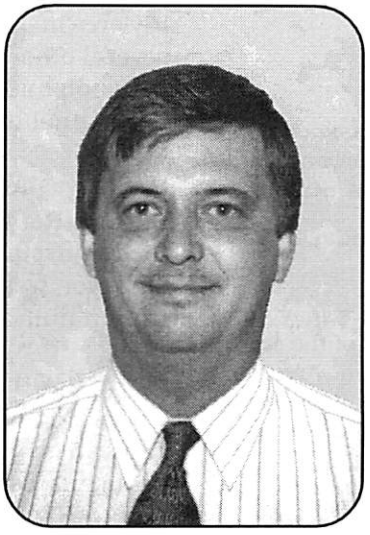
Saskatchewan Land Surveyors' Association

Newsletter

President's Message to the Membership

By M. L. Waschuk, SLS, P. Surv., President

When you have done something a certain way for an extended period of time, change or trying something new is always difficult. Some of the problems experienced with change may, however, be self inflicted. I am not defending ISC and at one point in time I was so frustrated with the E-Business Services Centre and the on-line plans that I was ready to explode. The new system is here to stay and we are all going to have to work together to make it work. Remember that "those who neglect the future risk losing it."



By now you should all be aware of the meeting we had with ISC and the panel (SLSA - ISC) that has been setup to help both parties cope. I am confident that this panel idea will work and after the new system is running smoothly, I hope the panel will continue to function to help maintain the lines of communication between our Association and the Corporation. Thanks to Guy Craig, Larry McLeod and Ed Grenkie for volunteering to serve on the panel. Council has discussed and circulated the idea of a "private members group" being setup. Maybe this panel could evolve into such a group.

At our Council Meeting on September 10th in Saskatoon I had the pleasure of presenting Lt. Col.(ret'd.) Ravi Shrivastava with his Certificate as a Professional Surveyor. Ravi has the distinction of being our first-ever 'direct' Professional Surveyor.

Congratulations Ravi!

Continued on page 83

Inside This Issue

Advertisers

Council Highlights

By: A. Carl Shiels, M. Sc., P. Eng.,
Executive Director

The *Saskatchewan Land Surveyors' Association Newsletter* is published by the Saskatchewan Land Surveyors' Association for circulation to its members.

Deadlines for articles will be the last Friday in December, March, June and September.

The opinions of the contributing writers may not be consistent with those of the Council of the Saskatchewan Land Surveyors' Association. Articles may be reprinted with appropriate credit given to the authors, unless it is under copyright.

Address all correspondence to:
408 Broad Street #230
Regina, Saskatchewan S4R 1X3
Phone: 306/352-8999
Fax: 306/352-8366
e-mail: slsa@sk.sympatico.ca
web site: www.slsa.sk.ca

Office hours are from 9:00 a.m. to 12:00 p.m. and 1:00 p.m. to 5:00 p.m. on all business days.

2001/2002 Council

President	Michael L. Waschuk
Vice President	Guy D. Craig
Past President	Bill C. Soroski
Councillors	Willard Larson
	Conrad B. Swenson
	D. Jim Clarke
	Alan I. Jensen
Public Member	Walter M. Streelasky
Executive Director	A. Carl Shiels
Executive Assistant	Vacant
Newsletter Editor	Doug A. Bouck

July 6, 2001 - Meeting #2

The president noted that almost everyone seemed to be having problems with the LAND project implementation.

Council met briefly with Chris Sakundiak, SLSIT and Dave Quirk, SLS, P. Surv. to review Mr. Sakundiak's articling experience. Mr. Sakundiak obtained a degree in geomatics engineering from Ryerson University in 1994 and received WCBE certification in the spring of 2001.

Labour Mobility - Mutual Recognition Agreement

The President provided a brief update on the signing ceremony at the annual meeting of the Ordre des Arpenteurs - Geometres du Quebec in Trois-Rivieres in June. There were visiting delegates from several other countries including France, Morocco, Lebanon and Columbia in attendance at the Quebec annual meeting.

