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Congress on Surveying and
Mapping

The California Surveyor

THE VOICE OF THE LAND SURVEYORS OF CALIFORNIA

NO. 53

WINTER EDITION

1978

METRIC CHAIN TAPES: A PROGRESS REPORT

by Leighton Keeling

An ancient poet-philosopher once observed "The mills of God grind slowly." I hope that I'll be forgiven for a clumsy paraphrase of this to "The progress of the U.S. millimetre is proceeding with hardly noticeable rapidity."

Actually, progress *is* being made. The ACSM is expected to publish in the very near future (it will probably be in print before this discussion appears) a "Recommended Practice Guide" for the surveying and mapping professions. This comprehensive study, chaired by Dr. Charles A. Whitten, involved a tremendous amount of careful thought and effort.

As a peddler ("vendor" sounds too formal and ostentatious) my principal concern has been to insure that plans be implemented to produce "chain" tapes that the U.S. field man will find useful and acceptable.

I had always been somewhat puzzled by the fact that there is no counterpart to the U.S. "add-foot" tape in the metric system. This void caused some apprehension, since it was obvious that considerable resistance to an enforced return to the use of "cut" tapes would hamper the adoption of the metric system by U.S. surveyors. To expect the U.S. field man to accept, as the smallest division, a graduation equivalent to about three of the graduations he's been accustomed to, didn't seem very practical. Also, graduating a 50 or 100 metre tape

(Continued on Page 14)

WATER BOUNDARY CONTROL IN CALIFORNIA

By Ronald C. Greenwell

The first portion of this article appeared in the Fall 1978 issue.

Riparian Boundary Lines

If the land was originally acquired by Government patents and bordered on seashore or navigable waters, meander lines were run for the purpose of ascertaining the amount of property involved. In most states, the meander line is not used to determine the riparian boundary, rather title was granted to *the high water* mark of the navigable waterway. (17) It has been held in many court decisions that the actual water line, not the meander line, describes the boundary of the patented land. Exceptions will occur if the meander line was erroneously run, if there was considerable land between meander and water's edge (20) or if the grant deed shows a different intent.

In California, the *mean high tide line* is considered the *littoral* boundary line when the property adjoins the coast line or tide-influenced navigable waterways. (18) Civil Code Section 670 states:

The State is the owner of all land below tide water, and below ordinary high water mark, bordering upon tide water within the State; of all land below the water of a navigable lake or stream; of all property lawfully appropriated by it to its own use; of all property dedicated to the State; and of all property of which there is no other owner. (As amended Code Am. 1873-74, C. 612, p. 217, 99.)

Note that the beds could be owned by someone other than the State.

If the patent is meandered along a navigable river or lake but the waterway is non tidal then the *riparian* boundary is to *ordinary low water mark*. This rule is applicable in California. (19)

The State was granted ownership of lands underlying navigable waterways when California was admitted to the Union. Furthermore, the Submerged Lands Act (Public Law 31) reads:

All lands within the boundaries of each of the respective states which are covered by non tidal waters that were navigable under the law of the United States at the time such state became a member of the Union, or acquired sovereignty over such lands and waters thereafter, up to the ordinary high water mark as heretofore or hereafter modified by accretion, erosion and reliction.

California released its rights between ordinary low water and the high water mark with adoption of Civil Code Section 830 which reads:

Except where the grant under which the land is held indicates a different intent, the owner of the upland, when it borders on tide-water, takes to ordinary high water mark; when it borders upon a navigable lake or stream, where there is no tide, the owner takes to the edge of the lake or stream, at low-water mark; when it borders upon any other water, the owner takes to the middle of the lake or stream.

(Continued on Page 12)

CALIFORNIA LAND SURVEYORS ASSOCIATION
HEADQUARTERS: P.O. BOX 7400
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TELEPHONE: 707-526-2572

THE CALIFORNIA SURVEYOR....

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

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

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

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CALIFORNIA BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS Written Examination Schedule 1978

Land Surveyor-in-Training—LISIT	*Final Filing Dates
April 7, 1979 (Saturday)	February 2, 1979 (Friday)
November 3, 1979 (Saturday)	August 31, 1979 (Friday)

**Land Surveyor—LS	
November 3, 1979 (Saturday)	July 6, 1979 (Friday)

*Applications filed after the final filing date specified will be considered for the following examination.

**Until further notice, these exams will be given only once a year.

NOTE: This schedule is subject to change at any time without prior notice. ▲

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Sustaining Membership

Membership in the California Land Surveyors Association 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 the Editor of *The California Surveyor*.

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. Material should be sent to *The California Surveyor*, P.O. Box 3707, Hayward, California 94540.

EDITOR: Michael S. McKissick, L.S.

P.O. Box 3707

Hayward, CA 94540

Phone (408) 287-3400

DEADLINE DATES FOR THE CALIFORNIA SURVEYOR

CONVENTION DECEMBER 31, 1978

SPRING FEBRUARY 17, 1979

Articles, Reports, Letters, etc., received after the above mentioned date will be placed in the next edition.

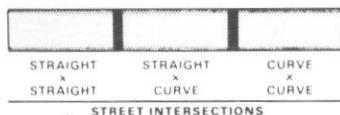
Editor



SURVEY 31

The computer that speaks your language.

As an example: Here's how easy it is to compute a street intersection. (Centerline points 1, 2, 108 & 261 have already been computed and stored in memory)



- STREET INTERSECTIONS
1. SELECT program.
 2. ENTER requested data:

```

(P.1.)
POINT? 108.
(1ST C/L)
TO POINT? 1.
OFFSET? 25.
(NEXT C/L)
TO POINT? 261.
OFFSET? 20.
CORNER RADIUS? 20.
RADIUS= 20.0000
DELTA= 90.00000
LENGTH= 31.4159
TANGENT= 20.0000
CHORD= 28.2843
(BC/PC)
POINT#? 299.
9332.9924
10027.4417
(RADIUS)
POINT#? 431.
9332.0656
10047.4415
(EC/PT)
POINT#? 300.
9313.0656
10047.5148
  
```

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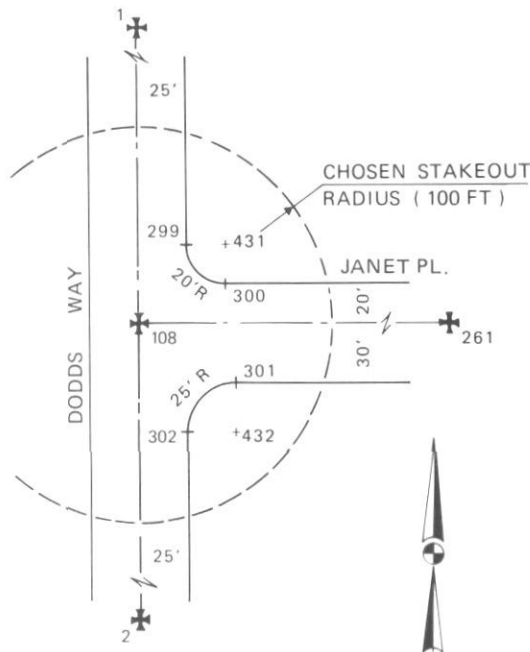
BACK OFFSET? 30.
(NEXT C/L)
TO POINT? 2.
OFFSET? 25.
CORNER RADIUS? 25.
RADIUS= 25.0000
DELTA= 90.00000
LENGTH= 39.2699
TANGENT= 25.0000
CHORD= 35.3553
(BC/PC)
POINT#? 301.
9263.0842
10052.6976
(RADIUS)
POINT#? 432.
9238.0843
10052.7890
(EC/PT)
POINT#? 302.
9237.9931
10027.7894
BACK OFFSET?
  
```

then, for staking out all points within a 100' radius of #108:

