

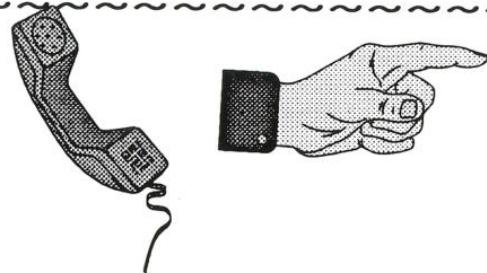
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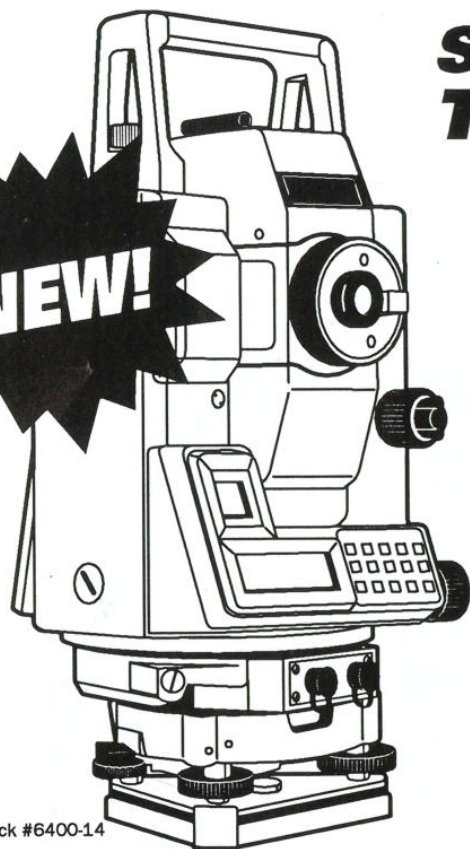
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YOUR TITLE: _____

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Additional information or comments (optional): _____

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☐ **Special Member**, annual dues \$50. (Not meeting above qualifications but with a particular interest in, or association with, the profession of land surveying.)

☐ **Special Member**, Student, annual dues \$15. (Pursuing a post secondary academic course of study, and currently enrolled.)

☐ **Sustaining Member**, annual dues \$100. (Persons, institutions or corporations desiring to assist PLSW financially.)

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NSPS Notice of Awards

SURVEYING EXCELLENCE AWARD

Staff Liaison: Pat Canfield, ACSM/NSPS, 5410 Grosvenor Lane, Bethesda, MD 20814-2122

Presented to a person who performed outstanding service to the surveying profession, this award includes an engraved plaque and a \$500 honorarium contributed by POB Publishing Co., Canton, Michigan.

The person does not have to be a surveyor or a member of NSPS or ACSM, but candidates must be nominated for the award by an ACSM affiliate section or two NSPS members at large. If nominated by an ACSM section or affiliate, the nomination must be signed by two officers of the organization. If nominated by two NSPS members at large, the nomination must be signed by the sponsors and accompanied by four letters of recommendation.

Each nomination must include a narrative stating the reasons why the sponsors feel the nominee is deserving of this honor, specific accomplishments the nominee has made toward the profession and biographical data that can be used in the award presentation.

The staff liaison must be notified of any nomination by December 31, 1995.

MOST INTERESTING SURVEYING PROJECT OF THE YEAR AWARD

Staff Liaison: Pat Canfield, ACSM/NSPS, 5410 Grosvenor Lane, Bethesda, MD 20814-2122

This award consisting of a Pentax IQZoom 105 Super 35mm camera with case, a plaque, and 1000 reprints of the resulting published article contributed by Pentax Corporation, Englewood, Colorado, is presented to individuals, companies, governmental units, or state associations having knowledge of interesting projects and the ability to provide documentation of the project — technical information, releases, photographs, and a record of the personnel and equipment involved. The project need not have occurred in the last year.

Interested candidates should submit a project by December 31, 1995 to P.O.B., Attn: Most Interesting Surveying Project, 5820 Lilly Road, #5, Canton, MI 48187.

STUDENT PROJECT OF THE YEAR AWARD

Staff Liaison: Pat Canfield, ACSM/NSPS, 5410 Grosvenor Lane, Bethesda, MD 20814-2122

This award consists of a plaque and a \$500 honorarium, contributed by C&G Software Systems, Inc., Atlanta, Georgia, as well as paid travel and lodging expenses to the ACSM-ASPRS Spring Convention.

A submitted paper should describe a project in which the applicant was a participant and may involve a group of students and/or non-students. The paper must be written by one person only. Advice and constructive criticism from the applicant's instructor or supervisor is permissible and encouraged. The project need not have occurred within the preceding 12 months. All papers submitted will be considered for presentation and publication by ACSM.

acquired from the staff liaison.

Completed papers should be submitted to the staff liaison by December 31, 1995.

EXCELLENCE IN PROFESSIONAL JOURNALISM

Chairperson: Kenneth S. Curtis, 2204 Happy Hollow Road, West Lafayette, IN 47906

An engraved plaque is presented annually to the ACSM affiliate society whose newsletter was judged to have the highest quality during the previous year. In the past, judging was made by the editors or publications chairmen of the newsletters participating in the contest. Any editor wishing to participate should contact the chairman for information. For complete details; Contact Pat Canfield at ACSM/NSPS, 5410 Grosvenor Lane, Bethesda, MD 20814-2122 or call 301-493-0200

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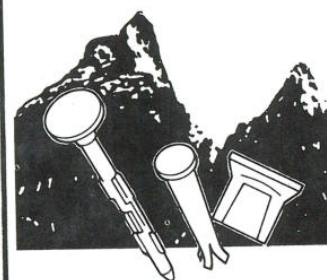


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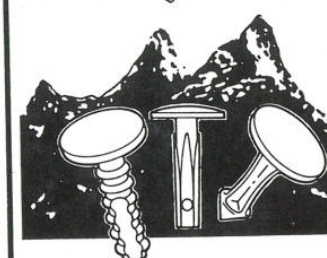
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EDITORIAL POTPOURRI

O NEW PLSW MEMBER - The newest members of PLSW, approved by the Board of Directors in April, are as follows:

Lawrence Kay	Member	Vernal, UT
Nelson Marshall	Member	Vernal, UT
Ted McMahon	Member	Gillette, WY
Richard Muscio	Member	Casper, WY

Congratulations and welcome to PLSW.

O PLSW MEMBERSHIP - If you are not a member of PLSW, join now. We need your support. An application is included in this issue. If you are a member, recruit a new member.

O SUPPORT OUR ADVERTISERS - Our advertisers have been very loyal to us. For your next purchase, consider our advertisers first.

O LOCAL PLSW NEWS - Send us a summary of your chapters activities or other related activities for publication. The deadline for the next issue of *Lines and Points* is presented on this page.

O PLSW BOARD MEETINGS - The minutes of the last Board of Directors meeting is contained in this issue. Present your views to your director and attend the next Board meeting at Buffalo. All members are welcome.

O BRONZE RAFFLE - Have you bought your raffle ticket? Have you sold any raffle tickets? Contact your Director for additional tickets.

O LINES AND POINTS FAX - The *Lines and Points* fax number is 307-235-5604 or 307-235-8184.

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PLSW (Professional Land Surveyors of Wyoming) is a statewide organization of Registered Land Surveyors licensed to practice in the Equality State of Wyoming. PLSW is dedicated to improving the technical, legal, and business aspects of surveying in the State of Wyoming. PLSW is affiliated with the American Congress on Surveying and Mapping and the Western Federation of Professional Land Surveyors.

Editorial Staff: John Hibsman, Steve Strang, Don Davis.

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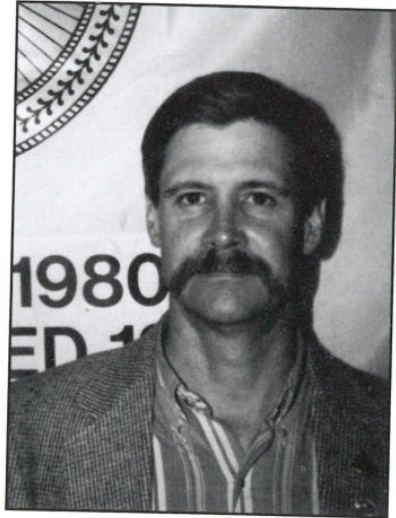
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Message From the President

I am sure most will agree that this is the busiest time of the year for surveyors. The ample amount of rainfall around the state has made for a good deal of muddy roads, full creeks, and a bumper crop of mosquitoes and deer flies, all combined making field conditions very interesting.

I was recently working with a cadastral crew on the Lower Brule Indian Reservation in South Dakota. We were retracing several original GLO surveys which were executed in 1890 by Edwin H. Van Antwerp and Monroe Warner. After retracing four and one half miles of reservation boundary, we found that our total retracement differed from the overall record by approximately seven links. Upon computing search areas, we were able to recover the remains of an original mile post and closing corner, both monumented with charred posts. It is always a pleasure to follow in the footsteps of diligent, competent surveyors and helps affirm my pride in being a part of this profession and its unique history.

I would like to take this opportunity to welcome all of our new members and associates. As you may recall, I had set a goal of increasing our membership by ten percent for this upcoming year. It appears (not to my credit) that we may have already surpassed that goal. To those responsible, I say thank you and keep up the good recruitment work.

Your PLSW Board of Directors met in Riverton on Saturday, April 29. The first order of business was a visit to the Wind River Initial Point on the Wind River Indian Reservation. Following an exhaustive search, traces of the original monument and subsequent monuments were recovered. With the addition of an old tire and a steel fence post, the rehabilitation was complete. The meeting resumed in Riverton at the Sundowner Station with some of the high points including the unanimous vote of approval for PLSW to participate in a five state convention to be held near Deadwood, South Dakota, tentatively scheduled for 1997. The Board also took steps to ensure that the PLSW Handbook be updated by a working committee comprised of members from the Upper Platte Chapter. The Board also adopted the TRIG STAR program on a statewide basis and appointed Marshall Lindeen, also from the Upper Platte Chapter, to oversee the program. Lastly, the board accepted the appointment of several new committee members.