R. Shrivastava - P. Surv.

Lt. Col.(Ret.) Ravi Shrivastava, having met all of the requirements for registration as a professional surveyor, was granted Professional Surveyor registration number 65.

Meeting With ISC Re: LAND Project Problems

Council noted that ISC President Fraser Nicholson had invited the SLSA to meet with him to discuss problems associated with implementation of the new LAND system. In response to that invitation, all members had been invited to submit any concerns they had about the new system to the association office. A broad variety of problems had already surfaced and more were anticipated. However it was unclear whether all of the problems would be resolved quickly by ISC or whether some might require discussions with Mr. Nicholson before they would be resolved.

It was agreed that a meeting with Mr. Nicholson should be planned for sometime in October by which date most problems would have been identified and those that were going to be solved would probably have been taken care of.

GeoSASK Conference

Council agreed to contribute to the GeoSASK 2001conference by providing free distribution of

promotional and informational items to the membership.

Sask Spacial Information Forum (SSIF)
The SLSA had been invited to participate in the SSIF as the representative of the survey/engineering sector. However, a question arose regarding whether this was a matter that should be dealt with by the professional association or by the survey industry. It was agreed that this question should be distributed to the membership for comment.

Executive Directors' Meeting
The association presidents from across Canada have been discussing the possibility of holding an annual meeting of association executive directors. Although still at the idea stage, consideration is also being given to creating a 'pool' of funds to cover travel costs so that all associations would contribute equally to the cost of such meetings. A message had also been received from Brian Mundy, Executive Director of the ALSA, suggesting that the first such meeting could be by telephone conference call to determine the potential value and agenda for any future meetings. Council agreed to support the idea of such meetings.

Convention Committee
The president reported that the 2002 annual meeting has tentatively been scheduled for May 30, 31 and June 1 in North Battleford.

September 10, 2001 - Meeting #3

The president noted that he continued to get several calls about problems with the LAND project implementation.

CCLS Public Relations Committee
Council appointed Stu Hayward to be the SLSA representative on the newly re-activated CCLS Public Relations Committee.

Residency Requirements for Members of Council
Council reviewed a letter from Sask Justice which indicated that whether and to what extent there may be non-resident members elected to the SLSA council was a matter to be decided by the membership of the association and is not dictated by any government policy. On that basis, Council directed the Executive Director to draft an amendment to the bylaws, for consideration at the next annual meeting, which would allow a minority of members of council to be non-residents.

Meeting With ISC
Council concluded that there were enough problems with the implementation of the new LAND system to warrant a meeting with ISC president Fraser Nicholson. The president was authorized to write to Mr. Nicholson, with a copy to the Minister, outlining the concerns of the membership, and to arrange a meeting to be held not later than the next meeting of Council.

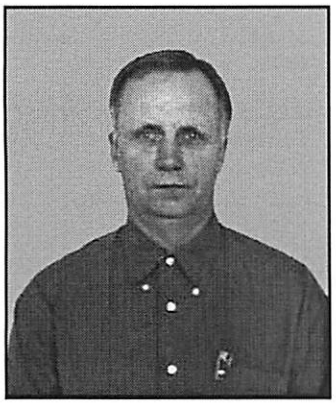
Practical Experience for SLSIT's
Council noted that many Land Surveyors in Training would be able to complete their period of practical experience before the date of the professional examinations the following year but few would be able to complete it before the January 15 deadline currently set out in the Rules for Professional Examinations. As a result, Council adopted the policy that, so long as the application to write the Professional Examinations is received by the January 15 deadline and the applicants are able to complete their practical experience before the end of March, they will be allowed to write their professional examinations in April.

Museum of Surveying
Council considered and rejected a request for donation from the Museum of Surveying in Lansing Michigan. Instead, Council agreed that an effort should be made to re-active and update the survey artifacts that had been vested with the museum in Regina. D. A. Bouck has agreed to work with T. N. Crump in that regard.