```

STAKEOUT DATA
Successive Points
Fixed Point

FROM POINT? 108.
BACKSIGHT POINT? 1.
RADIUS? 100.
  
```



... with the stakeout data printed on an optional page printer:

INSTRUMENT PT#	108.	9292.9012	10002.5882						
BACKSIGHT PT#	1.	10000.0000	10000.0000						
STAKEOUT RADIUS=	100.00								
TO PT:	BEARING	N AZIMUTH	TURNED<	2TURNED<	DEFLECTED<	2XDEFLECTED<	DISTANCE	NORTHING	EASTING
299.	NE 31.47444	31.47444	32.00194	64.00388	- 147.59406	- 295.59212	47.17	9332.9924	10027.4417
300.	NE 65.49410	65.49410	66.02160	132.04320	- 113.57440	- 227.55280	49.24	9313.0656	10047.5148
301.	SE 59.14445	120.45155	120.57505	241.55409	- 59.02095	- 118.04191	58.31	9263.0842	10052.6976
302.	SE 24.39132	155.20468	155.33218	311.06435	- 24.26382	- 48.53165	60.42	9237.9931	10027.7894
431.	NE 48.09243	48.09243	48.21593	96.43585	- 131.38007	- 263.16015	60.21	9333.0656	10047.4415
432.	SE 42.28593	137.31007	137.43357	275.27113	- 42.16243	- 84.32487	74.33	9238.0843	10052.7890

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RESPONSE TO FRESNO STATE STUDENT CHAPTER REPORT

The following letter, dated August 16, 1978 and addressed to Mr. James E. Adams, Past President, C.L.S.A., was received from the League of California Surveying Organizations and signed by Richard J. Mitchell, Division Engineer.

"I note your report on student chapter affairs at Fresno State as published on page 21 of the Summer Edition of *The California Surveyor*.

"The seven 'projects' listed as chapter activities disturb me. Six of them appeal to me as far less than baccalaureate or professional level projects. The students' desire to establish an active alumni association is, of course, commendable.

"Of the six projects, several appeal to me as a reinvention of the wheel or as adventures into the mundane. Project number 5 (draft letters of support for C.L.S.A. legislation) could easily be modified and made applicable to a four-year university program by changing the phrase 'of support for' to the words 'of analysis of.' Project number 7 could likewise be modified to read 'study the California legislative process

through contact with your C.L.S.A. legislative committee, discussion with your state assemblyman and senator, and through review of State Board of Registration actions.'

"But, wouldn't it advance our profession further if our students, (these will be the few formally educated members of the land surveying profession that are not escapees from the civil engineering discipline) . . . if our students were busy investigating future applications of inertial positioning devices, (there is a top-flight glaciologist in this country that needs to know how fast an antarctic glacier is moving), or of Doppler positioning devices (will we be able to give up our little E.D.M.s to Doppler?), or of either ground or satellite based laser ranging. (I have yet to see or write a definitive evaluation of vertical angle leveling.)

"How many truly automated graphics systems are there in the state or country and what are the relative merits of 'controlled' systems vs. 'free' systems?

"The names, addresses, areas of representation, wives' names and probably

even sexual preferences, of our legislators are available at our neighborhood libraries, but answers to the questions that I have propounded are not." ▲

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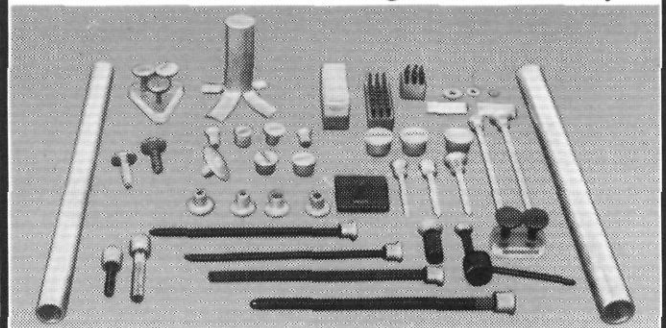
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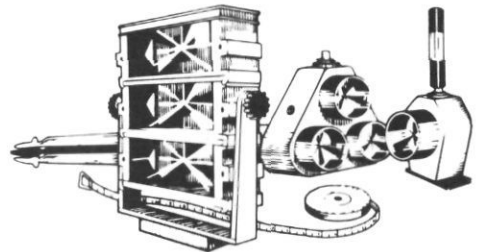
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†Cubic DM-60 Cubitape Distance Meter	25 00	15 00	10 00
†Hewlett-Packard 3805 Distance Meter	25 00	15 00	10 00
†Hewlett-Packard 3808 Distance Meter	50 00	30 00	20 00
†Hewlett-Packard 3810 Total Station	60 00	36 00	24 00
†Hewlett-Packard 3820 Total Station	120 00	72 00	48 00
*†K & E Autoranger with Azimuth Base or mount for Theodolite	30 00	18 00	12 00
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Cubic DM-20 Electrotapes—Two Units	40 00	24 00	16 00

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** Motorola Mini-Ranger with two Coded Transponders	200 00	105 00	70 00
Each Additional Mini-Ranger Coded Transponder	36 00	18 00	12 00
Cubic DM-40 Autotape with Two Responders	300 00	150 00	100 00
Autotape or Mini-Ranger Printer	15 00	6 00	4 00
Raytheon DE-719 Recording Fathometer	25 00	15 00	10 00

Optical Surveying Equipment:

*Lietz TM-1A 1" or Wild T2 Theodolite (Direct reading Horizontal and Vertical to 1", Self Indexing Vertical Circle)	27 50	16 50	11 00
*Lietz TM-6 or TM-10C 10" Theodolite (Horizontal and vertical Estimation to 1", Self Indexing Vertical Circle)	20 00	12 00	8 00
*Lietz TM-20C 20" Theodolite (Horizontal and vertical Estimation to 3", Self Indexing Vertical Circle)	17 50	10 50	7 00
*Lietz T-60D 60" Theodolite (Horizontal and vertical Estimation to 6", Self Indexing Vertical Circle)	16 50	9 90	6 60
*Lietz TS-20 60" Theodolite (Estimation to 20" Horizontal, 1" Vertical)	12 50	7 50	5 00
*Leitz BT-20A 20" or Geotek T-24 Optical Plummet	9 50	5 70	3 80
*Eagle 6 1/4" (20" Surveying Transit)	6 00	3 60	2 40
*Eagle 4" (1" Construction Transit)	4 50	2 70	1 80
*Leitz B-1 Engineers Precision Automatic Level	7 50	4 50	3 00
*Lietz B2-A Engineers Automatic Level	5 50	3 30	2 20
*Lietz C3-A Engineers Automatic Level	4 50	2 70	1 80
*Lietz B-4 Contractors Automatic Level	3 00	1 80	1 20

Miscellaneous:

*Lietz #7312-45 Traverse Set	6 00	3 60	2 40
*Magnetic Locator, Schonstedt	4 00	2 40	1 60
Spectra-Physics LT-3 Laser Transit with Fan Beam attachment	20 00	12 00	8 00
Spectra-Physics 611 Laser on 20" Transit	15 00	9 00	6 00
*American Paulin Model M-2 Surveying Altimeter — 0 to 10,000 feet. 2 foot graduation	4 00	2 40	1 60
*Kern #173 W. Tripod with 3/8" x 11 Adaptor	2 00	1 20	80
*Lietz #7512-52 or Equal Wide Frame 3/8" x 11 Tripod	1 00	60	40
*Lietz #7533-10 3 1/2" x 8 or #7533-20 3/8" x 11 Standard Wooden Tripods	50	30	20
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*Lietz #7311-38 Tribrach Prism Adaptor	50	30	20
*Retro-Ray Single Prism Assembly (round)	1 00	60	40
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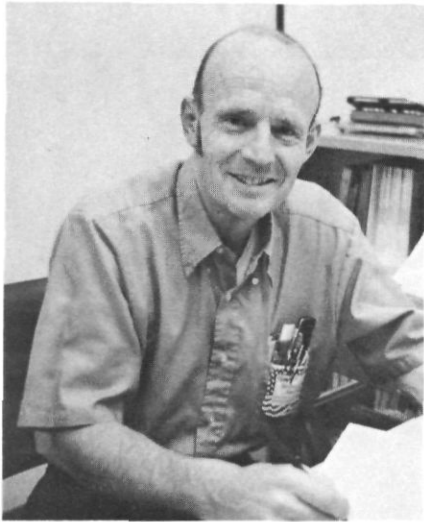
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WILLIAM R. FERRIS RETIRES