Our Education Committee and Professional Practice Committee chairman has been extremely busy as usual. Dr. Herb

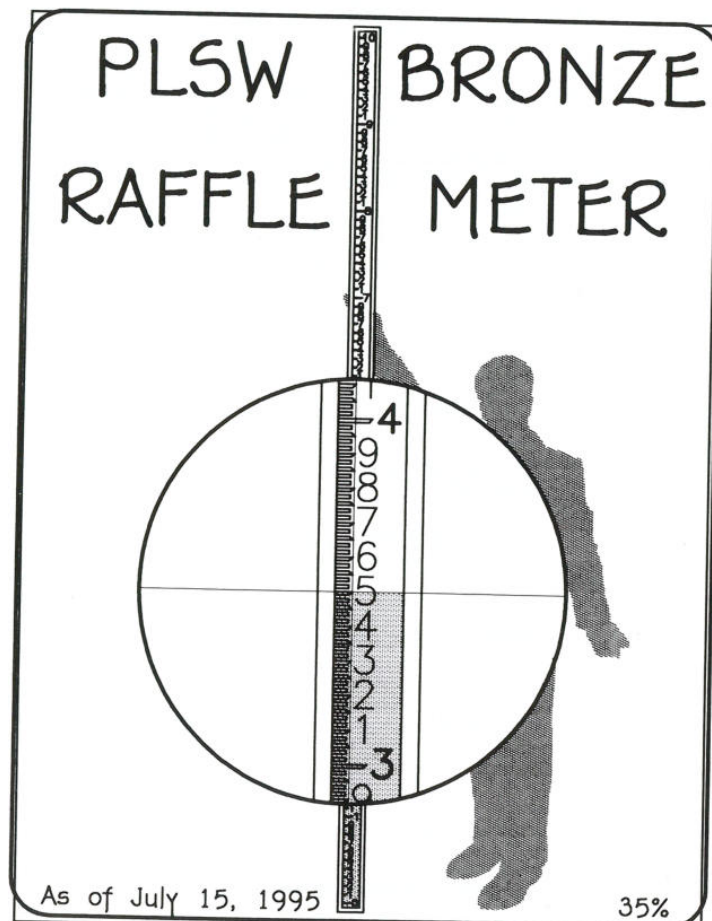
Stoughton has recently compiled and submitted to the SBRPEPLS the results of the recordation and remonumentation questionnaire. In addition, Herb represented the PLSW at a meeting with the University of Wyoming, Engineering Department, at Laramie regarding the future presentation and development of Land Surveying courses statewide. Hopefully we can expect to see some new surveying continuing education courses offered in the near future.

We are exploring the possibility of offering a weekend seminar in Casper, Friday and Saturday, December 8-9, 1995, in conjunction with the BOD meeting. The topics to be covered are still tentative. If you have any suggestions or comments please feel free to contact me or one of the education committee members.

As most of you are aware, Martin Pederson has recently been appointed as the Land Surveyor member to the SBRPEPLS. Martin has replaced Paul Scherbel, who has served in that capacity for the past eight years. PLSW would like to congratulate Martin on this appointment and are looking forward to working with him on issues that affect the land surveying profession in Wyoming. An immense thank you to Paul Scherbel for his tireless efforts at promoting excellence in the profession and his distinguished representation of the Wyoming Land Surveyors for the past eight years.

The next BOD meeting is scheduled for Saturday, August 26, 1995 in Buffalo, hosted by the Northeast Chapter. Hope to see you all there.

James D. Claflin



REPORT OF WESTERN FEDERATION OF PROFESSIONAL SURVEYORS BOARD OF DIRECTORS, 29 APRIL 1995, DENVER, CO.

Meeting was called to order by Chairman John Abenroth, @ 9:15 a.m. L.C.T. Agenda revisions were made along with approval of the January 14, 1995 meeting minutes. The action list was reviewed and updated.

Chairman John Abenroth gave a verbal chairman's report on WFPS. Secretary Chuck Paddack gave a verbal report on WFPS. Treasurer Jerry Tippin submitted a written financial report for the WFPS. A brief summary is as follows: Cash on hand \$594.10, Money Market Account \$1,886.51; Certificate of Deposit \$53,648.85 of which \$14,761.14 is designated for scholarships. Discussion was held on investing in Certificates of Deposit and Treasury Bills.

Correspondence concerning task analysis with NCEE was discussed and Ron Whitehead was appointed committee chairman of the NCEE Task Analysis/Liaison Committee. Susan Jensen sent a letter to WFPS withdrawing from the Chairman Elect position due to circumstances in her business and family.

Conference committee reported that 2 auction items are needed from each state for the scholarship auction to be held during the September convention in Denver. Gift donations are gladly accepted and items do not have to be survey items. Items should be sent along with a brief description and approximate value to: Brian Wiegart, WFPS Scholarship Chairman, 11080 S.W. Allen Blvd Suite 100, Beaverton, Oregon 97005 (503) 643-9410. Chuck Pearson reported that the 1997 conference site selection process has centered on either Salt Lake City, Utah or Coeur d'Alene, Idaho.

Continuing Education committee chairman Terry McHenry was absent. Discussion was held concerning the draft resolution on continuing education/professional competency, which was held for input and review from last meeting. After discussion, a final resolution was to be formulated by Chuck Pearson and Dave Difulvio for adoption later in the meeting.

Discussion was held on the WFPS bylaws and records. Chuck Pearson and Bud Campbell were to get together and report on what to do with WFPS records.

Brian Weigart, Scholarship Committee Chairman submitted a written report on the rules governing the WFPS scholarship program. After discussion, it was motioned and approved for (2) WFPS \$600 scholarships for the 1995-1996 school year. Meeting was adjourned for a lunch break @ 11:45 a.m. with a visit by delegates to the downtown Denver area.

Meeting was readjourned at 1:30 p.m. A final resolution was reviewed and discussed concerning continuing education/professional competency. By requested roll call vote all officers and delegates present voted unanimously for the resolution. As soon as I can obtain a copy of the resolution I will submit it to PLSW.

NSPS/ACSM nominations were announced by Bud Campbell for the absent Sam Best. PLSW member's Herb Stoughton has been nominated for Vice President and John Steil being retained for Area 7 director.

Nominations and election of officers was held. The results are as follows: Ron Whitehead, present Chairman-Elect to fill the Susan Jensen vacancy. Blair Meggett, Chairmen-Elect; Chuck Paddack, Secretary.

After discussion Ken Frisner and Dave Difulvio...

to work on a liaison committee to revise the Federal 255 and 254 forms.

After discussion it was approved for Jerry Tippin and Chuck Pearson to look into conference liability insurance for WFPS conferences.

Chic Chichester reported on indemnification clauses on contracts submitted to surveyors as contractors. After discussion it was deferred to Dave Difulvio for review and report back to WFPS.

Blair Meggett reported on the formulation of the NSPS foundation plan as a means of support for NSPS. No action by WFPS was taken on this issue.

State activity reports were reviewed and discussed. Some of the highlights are noted as follows:

Arizona - This year's annual conference was a rousing success with over 200 persons attending. The next annual conference will be held in Phoenix. Arizona Professional Land Surveyors Association has decided that if there is one feat to accomplish this year it would most certainly be mandatory continuing education. APLS is studying the matter.

Oregon - Professional Land Surveyors of Oregon have been fairly inactive with the exception of legislative efforts. PLSO has hired a professional lobbyist to achieve their legislative goals. PLSO sponsored two bills this year. One for action against a person practicing land surveying and one for entry upon private property to survey and establish permanent monuments. PLSO is also co-sponsoring legislation towards implementation of rules to require mandatory professional education.

New Mexico - Membership and money was up due to one reason. Mandatory PDU's in New Mexico. Ethical practice committee reviewed 54 complaints in 1994. To date 30 have been received in 1995. Jim Botsford stated that obviously the professional development unit requirements is having a very positive effect on membership in NMPS as well as attendance at conventions and chapter meetings. It is also placing a need on more and better seminars and educational programs.

Utah - Utah's annual state convention was Jan 19 & 20 with attendance @ 280. They felt attendance was down because of a off year for license renewal. The 1996 state convention will be held in St. George. Current activities include setting up 2 new chapters, continuing the quarterly newsletter (*Foresights*), setting up a insurance program for UCLS members, completing a Public Land Survey Section exam for the Utah portion of the L.S. exam, setting up a legislative committee, setting up a state scholarship fund and setting up a standards of practice for surveys.

Wyoming - My report briefly detailed our annual meeting in Cheyenne, the bronze sculpture scholarship raffle tickets, Martin Pederson being appointed the new P.L.S. member of the State Board and the PLSW Board of Directors meeting in Riverton with the planned recovery of the initial point of the Wind River Meridian. Members of WFPS also wanted it noted that Martin Pederson is a past-chairman of WFPS and wish him well in his appointment.

Next meeting of WFPS is scheduled for Sept 30, 1995 in conjunction with the conference in Denver.

Respectfully submitted,

REFLECTIONS (Continued from Page 19)

which was conducted in conjunction with the GIS/LIS Conference in Minneapolis. Therefore, future Auto Carto programs will always be scheduled with the Annual Conference.

Board Actions

The ACSM Board of Direction met on March 2, 1995 and initiated the following action items:

- Mary G. Clawson was appointed ACSM Secretary.
- Gary R. Kent was appointed ACSM Treasurer.
- An agreement was signed with the American Society for Photogrammetry and Remote Sensing defining respective Annual Convention responsibilities.
- A budget for the 1996 Convention in Baltimore, Maryland was approved.
- FIG America, the U.S. entity charged with organizing the convention for the International Federation of Surveyors in 2002, will select the site and dates for the ACSM/ASPRS Annual Convention.
- The ACSM Executive Director will petition the GIS/LIS Board of Directors to waive the 1995 registration fees for a special program geared to middle school students from the Nashville area.
- The Board of Direction will explore the pros and cons of inviting the Resource Technology Institute to join ASPRS and ACSM in sponsoring annual conventions.
- The ACSM Membership Committee and the NSPS Membership Committee will study a plan for a joint national, state, and local chapter dues structure.
- Vernon W. Dingman was approved as an ACSM Fellow.
- A special award honoring Charles A. Andregg will be established by ASPRS and ACSM.
- The notion of establishing a corporate/firm membership category was rejected because it would jeopardize "the professional status" of the Society.
- A study will be initiated to explore the feasibility of issuing bonds to finance the headquarters building.
- ACSM voted to support continued funding of the important functions performed by the Bureau of Land Management.
- A legal opinion will be secured to determine the legality of contributions from a non-dues-paying incorporated affiliate to the ACSM/NSPS PAC.
- A list will be compiled identifying individuals who have significant political contacts.
- The efficiency with which hydrography certification is awarded will be reviewed, and the process streamlined wherever possible.
- Candidates for elected positions with either ACSM or

Member Organizations will be required to provide written position statements for publication in the Bulletin prior to the election.