Sask Spatial Information Forum (SSIF)
Council learned that there had been very little interest expressed by the membership in the forum. However, it was not clear whether that was because members were unclear about the purpose for the forum. It was agreed that a representative from ISC should be invited to make a presentation to the membership at the fall education seminar to provide more insight into the purpose and objectives of the SSIF.

Continued on page 110

Councillor's Report



By D. J. Clarke, SLS, P. Surv.

David Thompson

A Monument to An Amazing Surveyor and Geographer

As I found out long after Roy Pominville approached me about running for council, one of the duties of a councillor is to write an article for the newsletter. I was at a loss for a topic until the last council meeting where we considered a request for a donation to help fund a statue of David Thompson near Invermere, B.C. Thompson appears to be a popular topic for writers these days as recent issues of the B.C., Alberta and Saskatchewan (see June 2001 issue) newsletters have had articles about this man. Some of those present at the council meeting knew very little about this extraordinary man. The following information was obtained off the Internet.

David Thompson was born in England, on April 30, 1770. In 1784, at age 14, he apprenticed to the Hudson's Bay Company as a clerk, arriving at Hudson Bay in September.

His first two years were spent on the shores of Hudson Bay at Churchill and York Factory. He was sent inland and stationed at several posts on the Saskatchewan River. He spent the winter of 1787-88 with the Peigan Aboriginal people on the Bow River where he learned much of the language, life and customs of the Aboriginal peoples.

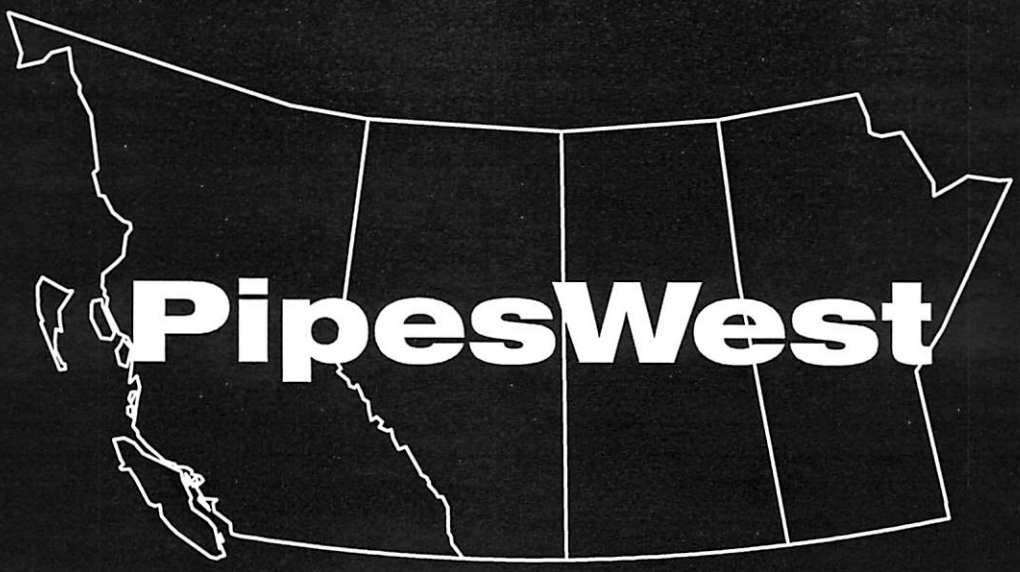
In December 1788, he broke his leg, an accident that changed the course of his life. The break was so severe that he was not completely mobile for more than a year. He spent the winter of 1789-90 convalescing at Cumberland House where Philip Turnor, the Hudson's Bay Company's astronomer, tutored him in surveying and practical astronomy. Surveying and mapping the uncharted West became Thompson's ambition and eventually his greatest achievement. From this time onward he surveyed wherever he travelled in the West. The company outfitted him with a sextant, an artificial horizon, compass, thermometers, watches, Nautical Almanacs, and all the instruments and supplies necessary to carry out his surveying.