William R. Ferris is retiring after 29 years of public service. He has been employed by the Santa Clara Valley Water District since its formation in 1962 and has been in charge of the Engineering Services Division. Bill has devoted a great deal of time and effort towards the advancement and recognition of the survey profession. He was a charter member of the local chapter of the C.L.S.A. and has served as its 2nd president. He has also been active with the A.C.S.M. and served as director and chairman of its Northern California Chapter.

A retirement dinner is planned by his many friends of the Water District. It is to take place at the Pinehurst Inn, San Jose, on January 12, 1979. Anyone interested in honoring Bill by attending should contact Gary Faler by telephone at (408) 265-2600, or write to 1454 Merrywood Drive, San Jose, California 95118 for detailed information. ▲

ACSM LAND SURVEYING EXCELLENCE AWARD TO BE ENHANCED

The ACSM Land Surveying Excellence Award will receive increased publicity and enhancement as a result of an agreement between ACSM Land Surveys Division and Technical Advisors, Inc. (TA). Highlights of the agreement were announced by John G. McEntyre, Land Surveys Division Chairman, and Edwin W. Miller, President of TA, Wayne, Michigan following approval of the agreement by the Land Survey Division Executive Committee at its June meeting in Albany, New York.

Under the agreement, TA will actively publicize the Award, created "in appreciation of continued efforts to advance the profession of Land Surveying," underwrite the cost of the Award plaques, and supplement the annual Award with an honorarium of \$500. TA will have no involvement in the selection of the Award Committee or in the determination of the Award recipient.

The Land Surveying Excellence Award Committee is appointed by the Chairman of Land Surveys Division and selects the Award recipient from persons nominated by ACSM Sections and Affiliates. TA's publicity campaign is expected to increase the number of nominations for the Award and promote interest in the Sections, Affiliates and Land Surveys Division of ACSM.

O.J. Woodrow, Jr., Chairman of the Land Surveying Excellence Award Committee requests that all ACSM Sections and Affiliates submit nominations of persons considered possible recipients of the 1979 Award. Formal nominations should be addressed to Mr. Woodrow at P.O. Box 526, Jack-

son, Mississippi 39205 and be received by December 15, 1978. Nominations are open not only to surveyors, but to anyone making an outstanding contribution to the field of Land Surveying.

Nominations must give specific reasons why the sponsoring organization feels its nominee deserves the Award. Biographical data should also be furnished for use in the Award presentation should the nominee be selected. The nomination must be signed by two or more officers of the sponsoring organization.

Nominees need not be members of ACSM nor do accomplishments for which the nominee has been chosen need to have occurred during the current or preceding year. The Awards Committee may decide that no Award will be given in a particular year if no sufficiently worthy candidate is nominated.

To aid organizations desiring to prepare nominations, Mr. Woodrow will, upon request, furnish a copy of the presentation made in behalf of a previous Award winner.

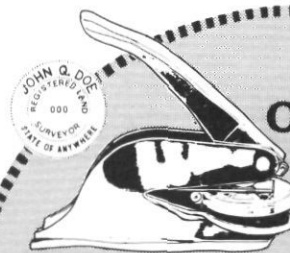
Presentation of the 1979 Land Surveying Excellence Award is scheduled for the ACSM Awards Meeting during the ACSM-ASP Convention at the Washington Hilton Hotel, Washington, D.C., March 18-23, 1979.

Recipients of the Award to date are: Percival "Tom" Sprague, Beaver Dam, Wisconsin (1975); Llewellyn T. Schofield, Framingham, Massachusetts (1976); Edwin R. Brownell, Miami, Florida (1977); Carlisle Madson, Hopkins, Minnesota and L. G. Sturgill, Charleston, West Virginia (1978). ▲

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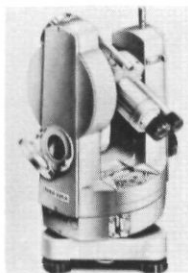


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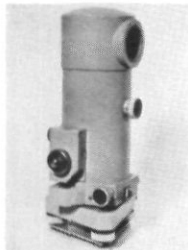
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SURVEYING AND PHOTOGRAMMETRY CONVENTION

California State University, Fresno's Surveying and Photogrammetry Program presents the 18th annual Surveying and Photogrammetry Convention on January 12-13, 1979, at the California State University, Fresno Campus.

The Convention will include an instrument display and lectures on related topics of surveying and photogrammetry.

Interested Speakers and Exhibitors, please contact:

Dr. K. Jeyapalan, General Chairman
or
Dr. F. Nader, Exhibit Chairman
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California State University, Fresno
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CSUF SURVEYING & PHOTOGRAMMETRY ALUMNI ASSOCIATION

By Peggy McMicken

We students in the Surveying & Photogrammetry program at California State University Fresno made the first steps in organizing an Alumni Association last spring. To begin correspondence with graduates we sent out an introductory letter and an information form to those whose addresses were available to us. In the form we asked for information about the employment of the graduate and for any comments he had concerning the Alumni Association.

We consider graduates of the S & P program to be a valuable resource of information and interest in surveying. We hope by organizing an alumni association we can keep an exchange of information going between students preparing to enter the field and those who have finished the program and are now working members of the profession.

We hope to supply graduates with information concerning surveying jobs made known to the S & P department here at school, the upcoming San Joaquin S & P Convention held here at CSUF, current legislation concerning surveyors and photogrammetrists, as well as student activities.

If you are a graduate of the S & P program and have not been in contact with us, please write to the:

Alumni Association
Student Chapter CLSA
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We are also eager to hear from graduates if there are other functions they would like to see the Alumni Association perform or any comments they would like to make.

See you at the convention!

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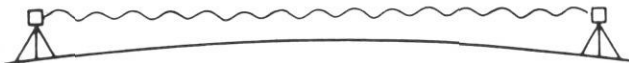
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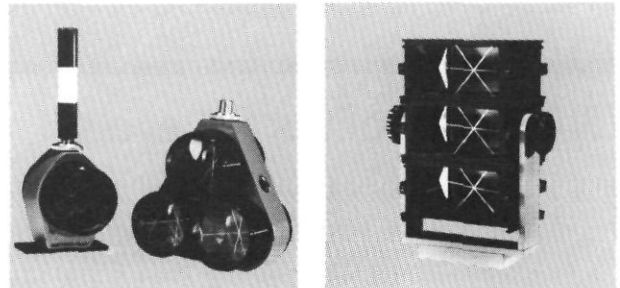