- The task force on workshops will be appointed as a permanent committee.

- A proposal will be submitted to the Federal Geographic Data Committee (FGDC) to coordinate a study and pilot project on establishment and use of standards for adjoining counties using GIS.

- Priorities for the Government Affairs Committee were approved.

It was further reported that membership counts were up, in terms of both renewals and new members. Also, the publication of the ACSM journals will be back on schedule before the end of 1995. Finally, ACSM finished the 1994 fiscal year with a slight budget surplus and the first quarter of 1995 is financially strong.



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BOARD OF DIRECTORS' MEETING SUMMARY

The spring meeting of the Board of Directors was held at Sundowner Station in Riverton on Saturday, April 29, 1995. The meeting was hosted by the Central Chapter, Past President Chris Hamilton having made the arrangements.

Prior to the meeting, other members of PLSW joined members of the Central Chapter for the recovery of the stone marking the initial point of the Wind River Meridian southwest of Ethete on the Wind River Indian Reservation.

Following lunch, the meeting was called to order at 2:30 P.M. by President Jim Claflin. All chapters, except one, were represented by their director. A total of fourteen members, ten of which being board members, were present.

The minutes of the past two board meetings, at Lander in January and at Cheyenne in February, were presented by Secretary Rick Hudson, discussed and approved.

The treasurers report in its usual format of bank statement, itemized expenses and balance sheet was distributed by Hudson and approved by the board.

The written report, by NSPS Governor Becky Braman, was distributed and presented by Vice President Pete Hutchison. Becky's report discussed the NSPS Board of Governors' meeting, in Charlotte, North Carolina, on February 25th and 26th. The report indicated much of the meeting dealt with proposed changes, by Congress, for the Geological Survey and Bureau of Land Management, Cadastral Survey Branch. The Interstate Commerce Commission apparently saw fit not to require monumentation of railroads being abandoned across the country. A general discussion, concerning the NSPS map competition, followed the presentation of the report.

There was no "WestFed" report, since delegate Paul Reid was attending a WFPS meeting this same day in Denver. It was recalled that this same conflict occurred in January.

Committee reports were presented (either orally or distributed in written form) from Membership, Education, Professional Practice, Scholarship and Handbook Committees. Seminar possibilities were discussed with suggestions of January in Casper being popular with the members in attendance. PLSW will be awarding a four-year scholarship, rather than an annual one, in the future. A general discussion followed wherein the newly formed Upper Platte Chapter will take charge of the distribution of the PLSW Handbooks to members and affiliates.

Old business concerned the investment of PLSW funds, the corner record questionnaire and finalization of the paperwork concerning the above mentioned Upper Platte Chapter. The board voted to invest \$7,500 currently in our savings account, in a 24-month certificate of deposit with Hilltop National Bank. It was reported that approximately 60 of the 110 questionnaires had been received and were being processed by Herb Stoughton. Director Martin Pedersen, of the Platte Valley Chapter, submitted a new petition to the board and a letter to South Central Chapter Director Don Davis, thereby completing the requirements for formation of the new chapter as previously approved by the board in February. We now have seven chapters covering the entire state.

The first matter of new business was the approval of four applications for membership: Lawrence C. Kay and Nelson J.

T. Muscio, Casper; all as Members. Welcome to PLSW! The next matter to be discussed concerned the distribution of the Corner Record form by PLSW. The board agreed to provide a copy of the form, either on bond paper or magnetic disk, to members and non-members for the nominal cost of one dollar. The Corner Record Committee will review the various disks submitted by members to insure compliance with the statute and rules and regulations.

The matter of insurance for the bronze "Mapping the Frontier" was presented by Jim thereby allowing the statue to be moved around the state for display and to improve ticket sales. After a general discussion, it was agreed that Martin will negotiate for the best deal regarding said insurance.

Scott Scherbel made a presentation regarding the NSPS "Trig-Star" program for which he is the regional coordinator; stating that competition begins at chapter level, then state; regional and finally national level. The awards at regional and national level are to be \$1,000 with the final competition to be held May 20th. The board agreed to support the program, at state level, in the amount of \$300.

Several items of business followed; including committee appointments by President Claflin, appreciation to WES by Northwest Chapter Director Paul Blough, participation in a proposed multi-state convention during May of 1997 in Deadwood, South Dakota, and discussion concerning auction items for the WFPS conference in Denver this September. Honorary Member Paul Scherbel asked PLSW to petition "WestFed" to underwrite the cost of publication of Al White's latest book concerning initial points.

Several announcements followed including distribution of material from the Virginia Surveyors Foundation, Director Rich Greenwood's mention of the availability of Wyoming state statutes on "the internet" via an "800" number, and further discussion by Rich regarding the new bill mandating each county to establish a GIS program by 1996. This last item resulted in a general discussion concerning a number of related topics.

The meeting was adjourned at 6:15 P.M.

Dated this 17th day of June, 1995.

R.L. Hudson,

Secretary / Treasurer

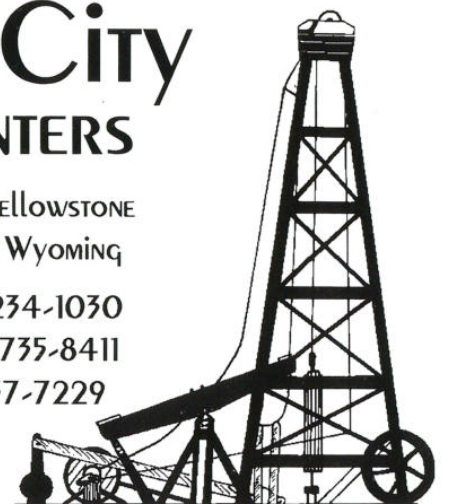
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Land Surveying Problems In The 90's

HERBERT W. STOUGHTON
GEODETIC ENGINEER
(PART 1 OF 3)

Introduction.

The practice of land surveying is defined by state statute [in Wyoming: WS 33-19-114 through 33-29-139]. Every state has a similar statute, which guides the practice of land surveying. Depending upon the state, the land surveyor is "licensed" or "registered," or "licensed and registered." Every state has its own definition of the profession. In Wyoming, the land surveyor is:

... a person who by reason of his knowledge of the mathematical and physical sciences, principles of land surveying and evidence gathering acquired by professional education and practical experience is qualified to practice land surveying as attested by his registration as land surveyor;

In Wyoming, land surveying practice is:

(A) Measurement of land to determine the position of any monument or reference point which marks a property line, boundary, or corner for the purpose of determining the area or description of the land;

(B) Location, relocation, establishment, reestablishment, setting, reselling, or replacing of corner monuments or reference points which identify land boundaries, rights-of-way, or easements;

(C) Platting or plotting of lands for the purpose of subdividing;

(D) Measurement by angles, distances, and elevations of natural or man-made features in the air, in the surface and immediate subsurface of the earth, within underground workings and on the surface or within bodies of water for the purpose of determining or establishing their size, shape, topography, grades, contours or the water surface and depths, and the preparation and perpetuation of field note records and maps depicting these features;

(E) Setting, resetting, or replacing of points to guide the location of new construction;

(F) A person shall be deemed to be practicing or offering to practice land surveying if he by verbal claim, sign, advertisement, letterhead, card, or other manner represents himself to be a professional land surveyor, or quotes fees for professional land surveying services or executes contracts or agreements for professional land surveying services, or holds himself out as able to perform or does perform any land surveying services recognized by the board as land surveying.

What A Modern Survey Should Reflect.

It is the responsibility of the land surveyor to assemble historical records and to "map" evidence encountered in the field. The prime role of the land surveyor is to assemble and depict all data, and indicate to the client any physical conflicts affecting physical tide. While the title company and the attorney closely work together in reviewing documents affecting title, the land surveyor is sometimes left afield without the requisite records required in order to execute the survey.

While the deed description usually contains the requisite descriptors and elements to locate, or relocate, a boundary, it is not uncommon for the document to contain errors, omissions, and ambiguities.

Since it is common practice for attorneys to copy the previously used description, transcription errors arise, are copied, or are compounded. This problem manifests itself in metes and bounds descriptions. When a description of a parcel does not change through several transactions, the abstract notes: "same as No. xx above." This may be true, but any aforementioned errors are overlooked.

Also, easements and other encumbrances arise from various actions, including executing written documents. However, the written records are frequently unfiled/unrecorded in the public records of the register of deeds or the county clerk. Written records may be ensconced in the records of municipal, town, and county highway commissions' minutes; municipal and county commissioner minutes; private and public utility records; congressional acts; and the records of organizations like the U.S. Forest Service, Bureau of Land Management, State Lands Commission, State Engineer, State Highway Department, etc. It is not uncommon for a special easement to be granted that is for a 'specific purpose,' which over time is viewed to no longer be in force. However, it is not the land surveyor or the attorney's decision that an easement is no longer valid. Each individual can offer an opinion, but only the courts can render a legal decision. In recent years, there have been a number of legal decisions that have determined that old, long unused easements were still valid.

In all likelihood, the most demanding aspects of the land surveyor's work is not the retracement of the real property boundaries, but is the determination and location of usage rights (easements). The major effort will be to identify and quantify unwritten easements (i.e. solar easement). The important legal issues are usually not found in the statutes, but in case law, which has not been widely disseminated in the legal and land surveying literature.

As indicated by Michigan Supreme Court Justice Cooley in the 1880's, the land surveyor must report the facts observed in the field. In order to minimize liability and litigation, the land surveyor must have the most and best historical information available to perform the survey. Neither the land surveyor nor the attorney can make the final determination. Their duties and responsibilities are well defined, and their advice as to tide rights and encumbrances are only advisory. The final decision is in the purview of the courts.

The survey should reflect the written record and the evidence unearthed afield. A knowledgeable land surveyor should be able to take the map of a previous survey and after visiting the scene be able to reconstruct the work of the land surveyor of record.

Clearer Understanding Of Survey Methods.