Thompson returned inland in 1793 and traded, explored and surveyed in present-day northern Manitoba and Saskatchewan. In 1797, believing the energetic and venturesome North West Company would use his skills better than the Hudson's Bay Company, he quit and joined its (Canadian) rival. In his first year with the North West Company, he travelled 6000 km to the Missouri and Mississippi rivers, to Sault St. Marie and back to Grand Portage. He located the company's posts in relation to the newly established international boundary, the 49th parallel.

Two years after becoming a "Nor'Wester," Thompson married Charlotte Small, the mixed-blood daughter of a North West company partner. Thompson visited Rocky Mountain House briefly in the spring of 1800, but was back for a two-year stay that fall. During this time, he and his colleagues, Duncan McGillivray and James Hughes, engaged in several exploratory trips. In the fall of 1800, Thompson made two such trips, the first to the Red Deer River and the second to the Bow River.

Continued on page 101

ensight



PipesWest

is reality.

Ensight's
Western Canadian Pipeline Database
is ready to put to work.

With your input and support,
the most comprehensive Canadian pipeline coverage
is now available.

We couldn't have done it without you.

PipesWest can be supplied in:
EGIS
TAB • MID/MIF • SHP

Ensight Information Services Ltd.
Tel: (403)292-0515 Fax: (403)294-1185 email: sales@ensightinfo.com

Shrivastava Earns P. Surv. Registration "The Hard Way"

By: A. Carl Shiels, Executive Director

On July 6, 2001 Lt. Col. (Ret.) Ravi Shrivastava was granted Professional Surveyor Registration Number 65 and became the first person to obtain such registration 'directly'. All other members who received their P. Surv. registration did so under Article XXV, Section 3 which allows Professional Land Surveyors to obtain P. Surv. registration by submitting an oath of office and an admission fee.

Ravi's application for membership as a Professional Surveyor came in September of 2000 and activated the Admissions Board for Professional Surveyors which had been largely dormant since developing the rules for admission in 1998. First, Ravi's work and academic background were reviewed in detail to confirm that he was eligible to apply. Next he was required to submit a technical paper which would demonstrate his knowledge and competence in the various categories in which he wished to practice – namely general surveying, geodetic surveying, photogrammetric surveying, mapping and cartographic surveying, geographic information systems, remote sensing and consultation in geomatics. Then, in April of 2001, Ravi wrote the one hour professional exam related to the Land Surveyors and Professional Surveyors Act and the Bylaws. His application was finally approved by the SLSA Council at their meeting on July 6.

President Mike Waschuk (r) presents P. Surv. Registration #65 to Lt. Col. (Ret.) Ravi Shrivastava at the September 10 meeting of Council

Ravi's ultimate objective is to obtain a commission as a Professional Land Surveyor. To that end, he obtained a WCBE Certificate of Completion in April of this year and immediately entered into a Land Surveyor in Training agreement with W. J. Peters, SLS, P. Surv. in Saskatoon.

Although Ravi does not regret the process which he has undergone to receive P. Surv. registration, his experience raises a number of questions about the reasons behind, and the future of, the category of Professional Surveyor. As the open letter from W. J. Peters (see next page) points out, it has been four years since the category of Professional Surveyor was established by the new Land Surveyors and Professional Surveyors Act. Yet there has been virtually no interest shown from eligible people involved in the broader geomatics industry. Is the problem lack of awareness? Or is it because the admission and membership requirements are viewed as too extreme for the benefits that accrue to P. Surv. members? Is a protected title really worth $600 per year to anyone in private practice or working within government?

If the category of Professional Surveyor is to have meaning, some would argue that the requirements for registration should include proof of knowledge and experience in the intended categories of practice for all new members whether they have received their commission as an SLS or not.