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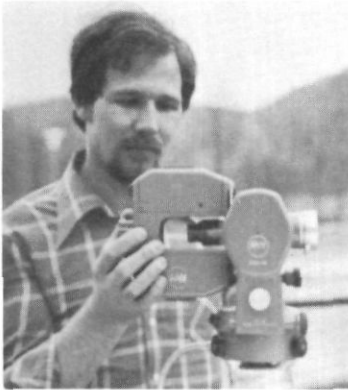
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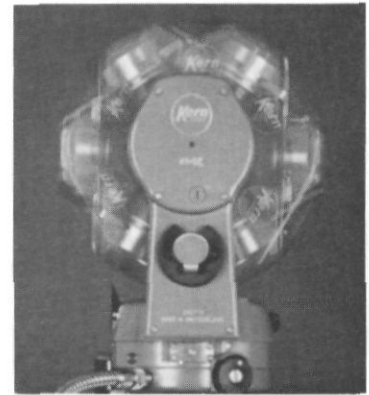
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CHAPTER NOTES

Sonoma Chapter

The September meeting of the Sonoma Chapter was held September 20 at the office of Mitchell & Heryford, Santa Rosa.

The committee, formed in July to look into the status of moonlighting, has concentrated on one project where an individual may be practicing without a license. Events have reached such a point that the committee was authorized to request help on the matter from the Grand Jury.

Dan Canet asked the Chapter if there were any preferences for a filing system for Corner Records. The consensus was to file them by assessor's Book & Page. Dan also noted that approval for Tentative Maps expires 18 months from the date of Planning commission or Board of Supervisors appeal.

A letter from the Marin County Chapter on the subject of recordation of surveys was read, their unanimous vote being that a professional approach consistent with the State Board Policy should be taken.

The report on the 43rd Annual Chapter Picnic turned into humorous recollections of the festivities of the day. The pop-top award was won by Bob Murphy, who did not catch a fish with one, but was tuned to the point of pulling the top off his paper cup, forgetting that it wasn't a can.

San Diego Chapter

Don Bender of L.A. Water and Power was the guest speaker at the July meeting. Don spoke on the many ways a Land Surveyor is classified by public and private agencies, providing substantial food for thought.

Chuck Moore, the chapter's alternate delegate to the Board of Directors was instructed to support the Action Committee.

The Ethics committee met on July 26.

San Diego/Orange County/ San Bernardino/ Riverside Chapters

A joint meeting was held on September 14 at the Caravan Inn in Riverside. The guest speaker for the evening was Michael Welch, President of the

State C.L.S.A., who spoke on S.B. 1850 and other legislative matters of interest to surveyors.

Feather River/ Northern Counties Chapter

A meeting was held November 8 at Pinocchios to discuss the 1978 Conference held October 14, and to elect officers for the coming year. The survey problem for the evening was presented by Bill Johnson.

San Mateo-Santa Clara County Chapter

The guest speaker at the September meeting was Bob Wilhelm, who spoke on how Land Surveyors can minimize their professional liability.

Paul Lamoreaux was appointed speaker chairman for the rest of 1978.

The guest speaker at the October meeting was Bill Wright, L.S., who spoke about the current waterfront dispute in Eureka, California.

East Bay Chapter

The chapter's August meeting was a joint meeting with the San Mateo/Santa Clara chapter. The program was a lively discussion of the procedures the different counties have for checking and filing maps. Participants included Don Marcott of Santa Clara County, Peter Lynch of Solano County, Lowell Tunison of Contra Costa County, and Ed Boris of Alameda County, moderated by Bob Floyd. Leroy Martin also spoke on the chapter's Map Review Committee.

Mr. Bob Becker, author, historian, Deputy Clerk of the U.S. District Court currently with the Bancroft Library was the guest speaker at the chapter's September meeting. His presentation, entitled "Surveyors and Surveys of Mexican California," described the requirements and methods of Rancho Surveys and was punctuated with slides comparing the original maps with U.S.G.S. quad maps of the same areas.

F.D. Uzes, chairman of the Surveyors Historical Society, survey historian, author, and supervisor of boundary determination activities of the California State Lands Commission, was guest speaker at the November meeting. Mr. Uzes described the historical background of the California/Nevada boundary, and the events leading to California's suit against Nevada and Nevada's subsequent countersuits, presently before the U.S. Supreme Court. He also discussed the legal aspects of the case at present, and the legal problems which may arise upon settlement of the case.

The chapter's annual Christmas Dinner-Dance was held December 8 at H's Lordships Restaurant in Berkeley, where the new officers for 1979 were elected and installed. ▲

Editor's Note—

"Chapter Notes" are taken from copies of each chapter's minutes. To insure timely inclusion of each chapter's activities in this column, minutes must be sent promptly to the State C.L.S.A. office. To place chapter news items not covered in monthly minutes, or for last-minute inclusions, phone Bob Baldwin at (415) 939-3700.

New Members - Third Quarter, 1978

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James D. Nowlan, LS
Michael L. Reichstein, LS
Roy Donald Smith, LS
Thomas D. Iacobellis, LS
Manuel Mendoza, LS

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Mark Lyons
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Gerard Scott

STUDENT MEMBERS

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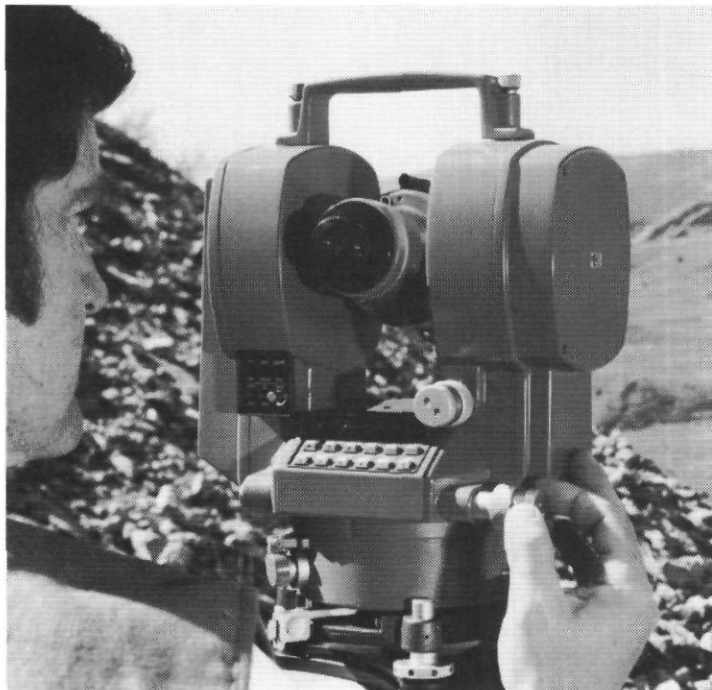


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WATER BOUNDARY

(Continued from Page 1)

If a government patent included a non-navigable lake or stream, the patent would have included title to the lake and stream. Civil Code Section 830:

Under this section except where the grant under which the land is held indicates a different intent, the owner of the upland, when it borders upon any other than navigable water, takes to the middle thereof; and the owner of land patented by the United States bordering upon a non-navigable pond takes by the law of this State to the center of the pond. *Foss vs. Johnstone* (1910) 158 C. 119, 110 P. 294.

The title to the lake or stream would be clear unless lost by the patentee due to sale, et cetera. The rights to the use of the water of a stream could be complicated by senior riparian water rights of property owners above and below his property.

In the case of ocean frontage, tidal bays, and tidal rivers, the patent's *littoral* boundary will be the mean high tide line. (21) In the case of navigable rivers and lakes, the *riparian* boundary will coincide with the low water mark. (22) This may be changed by litigation presently being decided in the courts. Along non-navigable streams and lakes, the *riparian* boundary will follow the center of the stream and extend to the middle of the lake respectively.