The technical aspects of surveying are based upon mathematical and engineering principles. The application of the principles of plane and solid geometry, plane and solid analytical geometry, and plane and spherical trigonometry are the foundations of all types of surveying - geodesy, cadastre, land surveying, engineering surveying, cartographic and topographic mapping, etc. Few modern textbooks deeply delve into the technical aspects of surveying instrumentation. If there is a weakness of the land surveying profession, it is the possession of only a cursory knowledge of the aforementioned mathematical principles and the understanding of the underlying geometry of survey instrumentation. It is impossible to set forth here all the knowledge gained from over three decades of study. However, it

ACSM/NSPS NEWS

JOHN LISACK, JR., ACSM EXECUTIVE DIRECTOR

The NSPS Board of Directors voted to request the publications staff at ACSM headquarters to prepare a quarterly feature article concerning ACSM/NSPS affairs for publication in affiliate newsletters. In the past I have sent articles and newsworthy information to the affiliate editors on an informal basis and efforts will now be made to formalize this into a regular activity. As part of this effort, copies of the Bulletin feature "Reflections" will be distributed to the editors for publication consideration. We hope this communication will provide valuable information about activities on the national scene.

Hydrographic Certification

The Hydrographic Certification Board met at ACSM Headquarters on May 18 and 19, 1995. The purpose of the Board meeting was to review certification procedures and explore ways to streamline the process. Major decisions were reached that will enhance the management of the program. The most important decision was to replace the current take-home examination with a sit-down examination which will be offered at the ACSM Annual Convention and the GIS/LIS Conference. The examination will consist of both multiple-choice and essay questions. The application procedure will also be redesigned to enable applicants to submit required materials in a more orderly fashion which will permit the Board to review the application requirement more quickly. The Board has targeted the Spring of 1996 to introduce the new exam.

1995 National GeoData Forum

The second National GeoData Forum was conducted May 7-10, 1995, in Crystal City, Virginia. The purpose of the Forum was to build partnerships to facilitate the development, evolution and use of the National Spatial Data Infrastructure (NSDI).

Bruce Babbitt, Secretary, U.S. Department of Interior and Chairman of the Federal Geographic Data Committee, was the keynote speaker. Leaders from the private sector, local government utilities and federal agencies participated in lively discussions about how to manage spatial data. No conclusive decisions were reached but the dialogue reinforced the need for continuing exchange of information on this important subject. As one of the sponsoring organizations, ACSM participated in the Professional Association Sector discussion. We learned that there is universal concern about the reduction in funding to the

Special ACSM Leadership/Government Affairs Committee Meeting

A special meeting of the ACSM leadership and Government Affairs Committee is scheduled to address budgetary and appropriation matters affecting federal surveying and mapping functions. Congress will be acting soon on appropriation measures for fiscal year 1996 following in June, a House/Senate conference on Final Budget Resolution. Reductions are anticipated for federal mapping and surveying functions. Concurrently, Congress is looking to downsize, restructure and eliminate departments and programs. ACSM needs to develop a unified approach and strategy to address these issues.

Survey Technician Certification

The Survey Technician Certification Board met in Miami, May 5-7, 1995. A review of all four levels of the program took place and plans to promote certification through magazine advertisements and booth displays at the Annual Convention were



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established. The bank of questions for Level III examinations was expanded to ensure low probability of duplicate questions. Several Level IV examinations were graded during the meeting.

NSPS Foundation

The second official meeting of the NSPS Foundation took place in Chicago, June 2-3, 1995. The Board discussed fund raising for special causes and developed an outline for the Bonnie S. Atwell Memorial Fund which could be used as a model for other similar type projects. A contest to design a logo for the Foundation was approved and an award of \$1,000.00 was authorized for the winner of the logo design.

These are some of the highlights that are happening on the ACSM/NSPS national scene. Final planning is taking place for the GIS/LIS Conference in Nashville this Fall. Be sure to mark your calendar, November 13-17, 1995 to be part of the largest and most successful GIS/LIS event in the world.

ASCM Reflections

The 1995 Annual Conference is over, and the planners should feel proud of a job well done. More than 3,300 professionals participated in the technical sessions and enjoyed North Carolinian hospitality. This attendance was second only to those of the Baltimore, Maryland conferences, which usually draw the most attendees.

Special recognition goes to Gary Thompson, Conference General Chairman, for organizing one of the strongest educational programs in recent years. Gary, along with the many supporting volunteers, provided exciting material that appealed to surveyors, cartographers, and geodesists alike, in a relaxed and friendly atmosphere. The program for surveyors, in particular, won high praise.

For the first time, surveying workshops were held prior to the Conference. The objectives of the workshop program, according to Workshop Committee Chair Robert Foster, are "to provide high-quality, low-cost workshops geared to supplementing continuing education for licensed surveyors." As more and more states mandate continuing education in the form of professional development hours (PDHs), the program provides registered surveyors with an additional opportunity for fulfilling their state's requirements. ACSM's 1995 Annual Convention workshops were accredited by every state having such a requirement. Through our program, says Bob Foster, "we hope to assist state affiliates in any way possible."

The Auto Carto program, which is typically offered every other year, drew 237 attendees-an increase over Auto Carto 11, (Continued on Page 20)

PRACTICE (Continued from Page 17)

perspective client, whether an attorney, realtor, title company, home owner, developer, engineer, architect, or other, "want a survey" - whatever that entails. The purpose of the survey usually is an ill-defined need. The requester (client) wants the survey, but does not know or understand what the survey should or could entail. All too often the land surveyor is selected because of the fee, rather than the individual's expertise. It may surprise everyone, but surveyors may have specialized areas of expertise which have been acquired through education and work expertise. Land surveyor licensure, like other professional licensures, establishes minimum requirements/standards. Therefrom each licensee embraces the general subject and specialized areas of intellectual or economic interest.

The profession and practice of land surveying is not just the measurement of angles and distances or the drawing of maps. It requires the collection and assimilation of facts and data from diverse subject areas in order to complete the assignments.

This paper is dedicated to the memories of Clarence Thomas Johnston, Wyoming State Engineer and Professor of Surveying and Geodesy, and Ralph Moore Berry, Professor of Geodetic Engineering. Both gentlemen set by action and example the highest professional standards.

Lecture presented to lands surveyors and attorneys 26 February 1992.

ICC Decision on Railroad Abandonment Petition

BY NANCY PARKE, ACSM

On March 21, 1995 the Interstate Commerce Commission held a voting conference on four matters. Among those was the ACSM Ex Parte No. 511 Petition for a Rulemaking for the Protection of Surveying Monuments in Railroad Abandonments. I attended the voting conference, however, attendees at such conferences are not able to address the commissioners.

The ICC Commission, consisting of three commissioners and the Commission Chair Gail MacDonald, publicly debated Docket Ex Parte No. 511 related to the four options proposed by the ICC staff. Unfortunately, the ICC voted to accept Option One which provides the least remedy of all the proposed options (list of options attached).

Option One does the following. It denies the ACSM petition to institute a rulemaking but implements the expanded notice proposal of the Association of American Railroads (AAR) without seeking further comment.

The AAR proposal is that a representative of the USGS and C&GS be added as an additional party entitled to receive copies of Environmental and Historic reports in abandonment and abandonment exemption proceedings.

A copy of the voting conference transcript will be provided to NSPS president Jim Granger. It shows the lack of understanding by ICC commissioners of the relevant issues presented in our original petition and subsequent filings.

NSPS needs to revisit the railroad abandonment issue now that our ICC petition has been denied. As you recall, the rationale for bringing this matter to the ICC, was to exhaust all regulatory remedies to this problem.

If NSPS decides that we should seek a legislative remedy through Congress, please consider the following aspects:

- The current political climate on the Hill may not be receptive to the solutions outlined in our ICC petition because of the unfunded mandate and economic burden it would place on the railroads.
- The railroads are a powerful lobbying group in Washington, D.C. We would need strong political clout to outweigh the railroads.
- Strong political clout, i.e., a well-connected and seasoned insider would cost a lot of money and yet would not, by itself, be a guarantee of any success.

Please take another look at this issue and provide some direction to the Government Affairs Committee as to how you would like us to proceed.

PETITION FOR RULEMAKING PROTECTION OF SURVEYING BENCHMARKS IN RAILROAD ABANDONMENTS, DOCKET EX PARTE NO. 511.

BACKGROUND

This proceeding involves a petition filed by the American Congress on Surveying and Mapping requesting the Commission institute a rulemaking proceeding to consider the protection of surveying benchmarks, monumentation, and mapping information exposed to possible destruction when, pursuant to a Commission authorized abandonment, railroad tracks are dismantled. On October 1, 1993, the commission issued a notice of intent to institute a rulemaking and requested public comment and/or specific proposals to assist the agency in determining whether to institute a rulemaking proceeding.

OPTIONS:

Option 1: Deny the petition to institute a rulemaking but implement the expanded notice proposal of the Association of American Railroads without seeking further comment.

Option 2:

(a) Deny the petition to institute 'a rulemaking but implement a broadened version of the Association of American Railroads proposal so as to expand the required environmental report service list to include the federal surveying and mapping agencies representatives of the surveying community, and affected county surveyors of their appropriate counterparts without seeking further comment.

(b) Grant the petition to institute a rulemaking and submit for public comment a rule which would expand the required environmental report service list to include the federal surveying and mapping agencies, representatives of the surveying community, and affected county surveyors of their appropriate counterparts.

Option 3: Grant the petition to institute a rulemaking and submit for further comment the three part rule proposed by the American Congress on Surveying and Mapping.

Option 4: Grant the petition to institute a rulemaking and submit for further public comment a rule which would (a) expand the required environmental report service list to include the federal surveying and mapping agencies, representatives of the surveying community, and affect county surveyors or their appropriate counterparts and (b) incorporate the first two of the regulations proposed by the American Congress on Surveying and Mapping (identify and protect all visibly marked vertical benchmarks, place horizontal control monuments, and locate centerlines of in-place trackage).

can be stated that errors in measurement result from imperfect instruments, inadequate calibration and adjustment of the instruments, nonrigorous observing procedures that could bias the measurements, and misunderstanding of the desired results.

Magnetic vs. True North.