No doubt these and other questions will be discussed in the weeks and months to come. In the mean time, Lt. Col. Ravi Shrivastava deserves full recognition for having worked very hard at creating a unique place for himself in the history of the Association.

Open Letter

W. J. Peters, SLS, P. Surv. C.L.S.

June 29, 2001

Re: Image and Recognition of Professional Surveyor

It was a pleasure talking to you (SLSA Executive Director) this morning regarding the objectives and promotion of activities of Professional Surveyors of our association.

In compliance with these objectives and the promotion of professionalism, I take pride to encourage Lt. Col. (Ret'd) Ravi Shrivastava to join us as first ever "direct" Professional Surveyor. Although, being a practicing Land Surveyor, I believe that the title of P. Surv. is redundant to my business or professional interest.

I strongly feel unless those people from industry or government who have a professional interest in Geomatics are invited to join us and the membership is expanded, it will neither serve the purpose of its existence nor will it enhance the image of a Professional Surveyor. It will be of no use to the practicing Land Surveyors to use the protected title of P. Surv. at an annual fee of $100.00, year after year.

The public, professionals, industry and government are not well served by the presence of this protected title of Professional Surveyor. There was not adequate publicity given to this new category of professional in the past. Potential clients are not aware of the protection of their interests and rights governed by the acts and regulations of professional survey, code of ethics, professional conduct and practice.

Entry of Ravi as the first direct Professional Surveyor should therefore be regarded as a welcome step. We should take pride in introducing the first member and take an opportunity to give wide media coverage. This will not only enhance the image of the title of Professional Surveyor but also encourage existing potential professionals to join our association and will be in the public interest at large.

W. J. (Wilf) Peters S.L.S., P.Surv., C.L.S.

Continued from page 77 - "President's Report"

With our first direct Professional Surveyor finally under our belt, lots of questions begin to re-surface. How come it has taken this long? How can we attract more? Why didn't all the geomatics professionals working for the Central Survey and Mapping Agency join as was expected? Was it a good idea to begin with? Please think about these questions and send in your thoughts and ideas.

In mid-September, Carolyn and I had the pleasure of attending the AMLS Annual General Meeting in Brandon,Manitoba and we are getting ready to attend the ANLS AGM in Bridgewater, Nova Scotia.

The AGM in Brandon was excellent (I am not just saying that because I won a golf trophy) and their business meetings moved along quite smoothly.

Lyall Pratt (Director of Practice Review - ALSA) gave an informative presentation on the Practice Review history and process in Alberta. It sounds like the Practice Review system is now generally accepted and some members expect/want/use it as a tool to make improvements in their businesses.

John Holmlund (Vice Pres. - CIG) gave a talk on the Canadian Institute of Geomatics and made a plea to surveyors across the country to renew or join CIG as they are experiencing a substantial decline in members with resultant financial difficulties. John will be delivering this message across the country and will more than likely be speaking about this at our next seminar.

A brief presentation by Greg Browne (Pres. - CCLS) was made on the NAFTA Mutual Recognition Document #6. Based on the comments and questions from the floor I didn't think the AMLS was going to endorse MRD#6 but when a vote was taken their endorsement was approved.

Doug Bouck informs me that he is busy getting things ready for our upcoming seminar. The seminar will probably be in early December in Saskatoon and I hope you can all make it. Don't forget to start getting your points all in order as January isn't that far away.

After scraping the windshield this morning I would say that fall is now upon us and I can't remember a summer going by so fast.

Take care, work hard and we'll see you at the seminar.

Iron Survey Post Punctures Natural Gas Main

The following is a letter from ATCO Gas dated January 16, 2001 along with the ALSA's response dated February 2, 2001.

Reprinted, with permission, from the ALS News, March 2001

Dear Sir/Madam:

The purpose of this letter is to bring to your attention a safety concern that ATCO Gas has with the practice of delayed posting of new subdivisions within its franchise areas.