In dealing with property that was originally bought from the State or private corporation, the title description must be studied in detail to ascertain the true intent as written. It is possible to sell riparian rights separate from the property in which case the new owner may not enjoy the riparian privileges that originated with the property. There should be no real difference in boundary location when compared to lands that were originally patented except in cases where patented land has subsequently been divided into smaller parcels.

If the boundary calls to a non-navigable stream, note whether the call is to the bed of stream (meaning its center) or a contrary call. It should call for the center as noted in court case *Ford vs. Butte County* (1944) 145 P.2d 640, 62 C.A.2d 638. Neighboring deed descriptions should be

checked in order to ascertain their original intent. Note that in cases of ambiguities it may be possible to contact the original grantor. The title may be easily settled with his cooperation in the form of a quit claim, et cetera.

Another type of grant is a Mexican or Spanish land grant. The extent of ownership of this real property is directly tied to the date of the original grant and the laws applicable to Spain or Mexico at that date as the rights to all Spanish and Mexican grants were guaranteed by the Treaty of Guadalupe Hidalgo in 1848:

... In the said territories, property of every kind, now belonging to Mexicans not established there shall be inviolably respected. The present owners, the heirs of these, and all Mexicans who may hereafter acquire said property by contract, shall enjoy with respect to it guaranties equally ample as if the same belonged to citizens of the United States. (Article VIII)

On March 3, 1851, Congress passed the Act entitled "Settlement of Land Claims" providing for a commission of three to hear evidence and affirm these grants. The District and Supreme Courts were instructed as follows:

Section Eleven. And be it further enacted, that the commissioners herein provide for and the District and Supreme Courts, in deciding on validity of any claim brought before them under the provisions of this Act, shall be governed by the Treaty of Guadalupe Hidalgo, the laws of nations, the laws, usages, and customs of the government from which the claim is derived, the principles of equity, and the decisions of the Supreme Court of the United States, so far as they are applicable.

As late as 1890 there were court cases dealing with the settlement of land grant disputes. As a guide to the history of Spanish and Mexican land grants, refer to "California Land Grant Disputes 1852-1872: A Rhetorical Analysis" by S. Gaffey and "The Confirmation of Spanish and Mexican Land Grants in California" by Ivy B. Ross, Library of Congress Card Catalog Number 73-82384, both of which are available in the University of California, Fresno, library.

As an example of the ambiguities

(Continued on Page 16)

CLSA-ACSM WORKSHOPS PLANNED

A joint committee of CLSA and ACSM members is planning its first workshop in a series to be presented throughout California, beginning next May. Present plans are based on the premise that numerous opportunities already exist for the prospective or recently licensed surveyor. What is needed, the committee believes, is opportunity for continuing education for the licensed practitioner, and the California Land Surveyors Continuing Education Series is intended to fill that need.

Registrants should have at least ten years of progressively increasing responsibility since obtaining their Land Surveyors license (or equivalent background), as those with lesser qualifications may have difficulty maintaining pace with the class.

Presenting one day events containing advanced level material for the busy professional necessitates limited topic breadth. By confining subject matter to very narrow fields, however, the seminars will be able to pursue each matter in depth. This should meet the needs of the experienced practitioner in lieu of the cursory introduction frequently found in workshops attempting to meet the needs of all participants.

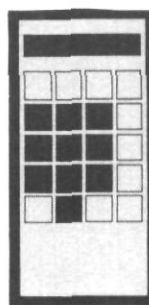
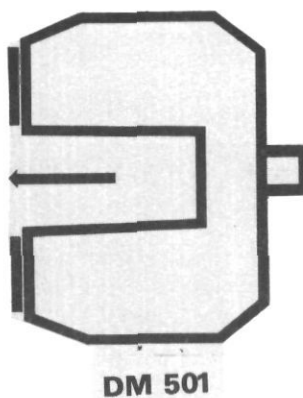
The initial workshop will investigate the definition and responsibilities of Boundary Surveys. Scheduled for May or September, it will be a one-day (Saturday) session in Orange County, and will be followed by another a week or two later in San Mateo County. Additional courses following the logical development of boundary problems are being prepared for following years.

The committee is also investigating other less-advanced subject matter and lecturers, in order to fill voids that may exist in presently available offerings. Special attention is being directed toward opportunities developed outside California to ascertain content applicability and practicality for California practice. The committee finds many such offerings ignore the peculiarities and specifics of California law or custom. This joint effort has the potential to upgrade the level of opportunities available in California.

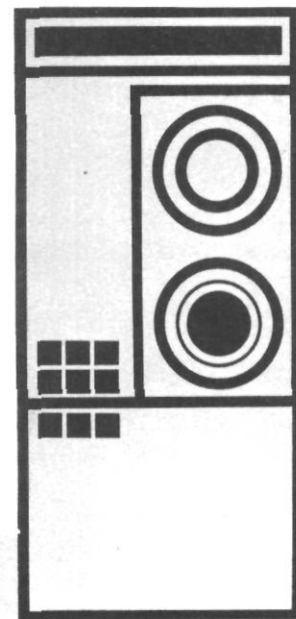
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METRIC CHAIN TAPES

(Continued from Page 1)

to millimetres throughout would be needlessly expensive.

The most practical solution appeared to be a tape line graduated in metres and decimetres, with an extra decimetre before zero numbered from right to left, graduated in millimetres. Members of the Southern California Section of the ACSM were exposed to my thoughts along these lines a couple of years ago. The ensuing discussion confirmed my basic suspicion that everyone was horrified by the potential requirement that "cut" tapes be revived.

However, the ACSM's Practice Guide Study Committee recognized the value and desirability of "add increment" tapes. They also recognized, at least by inference, that it wasn't particularly desirable to require that the longer length tapes be graduated to millimetres, or even to centimetres.