Maps and surveys are related to "north." This "reference line" is a *meridian* [great circle passing through the celestial poles and zenith of any place on the earth's surface; circle lying in the plane of this and passing through the place and the poles; point at which sun or star attains highest altitude]. Land surveyors employ several meridians (types) that are confusing to nonsurveyors. The most common are: (1) *true north*; (2) *magnetic north*; (3) *grid (state plane coordinate) north*; and (4) *assumed north*. The basic definitions are:

(1) *True North*: This is an astronomic meridian which is a line on the surface of the earth having the same astronomic longitude at every point. The direction of this meridian is determined by astronomic observations of stars or sun, or by use of a gyroscopic theodolite. The accuracy of its determination is a function of the instrumentation and procedures employed. The most *accurate* determination is one arc-second (determined by geodetic procedures).

(2) *Magnetic North*: This is an isogonic line which points to the magnetic pole. The magnetic meridian is a function of the earth's geomagnetic field, which, due to the nonhomogeneity of the earth, is not a "regular curve," but an erratic curve that is determined only by field observations. Also, to compound the determination is the secular "movement" (variation). The magnetic meridian at a unique point will be significantly different in 1993 than what was observed in 1893.

(3) *Grid North*: This is a fundamental line of definition of a map projection. The fundamental line is an exactly defined relationship to the true meridian. At every point on the map projection a mathematical function states the relationship between the true and grid meridians.

(4) *Assumed North*: This is a commonly employed meridian. Surveyors select a prominent land mark and define one physical line to have a specified geometrical relationship to the meridian. For example, in Cheyenne, Capitol Avenue appears to run nearly north-south. A land surveyor assumes that the centerline of the street is due north. This approach is common in older developed areas.

No problem arises when two adjacent properties are on different meridians. The angles *between* adjacent straight lines do *not* change because of different types of meridians. All that is required is to rotate the bearing of one system to the second system. No matter which type of meridian is employed, the survey maps and descriptions should indicate the type of meridian (also called *Basis of Bearings*).

Distance Calculation.

The cited distance between two points is a *horizontal*, straight distance, unless the description or the survey map indicates otherwise. The two most common exceptions are the arc distance along a curve and the distance along a contour, stream water boundary (i.e. high water mark, mean water mark, low water mark, or thalweg). Distances can be measured directly, computed, or extrapolated. For instance, two boundary corners are intervisible and have no physical obstructions along the line. Then, the distance is directly measured. When the two points are not intervisible, a series of angular and distance measurements

are made that connect the two points (simplest being a triangle with one side being the unknown length (boundary)). The remaining two sides and the included angle are measured. Then, employing the classical trigonometrical formula for the law of cosines, the unknown length is calculated. The more elegant procedure is to employ analytical geometry and compute the "inverse" between the two points (the bearing and distance of the unknown boundary results). The accuracy of these calculations is as good, but no better than, the accuracy of the original measurements.

Measured distances are sometimes referred to as "calculated distances," because certain calculations are performed to obtain the horizontal length. The calculations are *not* for the purpose of "faking" the data. When length measurements are made, the distance must be corrected for the effects caused by failure of the instrument to exactly duplicate conditions when the instrument was calibrated against an accepted standard. In many instances the measured distance is not horizontal, but inclined, and must be reduced to a horizontal length. For surveyors' tapes the corrections are temperature, inclination, and physical support (or catenary). For electronic distances, the variation in meteorological conditions and inclination are the major factors. The change in ambient temperature, relative humidity, and barometric pressure change the velocity of electromagnetic radiation, which can be significant. For a steel tape, a 100-foot length changes about 1/8 inch for a change in temperature of 15°F. It is not uncommon for surveyed lengths to change by one percent or more of the observed length!

(To Be Continued Next Issue)



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Chapter directors have received raffle tickets and prints of the Bronze for distribution. Please consult your director for these tickets and let's have a successful raffle. Additional prints may be available by contacting John Steil at 307-634-7273.

Letters

8 May 92

Dear Jim,

The Northwest Chapter expresses its appreciation to the Board of Directors for your efforts in coordinating programming during the past Wyoming Engineering Society convention.

In particular, we would like to compliment you on your selection of topics and presenters, and your use of general association funds to bring the programming to the membership. Keep up the good work.

Sincerely,

Northwest Chapter, PLSW
Alan B. Cormer, PLS, President
Stanton J. Abell, Jr., PE-PLS, Vice-president
Kevin D. Jones, PE-PLS, Secretary-Treasurer
Paul A. Blough, PLS, Director

Arthur W. Hipp
Editor, *Side Shots*
Dear Art:

10 Feb 95

On behalf of NSPS President G. S. (Sam) Best, I extend sincere congratulations to you for being selected as the recipient of the "NSPS/ACSM Excellence in Professional Journalism Award." The award will be presented to you at the ACSM/ASPRS Annual Meeting and Convention in Charlotte, North Carolina, February 27-March 2, 1995.

The ceremony will be held Wednesday, March 1, beginning at 9:00 a.m. It will take place in the Graves Room of the Omni Charlotte Hotel. We hope that you can join us and be present to receive your award.

Again, congratulations and continuing success.

With best wishes,

Patricia A. Canfield,
NSPS Executive Administrator.

Editor's Note: Congratulations Art.

(Reprinted from *Side Shots*)

Federal Map Series Published by the U.S. Geological Survey

The following maps pertaining to Wyoming were published by the U.S. Geological Survey. The information was gleaned from the monthly publication *New Publications of the U.S. Geological Survey* (List Nos. 1026 through 1038, January 1994 through January 1995).

1. State Index of 7.5 minute quadrangles; date: 11/1993.
2. 7.5 minute, 1:24,000 scale, topographic quadrangles (price \$2.50):

- a. Borie
- b. Round Top Lake
- c. Cheyenne South
- d. Cheyenne North

3. Yellowstone National Park (price \$5.00).

4. Bureau of Land Management Intermediate Scale (1:100,000) maps (price \$4.00):

- a. Surface Management of Lands and Mineral editions (two separate maps).

- (1). Basin 1979/1992
- (2). Fontelle Reservoir 1977/1992
- (3). Medicine Bow 1977/1992
- (4). Farson 1989/1992
- (5). Riverton 1975/1993
- (6). Casper 1961/1994
- (7). Chugwater 1963/1993
- (8). Lusk 1981/1993
- (9). Devil's Tower 1958/1993

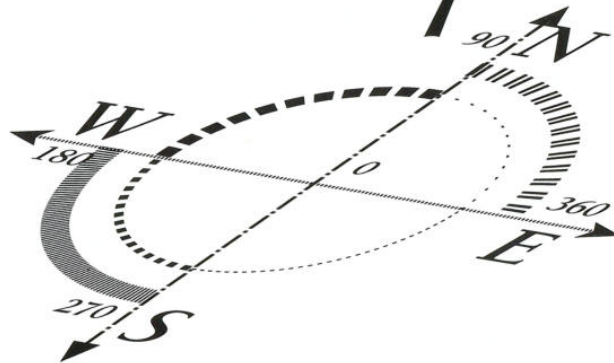
- b. Surface Management edition, only.

- (1). Salt Lake City 1976/1993

Note: the Bureau of Land Management maps may also be purchased directly from the BLM for the same price. U.S. Geological Survey Maps can be purchased from: U.S. Geological Survey, Information Services; Box 25286, Federal Center; Denver, Colorado 80225.

Herbert W. Stoughton

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(2). It is probable that at least ninety-nine percent of all questions of disputed boundaries are settled in accordance with the decision of the surveyor.

(3). Surveyors must remember that the only force their decisions have derives from the consent and acquiescence of the parties.

(4). Surveyors have no more authority than other persons to determine boundaries, but may have means of judgment not possessed by others.

(5). The law does not have and can not make the surveyor an arbiter of private rights.

(6). Where a boundary or starting point actually exists, is always a question of fact, and can not be left to the opinion of an expert, but the determination of fact belongs exclusively to the courts and juries.

(7). When a boundary has been fixed by long use and acquiescence, it is contrary to all reason to have the location altered employing any abstract notion of science/mathematics.

(8). New surveys disturbing old boundaries are to be discouraged.

(9). Boundaries long unquestioned should not be disturbed upon a disagreement of surveys, especially when the last survey fails to recover the evidence used in the previous survey.

(10). The surveyor not only must know and understand the current law, rules, and regulations, but also must know and understand the law, rules, and regulations in force when previous surveys were executed.

The retracement of an original GLO survey requires knowledge of the original survey (contract, special instructions, manual of instructions, etc.); knowledge of the rules in force at the time any previous resurvey was executed; and the claims or disputes. The rules in force at the time any previous resurvey was executed is important in locating any evidence of the resurvey. An excellent example is the major change in restoring corners and subdividing sections between the 1879 circular and the 1883 edition. Also, the question arises when to decide that sufficient time had elapsed between the date of publication and general knowledge by the surveying profession. The Wyoming State Board of Registration for Professional Engineers and Professional Land Surveyors (in its rules and regulations, chapter V) stipulate that the *current editions* of the "Manual of Instructions" and "Restoration of Lost or Obliterated Corners ..." shall be used. When the issue is raised, either in court case for a boundary controversy, professional insurance liability, or an administrative law case of professional misconduct by a professional land surveyor this regulation should be corrected.

In urban, residential, and metropolitan areas land surveying practice addresses quite different problems. In the rural areas, land surveyors are concerned with the retracement of GLO surveys and the subdivision of sections. In the metropolitan areas, land surveying practice emphasis is on the retracement of "city lots," subdivisions, and metes and bounds parcels, subdivision design, engineering and architectural surveying and mapping, and land planning mapping. The original GLO surveys are subordinate in the determination or redetermination of boundaries. The surveying practice is similar to land surveying practice in the colonial states. The rules of determining boundary locations are predicated upon common law. The land surveyor

searches for existing corners, evidence of possession, evidence of disagreement, evidence of record, and evidence which would affect or encumber the owner's usage of the land. In particular, the surveyor must know of the existence of both documented and undocumented rights-of-way and easements. Many subsequent tide problems result from the failure to identify these items or the unwillingness of the client to pay for the effort. In both rural and metropolitan areas there exist significant numbers of undocumented easements. Some of these easements result from eminent domain. Other easements may terminate through nonusage or be transferred for another use. It must be remembered that existing easements and rights-of-way limit the property owner's rights of usage.

The land surveyor is involved in all phases of land development. From the initial boundary retracement, through the design and planning stages, to final approval and construction, the surveyor plays an integral role. The surveyors who regularly design subdivisions have a sound working knowledge of the regulatory agencies who oversee land development.