To date, ATCO Gas has recorded four separate incidents within the Edmonton region where a pressurized natural gas line has been damaged by the placement of a statutory iron survey post by a legal survey firm.

Our first concern is for the safety of the individuals planting the monuments and public safety; fortunately no one has been injured in the above mentioned incidents. However, with this number of occurrences, it is apparent we are not dealing with an isolated incident and there is a possibility of this potentially dangerous situation reoccurring. In one occurrence, the survey post punctured the gas main allowing the gas to migrate below the frozen surface along the trench to the foundation of the home. Combustible gas readings were taken at the house indicating 100% gas at the foundation.

The proposed alignment of ATCO gas mains in new subdivisions is within a set easement inside the property and at approximately 0.8 meters deep. These gas main locations are staked prior to its placement to ensure they are installed at the proper alignment.

ATCO Gas attempts to ensure that the designed location for its gas lines is rigidly adhered to by the installation crews. However, on occasion, encroachment onto the property lines may occur.

In three of the above mentioned incidents, a section of gas main encroached onto the property line and was directly below the location where a statutory iron survey post was planted. The fourth incident was the result of the legal survey firm offsetting the posting within our easement and at one location, directly over our gas main.

Our view is that survey firms should notify "Alberta One-Call" prior to the placement of the iron posts and have the underground utilities located and marked. This action would identify any location where a potential conflict may occur. Subsequent to establishing the location of all underground pipelines, Current General Safety Regulations under the Occupational Health and Safety Act, require the employer to ensure that a pipeline is exposed by hand digging prior to any disturbance of soil within 600 millimetres of an existing pipeline.

Proposed revisions to the Occupational Health and Safety General Safety Regulations introduce the concept of a "hand expose zone" to avoid hitting buried facilities. This hand expose zone means a strip of land one metre wide on each side of locate marks for all types of buried services. We feel it would be in the best interest of the Alberta Land Surveyors' Association to address any concerns you may have with any new proposed revisions.

It is our hope that, by bringing this matter to your attention, you would relay our sincere concern to your membership that they should know the location of our gas mains prior to planting iron posts in subdivisions that have the underground utilities already installed.

We can't emphasize strongly enough that our first concern is for the safety of the individuals planting the monuments and public safety.

Please contact me at 420-4113 if you would like to discuss this further.

R.B. Johnson, Supervisor
Contract Construction/Survey, ATCO Gas

See ALSA Response on page 101

Survey Techniques

SPR Corner By Lyall Pratt, ALS, Director of Systematic Practice Review

Reprinted, with permission, from the ALS News - June 1999

Case Study No. 1

The Project
A practitioner conducted a pipeline right of way survey in surveyed territory. The township the survey fell within was originally subdivided in 1901. The right of way survey was done during frost-free conditions. Many of the section corner monuments appeared to be missing and the registered plan of the right of way survey showed four miles of re-established section corner evidence. All of the corners had been mechanically re-established, relying on the township plan dimensions.

The Plan Examination
In 1929, a road survey was conducted in Section 25. The practitioner's right of way survey made no mention of this road plan or the evidence established by it. This road survey had located what would appear be original survey evidence at five of the monuments defining the limits of Section 25. The plan shows that the survey found pits at the E ¼ of Section 26 and a mound at the E ¼ of Section 25 as per the original township survey. The road was surveyed along the east/west quarter line of Section 25 and three iron posts were placed on the quarter line, which was the south limit of the road. The nearest iron post to the E ¼ of Section 26 was 2.5 chains (50.29m) east along the quarter line. The road plan was cancelled at the Land Titles Office in 1959, or approximately 40 years ago.

The Field Inspection
We found no trace of original evidence at any of the re-established section corners. It would appear that none of the few existing fences was more than a few years old, and in fact the practitioner appeared to be correct in resorting to mechanical re-establishment.