In the meantime, my curiosity about the apparent failure of metric tape users elsewhere in the world to adopt an "add" increment was cleared up by the realization that: (a) tape lines used by surveyors in the metric system were generally subdivided to centimetres, and (b) one of the first things a surveying trainee is taught in Europe is to practice adeptness and consistency in his estimation or interpolation of centimetres to millimetres.

Returning to the wants of the U.S. field man, although some prefer tapes, even as long as 300 feet, graduated to hundredths of a foot throughout, most land surveyors use tape lines graduated in feet only, with the last foot and an extra foot before zero subdivided to hundredths.

There are, of course, valid reasons why a 100 foot tape marked to hundredths throughout is often desirable, but in most cases it is a needless expense to pay for 10,000 or 30,000 marks on a ribbon of steel, when 200 or 400 marks will serve the purpose. The same reasoning can be applied to metric tapes. A 30 metre tape line, graduated throughout to millimetres will have 30,000 marks on it; graduated to centimetres, it will have 3,100 (assuming that the first decimetre is subdivided to millimetres).

In contrast, a 30 metre tape line, graduated to decimetres, with an extra decimetre before zero to millimetres requires only about 400 marks.

Another objection encountered

when discussing the adoption of the metric system by the U.S. surveyor earlier was the confusion that could be expected from the separate nomenclatures for the various graduation elements... metres, decimetres, centimetres and millimetres, especially if the lines were to be numbered in these separate increments.

Dr. Whitten's astute panel of experts solved this problem. Their "Metric Practice Guide" recommends that length measurements be expressed as metres and decimals of a metre. This would virtually phase out, for surveyors and engineers, use of the terms decimetre, centimetre and (except for special instances) millimetres.

Quoting applicable excerpts from the ACSM report:

"Unit. The fundamental unit for horizontal distances, heights or depths is the metre, with the number of decimals consistent with the precision to be indicated."

Another section, dealing expressly with measuring tapes, states:

"Divisions should be such that the user may (1) measure to the nearest millimetre with a minimum possibility of error. If the popular "add" feature is used, the section added at the zero end should be only one decimetre in length with the full tape divided to decimetres."

It is with considerable personal satisfaction that I report that Lufkin is going ahead with the manufacture of metric tapes in conformity with the ACSM's recommendations. The graduations and numbering style being put

into production are shown in the accompanying illustration.

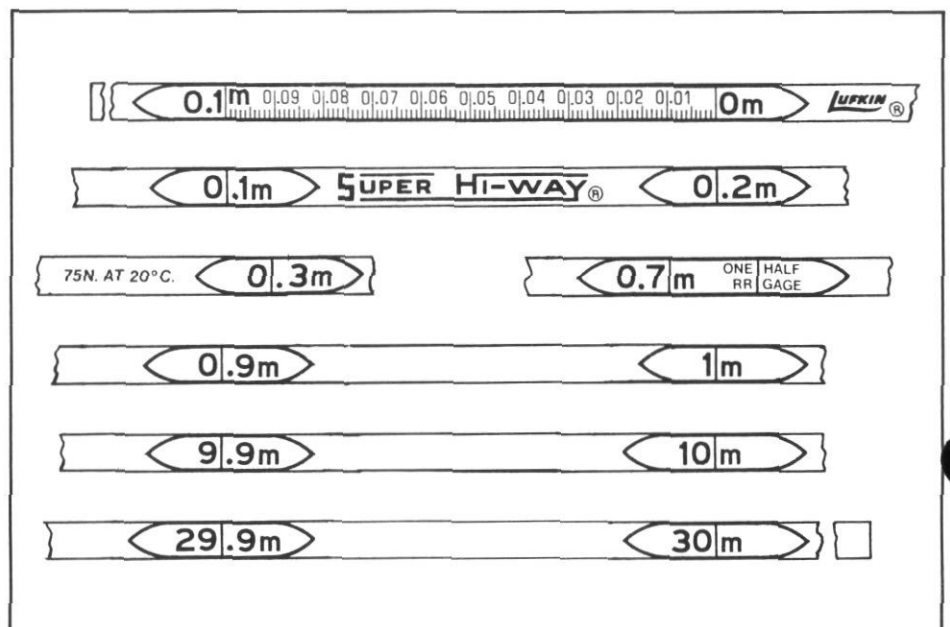
It will be noted from the illustration that the tension (when supported throughout) will probably be expressed as "newtons," the metric term for units of force, rather than in kilos, the units of weight. I understand that this matter is still being debated by the various authorities involved. However, regardless of the final decision, no great problem will be involved, as a simple conversion can be made. Ten kilos equal 98 newtons, and 1 pound equals 4.448 newtons. The tension of 75 newtons shown in the illustration is the equivalent of 17 pounds.

This is somewhat more than is called for by current manufacturing specifications and applicable governmental standards, hence the continuing debate.

But, to sum it up, the important thing for the U.S. surveyor and the CLSA membership to know is that they will *not* be expected to retrogress to the use of "cut" tapes. Metric tapes with an "add" increment will be ready when you are ready for them.

(1) Italics added by the author. Note that the use of measurements to millimetres is to be permissive, rather than mandatory. It will be up to the practitioner to measure to the number of decimals of a metre that the requirements of the job dictate.

Since this article was written, the "Metric Practice Guide For Surveying and Mapping" has been printed and is available through CLSA. Also, Lufkin is producing metric tape.



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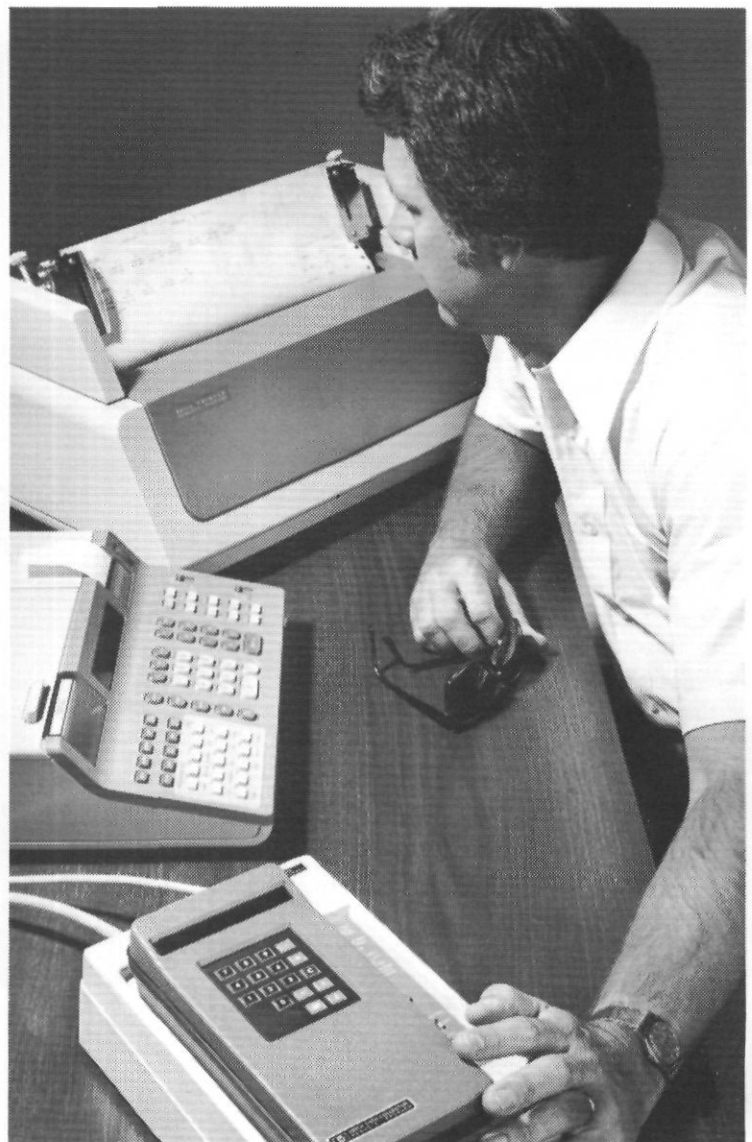
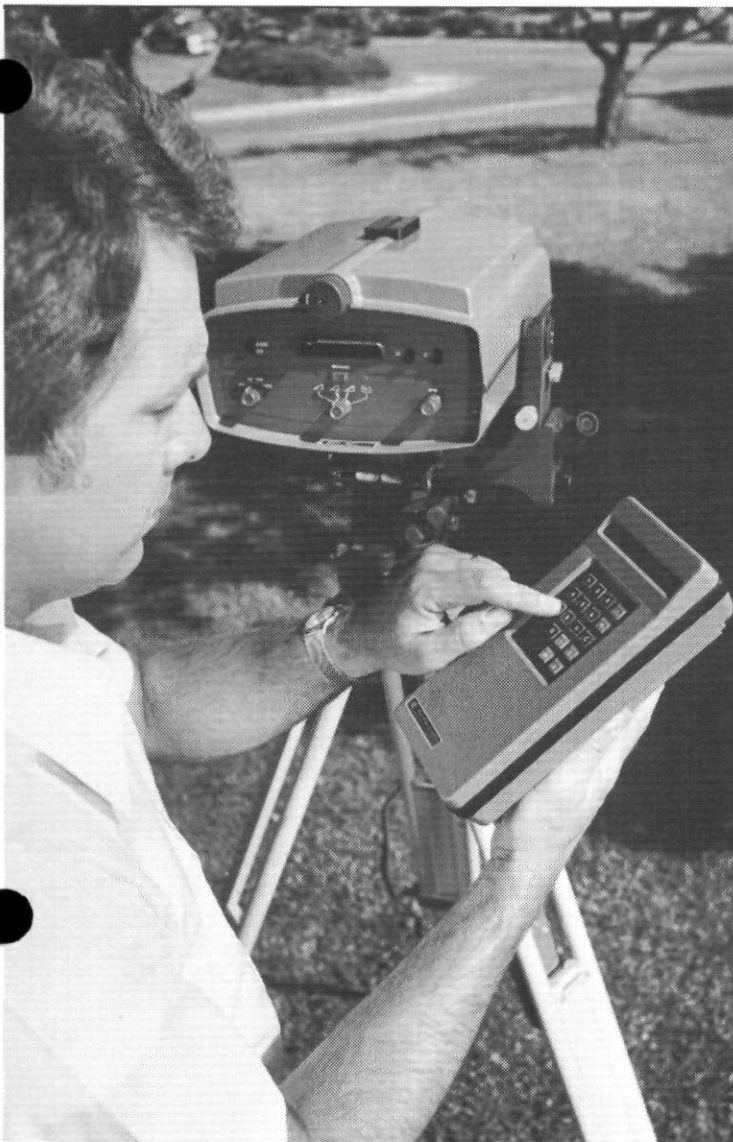
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WATER BOUNDARY

(Continued from Page 12)

that may be encountered in dealing with grants, here follows an excerpt from Section 2077 of California Civil Procedure Code:

The Mexican grant dated January 13, 1844 covering the bed of the Stockton Slough or Channel, being prior to the treaty of 1848 between Mexico and the United States, the grantee and his successors are the owners, and not the State of California, although the channel is a navigable water way. 5 Ops. Atty. Gen. 180.

When dealing with title descriptions remember that all boundaries are subject to the intent of the grant deed. Therefore, be sure of your decision and know your position vis-à-vis the accepted laws that are involved.

Establishing the Riparian Boundaries

In this section I shall discuss the established procedure for setting the water boundary: in the case of tidal boundaries, setting the point of intersection of the mean high tide plane with the shore line; in the case of low water mark, establishing the intersection of your boundary line with the low water line; in the case of non-navigable streams, determining the center or thread line of the stream. You must be prepared to show new boundary lines if accretion, erosion or reliction has occurred. Note that in dealing with tidal lands you are required to establish the mean high tide line as it exists along the shore of the seaward coast or as it existed at its *last natural state*.

As it is beyond the scope of this article to fully explain the science of tidal determination, I will describe only the terms and methods used in this paper that are pertinent to California. For a fuller explanation refer to "Tidal Datum Planes" by H. A. Marmer, "Manual of Tide Observations" by the U.S. Department of Commerce Coast and Geodetic Survey, "Shore and Sea Boundaries" by Aaron L. Shalowitz and the printed proceedings of the California Land Surveyors Association "Water Boundaries Workshop, May 20 & 21, 1977".

