For fulfilling the requirements for life membership, serving as an officer of the Monterey Bay Chapter and striving for the highest professional standards of the land surveying profession.

NATIONAL HIGHLIGHTS

The following are some of the national highlights as submitted to CLSA by Pat Canfield; NSPS Coordinator

NAVD 88 LEGISLATION

TO: NSPS Board of Governors
FROM: Edward J. McKay, Vertical Network Branch, NGS
SUBJECT: State Legislation Defining Vertical Datum

The National Geodetic Survey (NGS) has been asked to develop a model state law that references the new vertical datum, the North American Vertical Datum of 1988 (NAVD 88), to be used within a state for surveying and mapping projects. This model would assist states that wish to enact legislation defining the vertical datum. The concept of a model law for NAVD 88 is similar to what NGS provided to states as a model state law for the North American Datum of 1983 (NAD 83) State Plane Coordinate System.

We have no information on state vertical datum legislation from which to begin developing a new model law. Therefore, I am asking you to provide any current (or proposed) state legislation for your state, or any other state you are aware of, that references the old vertical datum, the National Geodetic Vertical Datum of 1929 (NGVD 29).

If you know of any legislation that references NGVD 29 or other vertical datums, please send a copy to:

Edward J. McKay
Vertical Network Branch
N/CG13, Rockwall Bldg., Room 313
National Geodetic Survey, NOAA
Rockville, Maryland 20852
Tel: 301-443-8567
Fax: 301-881-0117
Thank you.

ACSM FELLOWSHIPS & SCHOLARSHIPS for the 1993-1994 Academic Year

American Association for Geodetic Surveying Fellowship - The American Association for Geodetic Surveying Fellowship is a $2,000 fellowship award for one graduate student. The award is to be used for graduate study in a program with a significant focus upon geodetic surveying or geodesy at a school of the recipient's choice.

Joseph F. Dracup Scholarship - The Joseph F. Dracup Scholarship is a $2,000 award for one undergraduate student. The award is designed to encourage and recognize students committed to a career in geodetic surveying. It is provided by the American Association for Geodetic Surveying.

The American Cartographic Association Scholarship - The American Cartographic Association Scholarship is a $1,000 award for full-time students of junior or senior standing. Applicants should be enrolled in a cartography or other mapping-science curriculum in a four-year degree granting institution.

Leica Inc. Surveying Scholarship (Two) The Leica Inc. Surveying Scholarships consist of a $1,000 award for each of two undergraduate students, $2,00 credit to the student's institution to purchase Leica equipment and $500 credit to each graduating senior for the purchase of Leica equipment. The awards are to be used for undergraduate study in surveying in a four-year degree program of the recipient's choice.

Schonstedt Scholarship in Surveying The Schonstedt Scholarship is a $1,500 scholarship award for one undergraduate student. The award is to be used for undergraduate study in surveying by a student who has completed at least two years of a four-year curriculum leading to a degree in surveying.

Berntsen International Scholarship in Surveying (Two) - The Berntsen Scholarships in Surveying consist of one $1,500 scholarship award to be used for undergraduate study in surveying in a four-year degree program of the recipient's choice and one $500 scholarship award to be used for undergraduate study in surveying in a two-year degree program of the recipient's choice.

NSPS Scholarship (Two) - The NSPS Scholarship is a $1,000 award and a certificate for each of two undergraduate students. The award is to be used for study in a four-year degree program in surveying.

Application Deadline:
December 1, 1992
Application forms and instructions may be obtained by writing:
ACSM Awards Director
5410 Grosvenor Lane,
Bethesda, MD 20814-2122
Phone: (301) 493-0200
FAX: (301) 493-8245

NSPS NOMINATIONS

DATE: May 25, 1992
TO: NSPS Nominations Committee
FROM: Charles A. Tapley, Chair
SUBJECT: ACSM and NSPS Nominations

On April 20, 1992 I sent a letter to a number of persons suggesting that they consider placing their names in nomination for a specific office. These suggested offices were strictly my idea. We have a great number of persons to nominate for offices this year.

Included in this letter is a list of the individuals that I contacted and their responses. Also shown are offices which I have suggested for them.

I would like for you to search out qualified persons in your area. Make the contact and encourage these people to be nominated for any office that they have an interest in.

When you find them please let me know who they are.

We especially need ACSM Director Nominees. Letters were sent to the following:

ACSM Vice-President:
John Dailey *No response*
Jud Rouch *Yes*
David Ingram *Yes*
Milt Denny *No*
Richard Lomax *Yes*

ACSM Director:
Tommy Anderson *No*
Everett Rowland *Yes*
Albert Frieze *No*
Ralph Harris *No response*
James Elliott *No*
Pat Hutcheson *No*
John Abenroth *No response*
Edward E. Northrup *No response*
M. Greg Johnson *Maybe* (encouragement)
Martin Menk *No*
Herb Stoughton *Yes*

NSPS Vice-President:
Frank Fitzpatrick *No response*
James Granger *Yes*
David Atwell *No*

NSPS Sec/Treas:
John Thalacker *Yes*
Joe Dolan *No response*
Wendy Lathrop *No* (maybe next year)

Director Area 3:
Al Matherly *Yes*
Herb Redmond *No response*
Gary W. Thompson *No response*

Director Area 5:
Duane Weiss *No response*
Earl Gray *No*

Director Area 7:
Russ Kastell *No response*
Charles Tiltrum *No*
Warren Fisk *No*
John A. Steil *Yes*
Raymond Connin *Yes*

Director Area 9: California/Nevada & Alaska
Rita Lumos *No*
Susan Jensen *Yes*
Patrick Cummins *Maybe*

PRODUCT NEWS

Motorola Introduces Sixgun Series of DGPS Receivers and Systems

Scottsdale, Arizona-Motorola Government Electronics Group announces a new series of differential global positioning system (DGPS) receivers and systems. Designated the SixGun series, this product line comprises GPS receivers, controllers and data links in small, lightweight units.