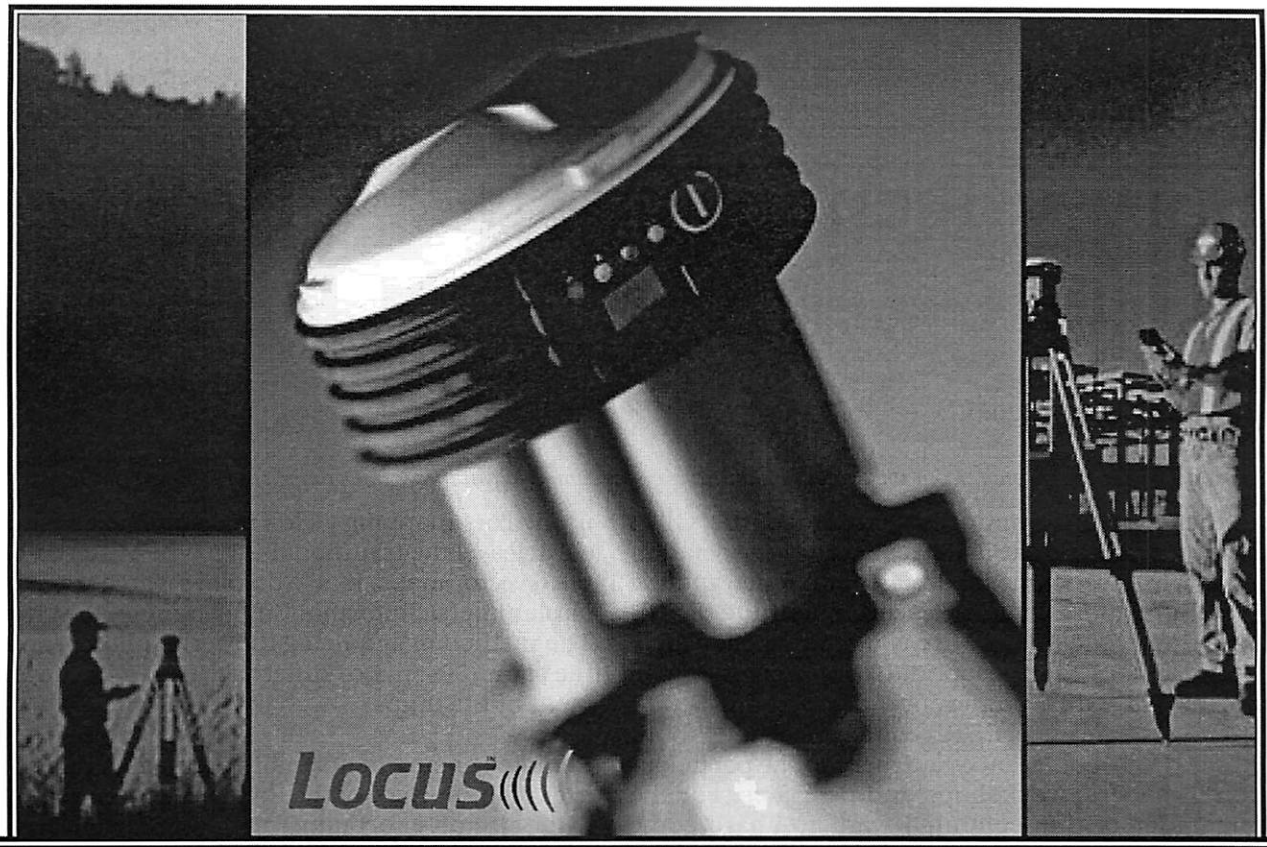
Our field inspection found all three monuments along the quarter line that had been placed by the 1929 road survey and found that they lined up very well. Producing the line west 2.5 chains to the E ¼ of Section 26, we disagreed with the practitioner's re-established position by approximately 1 metre. The road was abandoned, and no physical trace of any road grade remained. Nothing in the field would indicate that a road had ever been constructed or surveyed along the quarter line.