Some of the terms used in this paper as defined by Special Publication No. 135, "Tidal Datum Planes"

and "Shore and Sea Boundaries", Vol. 2, are:

Mixed type tide is one in which two high and two low waters occur in a day, but with marked differences between the two high waters or between the two low waters of the day.

Diurnal inequality is the exhibited differences between the two high or low waters of a day.

Mean sea level is the average height of the surface of the sea for all stages of the tide over a 19-year period, usually determined from hourly height readings.

Mean high water is the average height of the high waters at that place over a period of 19 years. "On the Pacific Coast, two high and two low tides occur each tidal day. The average of all high tides is Mean High Tide or Mean High Water. The average of the higher of the two daily high tides is Mean Higher High Water." (24)

There are several methods of determining mean high tide. With the primary determination method you must take tide observations over a 19 year period. This method entails great expense and would not be feasible for a private surveyor or land owner.

The secondary determination method can be broken down to comparison of simultaneous observations or correction by tabular values. When using the comparison of simultaneous observations you can use the day, month or year methods to compare your reading with the simultaneous readings of a primary station in the area. Each will give approximate values and accuracies listed below if conditions are ideal.

The day method involves reading a tidal staff every fifth day for a period of one month and yields an accuracy of around 0.1 ft.

The month method involves reading a tidal staff daily for high and low water readings for a period of one month and yields an accuracy of approximately 0.1 ft.

The year method gives an accuracy of 0.05 ft. for daily observations over a year's period. Here again the cost would be exorbitant and hard to justify on most projects.

Correction by tabular values is a method to be used when observations are taken at a place remote from a

suitable primary tide station. For a description of this method refer to Marmer's "Tidal Datum Planes". The most feasible method for the establishment of the tidal plane location would be by a level circuit run from an established tidal bench mark. To obtain tidal bench mark data and locations in your area contact the county surveyor's office, city public works department, or write the Director, U.S. Coast and Geodetic Survey, Washington, D.C.

Note that not all U.S. Coast and Geodetic bench marks are tied directly to the same mean high tide elevation. The zero point of the United States datum of 1929 is still in effect and may differ from local mean sea level.

In California court cases, there has been reference to the California definition of mean high water which is determined by averaging only the *neap tides*. One of the latest cases, *People vs. William Kent Estate Company*, 242 C.A.2d 156 (1966), stated that the "California rule" meant "... the average of all high neap tides" should be used in determining mean high water. Yet the State Lands Commission has used the average of all high tides since its beginning in 1939. Also, the California Land Surveyors Association and the California Society of Professional Engineers have agreed that the average of all high tides is the applicable method. The average of all high tides is the basis used by the Federal Government and its agencies.

Other court decisions have used the Federal definition of mean high tide (*Marks vs. Whitney*, 6 Cal.3d 251 (1971); *City of Long Beach vs. Mansell*, 3 Ca.3d 462(1970); *Los Angeles vs. Borax Consol* (1936) 74 F.2d 901) and the states were granted title to the submerged lands commencing at the mean high tide line as defined by the Federal Rule.

Note that unless this question is settled you should locate the mean of all high tides when surveying United States patented lands and mean of all neap tides when locating State patented lands.

To determine the boundary in its last natural state or date of title, you can solicit witnesses, United States records of surveys, old topographic maps, hydrographic surveys, navigational charts, recent aerial photographs or you can contact local surveyors to see if they can provide information or sources of information. You will need

(Continued on Page 18)

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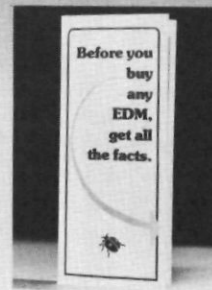
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WATER BOUNDARY

(Continued from Page 16)

to compare this data with the present location to determine if any changes have occurred and, if so, show the area and extent of change.

To determine the cause of an excess or deficiency you can consult the U.S. Army Corps of Engineers, oceanographers, soils experts and compare hydrographic survey, navigation maps and current charts.

If the cause is found to be natural, explain the applicable laws to your client and discuss your proposed proportioning method for the excess or deficiency. At this stage in the final survey you should try to negotiate a method of proportionment that will be satisfactory to your client and his neighbors. With this accomplished you can draw your final maps showing the old boundary and the proposed new boundary and proceed with their recordation. You can advise your client to contact an attorney versed in boundary adjudication who can advise your client on the methods required to obtain title to the area in dispute if it is contested by the State or by a private party.

The methods of apportionment in California are enumerated in 52 Cal Jur 2d 797 as follows:

The rule for determining the new frontage when accretion has added to a stream or seashore forming the boundary of lands adjoining is, first, to measure the whole extent of the ancient shore and compute the proportionate ownership of each riparian proprietor; second, to measure the newly formed bank and give each proprietor the same proportionate share of frontage he had on the old line; and third, to draw lines from the point of former ownership to the point of new ownership. The new lines will be either parallel, divergent, or convergent according to the new shore line of the river equaling, exceeding, or falling short of the old.