The SixGun series was developed to provide low cost GPS functionality for the system integrator, specifically for position reporting, tracking and differential applications.

New DGP8 Navigational System introduced by Motorola

Scottsdale Today, Motorola Government Electronics Group, introduced a new differential global positioning system (DGPS) designated Peregrine TM Marine Navigation System.

The Peregrine System combines an integral GPS receiver with navigation and charting modes, for a powerful marine navigation tool. The system's navigation and charting modes use C-Map electronic chart cartridges, providing an extensive library of marine charts from around the world. The GPS receiver provides differential and autonomous modes for use in both precision and general navigation applications.

For more information regarding the Peregrine System, call 1-800-235-9590 or
write P.O. Box 2606, Scottsdale, AZ 85252.

Nikon Surveying Instruments Provide Faster Focusing, Top Optics, Long Battery Life

Melville, New York, May 8 - Surveyors will now be able to zero on targets faster and easier with a pair of Nikon surveying theodolites that offer a revolutionary focusing system, long battery life, top optical performance and extraordinary ease of use, according to the company.

Nikon's NE-IOLA and NE-IOL theodolites come with world-renowned Nikon Extral Low Dispersion (ED) Glass linear telescopes, and use an exclusive focus mechanism to ensure faster, more accurate focusing at all distances down to O. 7 meters (2. 3 feet). The optical performance of the systems is unparalleled at any range.

For more information on Nikon's NE-IOLA and NE-IOL theodolites, contact Nikon Inc., Instrument Group, Surveying Department
1300 Walt Whitman Road,
Melville, New York 11747
phone (800) 231-3577

Trimble Announces Release of RINEX Conversion Program & Fast Static Surveying

Sunnyvale, CA - May 8, 1992 - As a long time supporter of open standards, the Surveying and Mapping Products division of Trimble today released two Receiver-Independent Exchange Format (RINEX) Conversion Programs. These programs convert geographic position data, recorded using the Global Positioning System (GPS), into and out of the RINEX format.

Trimble Navigation has recently introduced two new Fast Static GPS Survey Systems. Fast Static surveying greatly reduces the time spent in the field collecting GPS data and in the office processing data, while producing baseline results with accuracies approaching those of conventional static surveys.

Trimble Fast Static works with your current Trimble P-code GPS Survey Systems: the Geodetic Surveyor IIP and Geodesist P. This allows you to maintain your investment in these proven systems, while benefiting from increased productivity through the use of Fast Static surveying.
For more information:
contact Trimble Navigation
645 North Mary Avenue,
P.O. Box 3642, Sunnyvale, CA 94088-3642
phone (408) 730-2900

RBF Named in Top 500

The consulting engineering and surveying firm Robert Bein, William Frost & Associates has been named among the Top 500 Design Firms by the Engineering News Record. In fact, ENR placed the Irvine, Calif.-based company in the top 150, putting RBF in the elite company of some of the nation's largest design firms.

Chief Executive Officer Robert W. Bein credited the firm's employees for making the achievement possible.

"It's a great honor for a regional firm like RBF to be recognized among well known national firms," Bein said. "Its more proof that our people are among the most dedicated and talented professionals in the business."

Robert Bein, William Frost & Associates was founded nearly 50 years ago and has grown into a multi-disciplinary firm with local offices in Irvine, Palm Desert, San Diego, Temecula and Sacramento, California, and Denver, Colorado. The firm's services include planning, engineering and surveying services, as well as structural, electrical, mechanical and energy engineering; traffic and transportation planning and engineering; environmental services; professional video production; visual analysis and aerial photogrammetry; and global positioning satellite surveying.

For more information, call RBF's Irvine offices at (714) 855-3600.

Business Tools for Surveyors

Milton Denny of CED Technical Services ANNOUNCES the availability of the following items for the management of your survey or survey/engineering firm.

Marketing Manual For Surveyors:
Available for $45 + $4
Shipping & Handling.

Marketing Brochure:

Hazardous Waste Acronyms:
Available for $4.50 + $.50
Shipping & Handling.

Business Forms:
Delinquent account forms, carbonless forms, business stationery, business cards, Rolodex cards, resumes, layout and artwork. flyers, brochures, books, and other specialized printing orders can be tailored to your needs. Send for sample copy or price quote.
For additional information:
CED Technical Services
P.O. Box 2242 Tuscaloosa,
Alabama 35403
Telephone: (205) 556-3147

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The California Surveyor
Published Quarterly by the
CALIFORNIA LAND SURVEYORS ASSOCIATION
Post Office Box 9098
Santa Rosa, Ca 95405-9990

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