Probably the most controversial and misused product produced by the land surveyor is the mortgage survey or lenders inspection survey. The lender desires a map of the property showing the location and dimensions of all the structures and encumbrances *with respect to the property lines*. This type of survey is *not* a valid boundary survey, but required the information desired be correlated with the boundaries. In most instances, this survey is a fixed price product mandated by the lending institutions. Furthermore, many attorneys and land owners accept this product as a boundary survey, and use the survey for illegitimate purposes (i.e. to locate and construct fences, layout building additions and improvements, etc.). Land surveyors must be cognizant of their professional liability, because the question arises concerning whether this work is land surveying and whether it is covered under errors and omissions liability insurance. It is conceivable from a professional licensure/registration viewpoint to question whether the land surveyor is competently or negligently practicing the profession.

A second misunderstood and misused land survey product is the ALTA (American Land Title Association) survey. Both attorneys and land surveyors are at fault. Many requesters have heard the term "ALTA survey," and ask for it. Many land surveyors fail to understand the intent of the survey. To obtain an ALTA survey, every interested party must contribute to the effort. Attorneys and title companies *must provide* specific information and data to the surveyor. If the information is not provided, then the surveyor should obtain the information and bill the client for the nonperformance. If an attorney desires an ALTA survey, then it is the attorney's duty and responsibility to inform the land surveyor of the issues that mandate the survey. All parties interested in an ALTA survey should know and understand the ALTA-ACSM standards and requirements. These requirements specifically state the duties and responsibilities of each party and the products produced.

When a land surveyor is retained to perform a boundary related survey, the land surveyor must either reestablish and monument the boundaries or assure that the identified boundaries are correct and valid. An additional responsibility of the land surveyor is to make a reasonable effort to "find the truth." The role of the surveyor is often misunderstood. The surveyor's

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subdividing;

(d). Measurement by angles, distances and elevations of natural or man-made features in the air, in the surface and immediate subsurface of the earth, within underground workings and on the surface or within bodies of water for the purpose of determining or establishing their size, shape, topography, grades, contours or water surface or depths, and the preparation and perpetuation of field note records and maps depicting these features;

(e). Setting, resetting or replacing of points to guide the location of new construction;

(f). A person shall be deemed to be practicing or offering to practice land surveying if he by verbal claim, sign, advertisement, letterhead, card or any other manner represents himself to be a professional land surveyor or quotes fees for professional land surveying services or executes contracts or agreements for professional land surveying services, or holds himself out as able to perform or does perform any land surveying services recognized by the board as land surveying.

This definition of land surveying practice is the statutory definition, and is only an impersonal general overview of professional practice. However, the actual practice of land surveying is more complex and requires expert knowledge in a variety of topics. These include law, mathematics, local history, geography, geology, geophysics, astronomy, political-economic organizations, photogrammetry, cartography, and various engineering subjects. Depending upon the geographical area of professional practice, land surveyors may not require or utilize some of these branches of knowledge in their daily work. The land surveyor employs these knowledges in design work (subdivision) or resolving the issues as to the most probable location of "lost" boundaries in retracements.

The land surveyor's work in performing a boundary retracement is not the simple retracement of a deed description. A valid boundary survey is a demarcation on the ground of the boundaries and corners, and a documentary record of the survey. There are three types of documents that the land surveyor can provide - survey map or plat, legal property description, and report of survey. The first two are usually issued together. The report of survey is not usually employed, but is a very important document. When a retracement survey is requested, both the client and the land surveyor must understand the purpose of the survey and the form of the presentation of the results. Also, the client must understand that in some localities certain documents must be filed or recorded with certain public offices.

The title company, the attorney, and the land surveyor have unique roles in a boundary survey. The land surveyor and the attorney require detailed abstracts of title. The land surveyor requires a thorough knowledge of that information which affects boundary determinations or indicates the grantor's intent. This information assists the surveyor to search for field data, and be able to note discrepancies between written records and physical conditions. Normally, the surveyor is not interested in the claimants and assigns per se. Therefore, the issues of mortgages, liens, etc. are usually mute issues. However, there are instances when incorporation documents, marriage and death certificates, estate records, etc., are required by the surveyor. In most instances, the letters patent, subsequent deeds, easements, rights-

of-way, and survey maps are of primary interest. Also, the land surveyor may require a copy of the latest deed of record of all adjoining.

Besides the legal records, the land surveyor utilizes other historical records. Maps and field notes from earlier surveys and other historic records provide invaluable information. When the project requires retracement of the original GLO surveys or the subdivision of a section, other documents and sources of information are sought. The original surveys were governed by the contract document, which includes the *contract*, *issued special instructions*, *correspondence* between the surveyor general and the deputy surveyor pertaining to the contract, and the *Manual of Instruction* in effect when the contract was issued. The *GLO Manual of Instruction* became part of the official contract by the Act of Congress of 30 May 1862, which states: "That the printed manual of instructions relating to the public surveys, prepared by the General Land Office, ... the instructions of the Commissioner of the General Land Office, and the special instructions of the surveyor-general, when not in conflict with said printed manual or the instructions of said Commissioner, shall be taken and deemed to be a part of every contract for surveying the public lands of the United States." *The Manuals* that were employed in Wyoming are 1855 (22 February 1855) [reprinted without changes in 1871]; 1881 (3 May 1881); 1890; 1894; 1902 [reprinted in 1908]; Advance Sheets of Chapters I to VI, 1919 (16 June 1919); Advance Sheets of Chapters I to VI, 1924; Advance Sheets of Chapter IX, 1928 (1 March 1928); 1930 (14 June 1930) [printed in 1931]; 1947 (5 August 1947) [several reprints exist]; and 1973. Also, invaluable guidance is found in a series of publications on the "restoration of lost or obliterated corners." "In the period 1850 through 1879, the GLO Commissioner received numerous inquiries from county and private surveyors concerning the retracement of the original surveys. As the number of inquiries increased, the GLO Commissioner and staff were expending considerable effort and time responding. On 1 November 1879, J.M. Armstrong, Acting GLO Commissioner, published a three page instruction. On 13 March 1883, the publication *Restoration of Lost and Obliterated Corners* was printed. Since then, editions entitled: *Restoration Of Lost Or Obliterated Corners And Subdivision of Sections* were published 16 October 1896; 1 June 1909; [reprinted in 1916 and 1936]; 5 April 1939; 8 May 1952 [reprinted 11 July 1955 and 1960]; 3 June 1963 [reprinted in 1965 and 1968]; and 1974].

The land surveyor required to perform a retracement is confronted with complex and many times conflicting issues. In the 1880's, the Michigan Engineering Society invited Michigan Supreme Court Justice Cooley to address their annual meeting. In 1881 and 1883, Justice Cooley presented his views in papers titled: "The Judicial Functions of a Surveyor." Although Cooley referenced his remarks to

Michigan legal cases, the underlying principles and action of the land surveyor are everywhere applicable.

The land surveyor's rights, duties, and responsibilities are:

(1). By the consent and acquiescence of the parties concerned, surveyors are usually the arbiters of disputed boundaries, and their decisions, when acquiesced in by the parties, become in time as binding as the decisions of courts of law.

(Continued on Page 17)

More Conventioneering!



Next Year: CASPER

Initial Point - Wind River Meridian Recovery Project

On July 13, 1875, G.L.O. contract Surveyor, James W. Miller, set a 40"x18"x18" sandstone and raised a mound of earth and stones at the Initial Point of surveys in the Shoshone Indian Reservation. The stone was marked with "IP" on the west face, "1875" on the south face and "WRM" on the east face

It was July 10, 1913, that the point was again surveyed by Frederick C. Miller, G.L.O. surveyor, which he notes as a sandstone 6"x14"x48" above ground firmly set and marked "T1SR1E" on south face, "T1NR1E" on the east face, "T1SR1W" on the west face, and "T1NR1W 1904" on the north face. Mr. Miller set an iron post with cap along the north face and dug pits



Original stone corner at initial point Wind River Meridian with GLO brass cap set in concrete.



L-R: Rich Greenwood, Paul Scherbel, Scott Scherbel, Rick Hudson and Gary Hatle.

24"x24"x12' on each line and raised a mound of earth south of the corner.

In August of 1931, a Mr. Kimmer recovered a regulation G.L.O. 3-inch iron post with large red sandstone alongside. He then set the original 3" iron post in a concrete collar 14" square at the top and 20" square at the base, 40" long, 36" in the ground.

On April 29, 1995, surveyors from P.L.S.W., digging southwesterly about 20" from the concrete collar found a hard red sandstone 17"x5"x20", below ground and oriented NE/SW with the center being southwesterly 1.32' of the regulation G.L.O. brass cap, the bottom of the stone being 33" below ground with numerous pieces of white sandstone scattered in the excavation, about the red sandstone. A loose piece of red sandstone near the base fit nicely on the stone. The loose piece was tamped into place with a steel fence post and the tire casings along side.

The Central Chapter of P.L.S.W. is to be commended for their efforts in this recovery. Those attending included: Paul H. Scherbel, R. L. Hudson, Gary C. Hatle, Don A. Davis, Joel T. Ebner, James D. Claflin, Todd Cedarholm, Richard W. Greenwood, Scott A. Scherbel, Michael S. Quinn, Cooper J. Quinn, and Marilyn McElheney.

L&P Staff



Jim Claflin and Rick Hudson during excavation.



L-R: Gary Hatle, Rich Greenwood, Rick Hudson, Don Davis, Scott Scherbel, Cooper Quinn, Mike Quinn, Todd Cedarholm, Paul Scherbel, Joel Ebner and tire casings at initial point.

The Practice of Land Surveying

HERBERT W. STOUGHTON
GEODETIC ENGINEER

The profession of land surveying is not the "oldest profession," but antedates the second millennium before Christ in Egyptian-Hellenic civilization, and undoubtedly there exist similar antecedents in the oriental (China and Japan) and Hindustani cultures. In Roman times the land surveyors were known as *agtimensors* (measurers of land). During the feudal period (sometimes called the Dark Ages), land holdings and tenure were limited, thus no need for land surveyors. The disposal of land holdings of those feudal estates in the fifteenth and sixteenth centuries resulted in a need for the delineation and marking of real property boundaries. The first land surveyors in the American colonies arrived shortly after first settlement, and the earliest legislation governing land surveying practice was enacted in 1619. The first book specifically describing surveying practice in the colonies was published in 1679 [*Geodaesia, or the Art of Surveying* by John Love].