Section 979 states that modification may be required in special cases, giving the surveyor some leeway in the method used. Try to apportion the accretions or relictions in a manner that will allow each riparian and littoral owner to share equally according to the amount of water frontage they had prior to the accretion or reliction.

The one method that the State and the courts seem to reject is the method

by which the boundary line is extended in the direction of its last course. On curved water fronts they generally want the new line to extend perpendicular to the tangent of the shore. The pie method (25) for proportioning reliction in navigable and non-navigable lakes is acceptable and a combination of long-lake (26) and pie method would be acceptable on a long lake if it meets the criteria of proportionate shares as proportioned with the old shore line.

Conclusion

The status of water laws in California is very unpredictable. Court cases are being decided that will cause the most knowledgeable surveyors to pull out their hair.

At the present time, there is an opinion by the Attorney General of California stating, in effect, that the Legislature acted improperly in 1872 when it passed Civil Code Section 830. It is his opinion that the water boundary on non tidal navigable rivers and navigable lakes should set at the *high* water mark and not the low water mark. *There are cases in court deciding this issue at present and a decision in favor of the high water mark would upset over one hundred years of precedent.*

As surveyors you should equip your libraries with law sections and keep abreast of the court decisions that will affect you.

It is hoped that this paper will alert you to the pitfalls of water boundary location problems in California and cause you to proceed with due caution in the field of ever changing boundaries and laws.

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5. *Ibid.*, pg. 105.

6. *Ibid.*, pg. 105-106.

7. *Ibid.*, pg. 34.

8. *Ibid.*, pg. 355.

9. *Ibid.*, pg. 355.

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15. *City of Oakland vs. El Dorado Terminal Company* (1940) 106 P.2d 1000, 41 C.A.2d 320.

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17. *Ibid.*, pg. 450-452.

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19. In Nebraska, however, the meander line is presumptively the boundary (*Harrison vs. Stripes*, 51 N.S. 976 (1892)), and in Michigan, private ownership of land along Lake Michigan is held not to extend beyond the meander line (*Ainsworth vs. Munoskong Hunting Club*, 123 N.W. 802 (1909)).

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21. *City of Los Angeles vs. Borax Consolidated Limited* (C.C.A. 1935) 74 F.2d 901, 55 S.Ct. 921.

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25. Brown, Curtis M., BOUNDARY CONTROL AND LEGAL PRINCIPLES (New York, 1969) pg. 312.

26. *Ibid.* ▲

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TOWNSHIP TRIVIA

Clyde Elmore

It should be stated at the start that the sum total of any information contained herein will never aid anyone in surveying a section of land. The mathematical symmetry, however, of the ordinary township may be of some passing interest. The numerical arrangement of the sections in a township form a unique number series. Many of the features peculiar to this number series is related in some way to the number 111. This number, or even multiples of it, appears again and again throughout the township. Shown below are several number relationships that are the most apparent. They always involve a symmetrical portion of the township (for example: the two diagonals, the three sections in each corner, etc.). There probably exists many other interesting number combinations, but here are some that are noticeable.

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

- Each vertical column adds to 111.
(The horizontal rows are labeled A thru F from top to bottom).
- The sum of row A + row F = $222 \div 2 = 111$.
- The sum of row B + row E = $222 \div 2 = 111$.
- The sum of row C + row D = $222 \div 2 = 111$.
(The sections around the perimeter of the township are called the "Outer Square." The next row in is called the "Median Square." The four sections in the center of the township are called the "Inner Square.")
- The sum of the numbers in the outer square is 370. The sum of the numbers in the inner square is 74. $370 + 74 = 444 \div 4 = 111$.

- The sum of the numbers in the median square is $222 \div 2 = 111$.
- The sum of the two diagonal is $222 \div 2 = 111$.
- The sum of the NW 3 corner numbers $(5 + 6 + 7) = 18$
The sum of the SW 3 corner numbers $(30 + 31 + 32) = 93$.
 $93 + 18 = 111$
The sum of the NE 3 corner numbers $(2 + 1 + 12) = 15$
The sum of the SE 3 corner numbers $(25 + 35 + 36) = 96$.
 $96 + 15 = 111$
- The sum of the NW 3 median square numbers $(9 + 8 + 17) = 34$.
The sum of the SW 3 median square numbers $(20 + 29 + 28) = 77$. $77 + 34 = 111$.
The sum of the NE 3 median square numbers $(10 + 11 + 14) = 35$.
The sum of the SE 3 median square numbers $(23 + 26 + 27) = 76$. $76 + 35 = 111$.
- If $a =$ the number of the first section and $1 =$ the number of the last section and $n =$ the number of sections, then:

$$\frac{a+1}{2} \sqrt{n} = 111$$

$$\frac{1+36}{2} \sqrt{36} = 111$$

- In any block of nine (9) adjacent sections (3 x 3) the sum of the two diagonals equals each other. Example:

3	2	1
10	11	12
15	14	13

$$15 + 11 + 1 = 27$$

$$13 + 11 + 3 = 27$$

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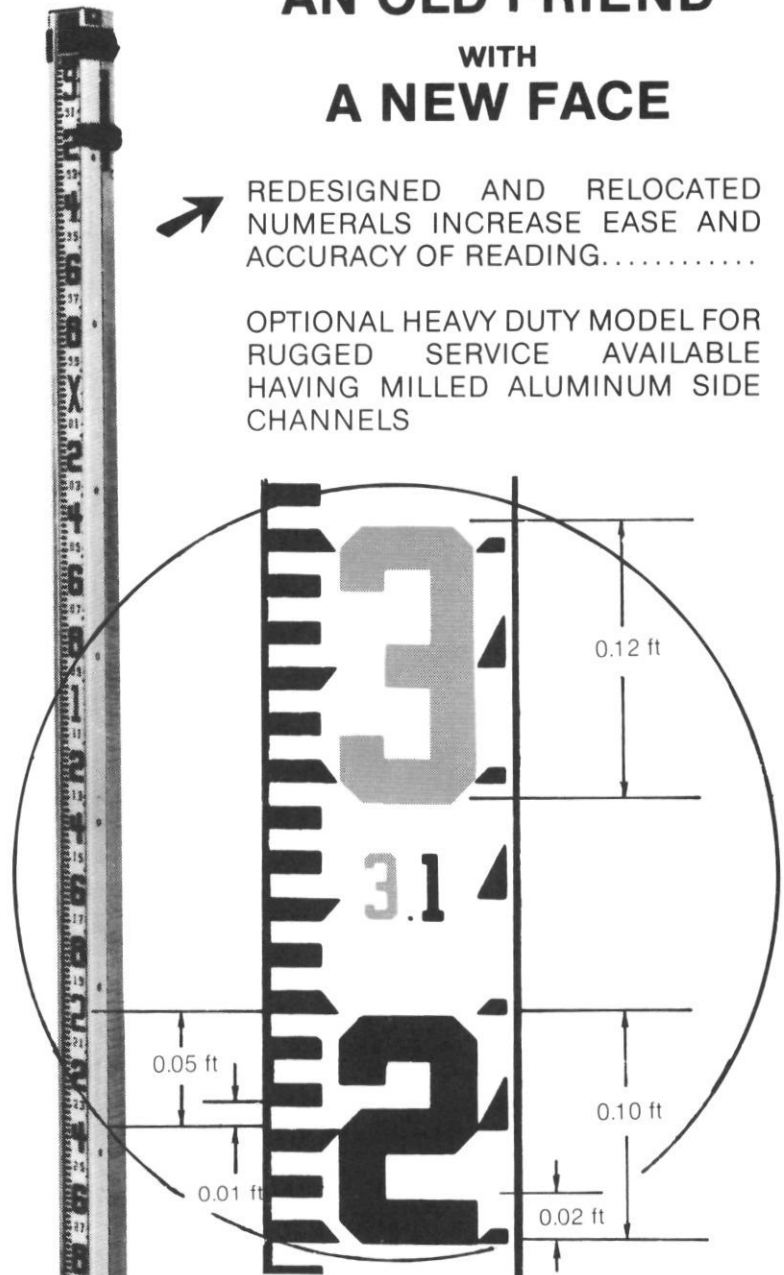
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- d. *The Ordinary High Water Mark - How Determined!*—Ned Washburn, Esq., Attorney at Law, Landes, Ripley & Diamond, San Francisco, CA
- e. *To Insure or Not to Insure—That is the Exception!*—James R. Dorsey, L.S., Executive Vice President, Winter, Durnford, Dorsey and Associates, Land Consultants.
- f. *More Muddles in the Puddle—The Jurisdictional Aspects and Boundaries of the California Coastal Zone Commission and San Francisco Bay Conservation and Development Commission*—Raymond B. Thinggaard, L.S., Assistant Manager Real Property, Leslie Salt Co.
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