Land surveying was an honored profession during the colonial period. Peter Jefferson (Thomas Jefferson's father), George Washington, Andrew Ellicott, Thomas Hutchins, Daniel Boone, Robert Erskine, Simon Dewitt, Rufus Putnam, and David Rittenhouse were active practitioners during the last half of the eighteenth and the opening decades of the nineteenth centuries. Each individual would significantly contribute to surveying and land tenure in the United States. In the decade following the American Revolution, the thirteen colonies settled private and colonial ownership claims and territorial claims, and transferred their remaining claims to lands west of the Appalachian Mountains to the Federal government. It was proposed that the Federal government be financed by the sale of these lands. In order to obtain the funds, a systematic methodology was established to survey and map these lands for public sale. This procedure was managed by the General Land Office (GLO).

By the end of the first quarter of the nineteenth century,

the Public Land Survey System had been formulated and the Federal statutes governing the system had been enacted. Until the second decade of this century the GLO entered into contracts with land surveyors to survey/map Federal lands. When the Wyoming Territory was formed [25 July 1868], no authority for GLO surveying department was approved. In the spring of 1870, Silas Reed, formerly Surveyor General for Illinois and Missouri, was appointed Wyoming Territory Surveyor General, and the first two contracts were issued on June 13th and 21st, 1870. By the beginning of 1880, over one hundred contracts had been executed. Contract surveys continued until the program was terminated by the Congressional act of 25 June 1910.

During the first decade of the twentieth century, Wyoming State Engineer Clarence T. Johnston reported to the Wyoming legislature his concern about the technical competence of surveyors. The result was a land surveyor registration law in 1907. Today (1992), the registration of land surveyors and the practice of land surveying is governed by Title 33, Chapter 29, Sections 114 through 139. In addition, there exist numerous other statutes that directly relate to professional practice. Besides the Wyoming statutes, various governmental organizations have enacted regulations that govern professional practice. Also, county, municipal, and regional entities have enacted legislation and regulations governing local practice. Although the statutes are the final authority, the supporting rules and regulations govern day-to-day operations. Two sources for Wyoming real property boundary law and related topics are: (1) *Madson, On Wyoming Real Property Boundary Law* [LLS Publ. Co.; P.O. Box 13158; Gainesville, Florida 32604], and (2) *Scherbel on Surveying: A Compilation of Parts of the Wyoming Statutes and Other Items of Interest to Professional Land Surveyors* [Surveyor Scherbel, Ltd.; P.O. Box 4296; Big Piney, Wyoming 83113]. A third publication - *Guidelines for the Professional Practice of Land Surveying* - was published by the Wyoming Association of Consulting Engineers and Surveyors [WACES; 5920 Yellowstone Road; Cheyenne, Wyoming 82009]. This latter work is not necessarily a legal reference, but a technical reference concerning professional practice. Attorneys might be more familiar with the law textbooks on real property and the codifications, but the earlier cited works are quick references which are considered useful in the daily practice of land surveying. When the problems are routine, these surveyor references are adequate. When complex problems arise, the attorney and the land surveyor must carefully study case and administrative law. There exist other sources of information that are helpful, but have rather limited circulation and need.

Wyoming statutes state that land surveying and land surveying practice are:

- Measurement of land to determine the position of any monument or reference point which marks a property line, boundary or corner for the purpose of determining the area or description of the land;
- Location, relocation, establishment, reestablishment, setting, resetting, or replacing of corner monuments or reference points which identify land boundaries, right-of-way or easements;
- Platting or plotting lands for the purpose of

(Continued on Page 16)



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—REMARKS (Continued from Page 13)

even before the 1967 Statute, so that there could be no excuse by the BLM not knowing that I had been in an area. At the same time I talked them into notifying WACES of impending surveys so that we could contact them with our information. This has gone into discard as the BLM surveyors now without fail consults the Corner Records in the Clerk's offices so it is known where work has been done.

In 1966 the BLM placed a 2"IP&BC at the northeast corner of Section 34, T42N, R116W, about two feet away from the original marked stone that had been used by several surveyors. With land so valuable in Teton County, I screamed to the BLM that there shouldn't be two points marking one corner.

Since the year one the GLO-BLM had placed the resurvey iron posts alongside the original marked stone believing that the original monument should not be disturbed. The result is two monuments for the same corner which is not acceptable in present day surveying. So the BLM has changed its practice and now buries the stones, contrariwise to the Instructions in the Manual.

BLM surveyors make mistakes just as private surveyors do. In 1969 Bill Teller, who at that time was the approving officer for all BLM surveys told me when I called him in regard to a BLM survey error that the BLM does not make

mistakes. This is true as long as no patented land is involved. But if private land is affected, it is not true. Anyway I happened onto Mr. Teller in the field checking the location of the monument in question and he found it to be incorrect. Together we reset the monument correctly. Since that time the BLM has been most cooperative in rectifying incorrect surveys.

There seems to be two major items that the Board needs to complete to help the profession.

One is a Record of Survey requirement on the books. Apparently it will never be done by legislation so perhaps it can be included into a revision of W.S. 33-39.

Second, a set of standards of practice is needed. Again the easiest way might be to give the board authority is W.S. 33-29.

Finally if the profession of Land Surveying is to have stature and respect in the State it will hinge upon the actions of the Board. If you insist on excellence and adherence to standards, the profession will be recognized for good. If the Board allows the standard to erode and fails to eliminate incompetence, the efforts of many of us through the years will be for nought. I want to belong to a well-respected profession. Its fate is upon your shoulders as no other organization has the power. PLSW can help but in the final analysis it rests with the Board.

MEMORABLE SET-UPS

At
C-C Section 29
T30N R77W
Natrona County,
Wyoming
during a Retracement
Survey of Sections
29, 30, 31, 32, and 33
(Original Survey 1878)
D. Davis — WLC
(Send us yours)



Herb's Corner
"Olde Survey Formulas, Are They Erroneous?"

When I taught the technical aspects of surveying, rather than the legal and design aspects, I emphasized the mathematical and physical theories. When I addressed the subject of mathematical formulas for specific problems most of the students accepted the textbook and my explanation of the formula's application. Occasionally, a student would ask why this formula? This question became more frequent once the hand-held calculator/computer appeared, and the archaic formula appeared unweildy.

Until the HP35, and its sister calculators appeared, calculation of square roots, etc. were labor intensive. The old "funny-looking" formulas have been described in the latest editions of a "plane surveying" textbook as *approximations*. This pronouncement is *untrue*. In most instances, the authors have copied from earlier works and do not *know*, or possibly understand, the subject of applied mathematics (before computers).

I believe that an example would illustrate this matter. When taping a distances, the correction for inclination (slope, or lack of being horizontal) for a taped distance (for a single tape span)

$$c_i = -\frac{h^2}{2s} - \frac{h^4}{8s^3}$$

Where:
 s = measured span/tape length.
 h = difference in elevation between the end points of the span (in the same length units as the tape).

This formula is derived from the theorem of Pythagoras. Recall the problem:

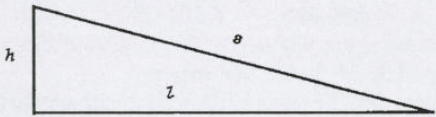


Figure 1.

Recall the mathematical expression of Pythagoras:
 $s^2 = h^2 + z^2$ (1)
Rearranging:

$$z = (s^2 - h^2)^{1/2} = s \left(1 - \frac{h^2}{s^2} \right)^{1/2}$$

Recall the series:
 $(1 - x)^n = 1 - nx + \frac{n(n-1)x^2}{2!} - \frac{n(n-1)(n-2)x^3}{3!} + \frac{n(n-1)(n-2)(n-3)x^4}{4!} - \dots$
Then:
$$z = s \left[1 - \left(\frac{1}{2}\right) \frac{h^2}{s^2} + \frac{1}{2} \left(\frac{1}{2}\right) \left(\frac{-1}{2}\right) \frac{h^4}{s^4} - \frac{1}{6} \left(\frac{1}{2}\right) \left(\frac{-1}{2}\right) \left(\frac{-3}{2}\right) \frac{h^6}{s^6} + \dots \right]$$

$$\left[-\frac{h^2}{2s} - \frac{h^4}{8s^3} + \frac{3h^6}{16s^5} - \dots \right]$$

Then:
$$c_i = z - s = s \left[1 - \frac{h^2}{2s^2} - \frac{h^4}{8s^4} - \frac{3h^6}{48s^6} - \dots \right] - s$$

Finally:
$$c_i = -\frac{h^2}{2s} - \frac{h^4}{8s^3} - \frac{h^6}{16s^5} - \dots \quad (2)$$

Recent textbooks state only the first term.
$$c_i = -\frac{h^2}{2s} \quad (3)$$

Old textbooks give the formula as the first two terms. In both instances the authors state that c_i is subtracted from the measured length, while in equation (2) the algebraic sign of the correction is incorporated into the formula.

Students frequently ask the question: how many terms do I need? To have a correction of 0.001 (feet, meters, etc.) the first, second, third, . . . terms must contribute 0.0005. Therefore:

$h^2 = 0.0005(2s)$ (4.a)
 $h^4 = 0.0005(8s^3)$ (4.b)
 $h^6 = 0.0005(16s^5)$ (4.c)

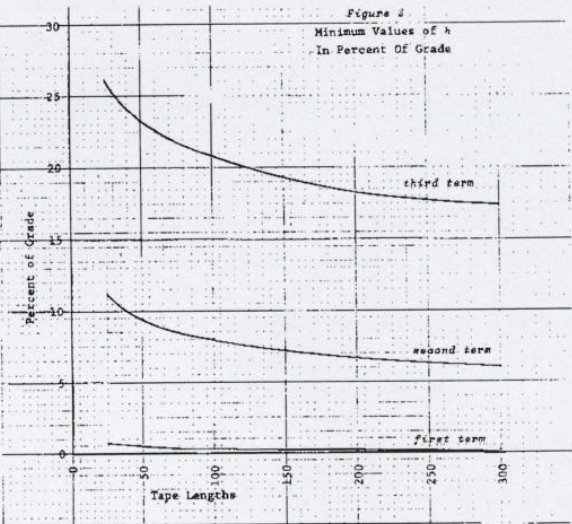
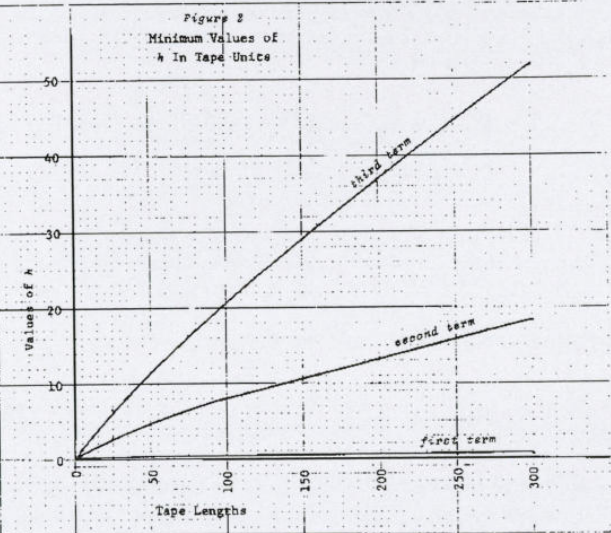
Tables 1 and 2 lists the minimum values of h for various spans up to 300. Table 1 list the values of h in tape length units. Table 2 lists the values in percent of grade.

Table 1
Minimum Value of h In Tape Units

s	First Term	Second Term	Third Term
0	0.000	0.000	0.000
25	0.158	2.812	6.538
50	0.224	4.729	11.650
75	0.274	6.409	16.333
100	0.316	7.953	20.758
150	0.387	10.779	29.102
200	0.447	13.375	36.986
250	0.500	15.811	44.545
300	0.548	18.127	51.854

Table 2
Minimum Value of h in Percent of Grade

s	First Term	Second Term	Third Term
0	0.00	0.00	0.00
25	0.63	11.25	26.15
50	0.45	9.46	23.30
75	0.37	8.55	21.78
100	0.32	7.95	20.76
150	0.26	7.19	19.40
200	0.22	6.69	18.49
250	0.20	6.32	17.82
300	0.18	6.04	17.28



The data in Table 2 indicates that for a 100 foot/meter tape an eight percent grade require the second term. The data in Table 1 is illustrated in Figure 2, and the data in Table 2 is illustrated in Figure 3.

If a surveyor is working to a precision of 0.01, then equations (4.1), (4.b), and (4.c) would be:

$$h^2 = 0.0005(2s) \quad (5.a)$$

$$h^4 = 0.005(8s^3) \quad (5.b)$$

$$h^6 = 0.005(16s^5) \quad (5.c)$$

Note: the series expansion was a frequently employed approach to simplify the computations prior to the advent of electronic calculators and computers. Also, in order to simplify the calculation of the complete formula [equation (2)], applying some algebra yields:

$$c_i = - \frac{h^2}{2s} \left[1 + \frac{h^2}{2s} \left[\frac{1}{2} - \frac{h^2}{2s} \left[\dots \right] \right] \right] \quad (6)$$

Notice, that the surveyor then only has to calculate the fraction $h^2/2s$, and then performs the calculation from the inner most terms outward.

Vertical Datum Equations

BY HERBERT W. STOUGHTON

With the adoption of the North American Vertical Datum of 1988 (NAVD88), surveyors will now be working with two different national vertical datums. The old datum, National Geodetic Vertical Datum of 1929 (NGVD29), formerly known as the Mean Sea Level Datum of 1929 (MSLD29 or MSL29), has been the basis for USGS topographic maps and other mappings and engineering projects. Research reveals that between 1900 and today there were six national vertical network adjustments. Also, there have been several regional adjustments of the national networks. Therefore, old bench marks may have as many as six published elevations based upon general adjustments and published elevations based upon regional adjustments. Also, USGS bench mark established prior to about 1910 may have published elevations that were based upon local vertical datums. In southeastern Wyoming the USGS elevations were based upon the "Denver Datum." The unified list of the USGS level network was published in 1914 [Results of Spirit Leveling in Wyoming, 1896 to 1913 by R.B. Marshall; USGS Bulletin No. 558], and was based upon the USC&GS vertical datums. Similar bulletins were published for adjacent states.

Mapping and the civil engineering infrastructure utilize elevations. In the older projects the available elevations were used. In order that expansions to the original projects 'fit,' the elevations of the new works had to be compatible with the old. However, as time passes the old bench marks are destroyed or otherwise disappear. When this occurs, new bench marks are established, and in some instances references to the older datum are lost. This causes confusion and misunderstanding.

An example will illustrate the problem. A USGS bench mark was established at the Wyoming Capitol building. The USC&GS identified the bench mark as "E" in 1900, but later was stamped "6097.599." The published USC&GS elevations for this bench mark are:

Year	meters	feet
1900	1,859.1694	6,099,625
1903	1,859.0226	6,099,143
1907	1,858.8924	6,098,716
1929 (1960)	1,858.597	6,097.747
1988	1,859.612	6,101.077

Depending upon when BM"E" was used there is a potential discrepancy of 3.425 feet (1.044 meters).

Great care must be taken in identifying the source of the elevation and the date the elevation was determined. It is recommended that surveyors annotate the source of elevation (i.e. published list, engineering drawing, another field book, etc.). In older developed areas, it is common practice to use the old elevations and the elevations of older bench marks are related to the earlier datum. Unsuspecting engineers and surveyors will employ these other bench marks with possible dire consequences.

When two sets of elevations are available for a bench mark, a datum equation should be written. The datum equation is a concise mathematical statement of the relationship between the two datums. For BM"E" the datum equation for NGVD29 and NAVD88 would be stated:

NGVD29 elevation 1,000.000 feet equals NAVD88 1,003.330 feet

This format removes any ambiguity about which datum is "higher" or "lower." When this problem occurs on an engineering project, two statements should be placed on every drawing. The first statement is the identity of the vertical datum employed. The second statement (when dual elevations are used) is the datum equation. Remember, elevations derived from GPS observations are ellipsoid heights. This means that the vertical distance between the reference ellipsoid and the geoid (leveling datum zero elevation) must be known as well as whether the ellipsoid is above or below the geoid.

Remarks Before the Meeting of the State Board for Registration of Professional Engineers and Land Surveyors

BY PAUL N. SCHERBEL, REGISTRATION NO. 164,
PROFESSIONAL LAND SURVEYOR

Before the meeting of the State Board for Registration of Professional Engineers and Professional Land Surveyors at Jackson, Wyoming 16 June 1995.

If you will permit me, I would like to remember for a few moments. Back in 1950 - 1951 when I took the Land Surveyor examination, I recall there being four questions:

1. Calculate a vertical curve.
2. Calculate a horizontal curve.
3. Compute an area by DMD and logarithms.
4. Transit adjustments.

In my 44 years of experience I have yet to place a vertical curve or a horizontal curve on the ground. Many areas have been calculated by DMD and logarithms. As for transit adjustments, if an instrument was found to be out of adjustment, it was always better to give it to an expert to repair.

There were no questions on land surveying especially the law of land surveying which makes up probably 90% of land surveying. Why? Surveying seems to divide itself into two parts: Surveys to obtain information for the design of engineering projects and then placing them upon the ground. And surveys to determine property boundaries.

Any one may make engineering surveys as it presumed that there is a registered professional engineer closely supervising the work so that he has the information necessary for the project.

But the registration law for surveys is designed to protect the public in obtaining property surveys. Obviously, then the practitioner ought to be found competent in land surveying.

It was not until 1963 and Robert Jack Smith was appointed to the Board that the Board started to take notice of this. The result is our present examination procedure.

But a word of caution. Once an applicant is accepted to take the examinations he is in the loop and in practically all cases will become registered. Consequently it is very important that the Board review the application thoroughly and weed out incompetents who are able to pass the examination. This requires a close look at the survey material that is submitted with the application.

Through the years many modifications to the statutes have been made, many at my instigation. It was found that some County Clerks would not accept record of survey plats for filing. This resulted in a permissive statute though we tried for a mandatory one. And we are still trying but it will never succeed until the professional land surveyors will really support it. Very few surveyors at present file their plats for record. Though we have over a thousand in Teton County, one County Clerk tells me that there are just seven in her

county. Though the State Engineer was requiring standard plat sizes, it was not statutory. So we obtained that statute so that the Clerks would not have a multitude of sizes to file.

The statute for additions to the Town originally said it was to be made by a "competent surveyor". We had this changed to Registered Land Surveyor. Now I am not sure that it should have been left as competent surveyor.

Another statute was to require annexation plats to Towns be filed with the County Clerk.

A major accomplishment was that of Peter M. Jorgensen in being able to get the Statutes revised to require an educational standard. The work of land surveyors has changed during the years and we now spend much of our time consulting with lawyers, judges, engineers, architects, and others who have extensive education. A present day surveyor must be able to read and write and be on an educational level of those of other professions with whom he deals.

As there seemed to be a need for a compilation of Wyoming Statutes pertaining to land surveying, a rendering was made about 1980 which was subsequently published by WACES. However that group did not seem to want to keep it current and so it was taken back in 1988 and has been revised from time to time since then by me.

I admired the fancy galvanized steel pipes with brass caps that the BLM used for monumenting section corners. However it was found that they were made by the Rock Island Arsenal in Illinois and were not available to the private surveyor. Shortly thereafter it was found that the BLM had let a contract with Schneidmiller Industries in Fort Collins to make the monuments finding it less expensive. Upon inquiry it was found that they would make them for private surveyors but required that a mold be furnished. So I lent the substantial sum to WACES to get the mold made and WACES was reimbursed at the rate of 25 per monument by the contractor and eventually repaid me. A great number of surveyors used these monuments especially before the advent of the aluminum monument.

Then the BLM. In 1950 my mentor Floyd A. Bishop set the E1/16 S22/S27, a nice stone monument with his mark "FB". In 1952 along came the BLM, acknowledged the existence of the Bishop monument but set its monument 2 links easterly. In 1958 when this was discovered by me, I tried to get Floyd to scream. But he said one never wins with the BLM and he would not do anything about it. At that time I vowed that this was not to happen to me and so I started filing copies of all my corner records with the BLM,

(Continued on Page 14)