The Legislation
Section 40(1) of the Surveys Act says: "When a surveyor is required to re-establish the position of a monument placed in the original survey in accordance with Section 29 that cannot be found, the surveyor shall do so from the best available evidence respecting the position of the monument." In the Manual of Standard Practice under Part E, Section 4, there are three pages listing Guidelines for Retracements and Restorations. The parts on research, hierarchy of evidence, and lost monument procedure on townships are particularly applicable to this survey.

The Corrections
As a result of our findings, the practitioner agreed that the 1929 road survey had likely found original survey evidence and that a properly weighted assessment of the documentary and physical evidence available would place a greater weight on the road plan monuments. Clearly our findings and the practitioner's agreement with them, resulted in additional field work and plan corrections. Several monuments had to be moved to account for the change in position of the E ¼ of Section 26. It appears that the practitioner's plan search did not find the cancelled road plan, or he did not order it because it was cancelled.

The Message
I believe that this entire problem resulted from either a poor plan search, or a failure to recognize the value of the survey evidence shown on cancelled plans. It is virtually impossible to re-establish a monument from the best available evidence if all the available documentary evidence is not obtained before going to the field. Plan searches are critical in this regard. Never overlook a plan because it is cancelled or abandoned. It may contain valuable evidence that can assist in re-establishment situations where mechanical re-establishment is the only available option.

Continued on page 112



Introducing...Locus.

Uh-oh! No cables.

You told us to do away with the cables, so we did. There are no cables, they're history - gone. We developed a wireless (cable-free) communication interface with the data collector and PC.

Whether you're a seasoned pro or just getting to know GPS, Locus is today's simple solution for smart surveying.

Easy to set up and even easier to operate, Locus packs performance and durability into a fully integrated design. Perfect for tackling your toughest survey jobs. And with a price tag you can't ignore, Locus is simply the best GPS survey investment you can make.

From centimeter-level static surveys to dynamic kinematic surveys, Locus has raised the bar by making technology work for the surveyor. Use Locus with confidence to boost productivity, reduce operating costs and turn a profit. All at the same time.

Extended Operation – No More Expensive Batteries

Locus operates in excess of 100 hours on a standard D-cell batteries. Or if you prefer, use C-cell batteries. It's your choice.

Easy-to-Operate Software

Here we set a new standard. We've made a complete GPS software package simple to use. It features a Windows® interface, network adjustment, analysis tools, blunder detection and more. You've got to try it to believe it.

Put Locus to work today. Call us at 1-800-361-0978

GEMINI POSITIONING SYSTEMS LTD.

Canadian Ashtech Distributor
for a local dealer near you please contact:
100,6130 3rd Street SE
Calgary AB T2H 1K4
1-800-361-0978 email: gempos@gps1.com

Certified ISO 9001 Since 1996

Ashtech

Survey Technology - New Directions in GIS

By Fred Henstridge, LS

Reprinted, with permission, from the Professional Surveyor - Volume 18, Number 7 ... October 1998

In the past three months I attended the GITA (Geospatial Information & Technology Association -formerly AM/FM International) conference and the Environmental Systems Research Institute (ESRI) User Conference. These are two of the most widely attended GIS and geospatial conferences in the world. The GITA conference drew about 5,000 attendees, and the ESRI conference had about 8,500. Both conferences attract global participation in papers, workshops and delegates. For the remainder of this column I want to share some observations on the direction GIS is taking.

GIS's CAD Roots

Over the past ten years or so, GIS has evolved from a CAD basis. This method of developing and displaying GIS data depends on accurate vector-based mapping or data conversion. The mapping is normally obtained through traditional aerial photogrammetric methods, whereas digitizing existing paper maps or conducting field surveys develops the database for the GIS. The GIS is usually based on some plane coordinate system, such as NAD 83, and includes an accurate land parcel base. This method is not only slow, but also is very costly. In a municipal GIS the cost for data can reach 75 percent of the total budget. This is the most accurate and reliable method for developing a GIS that will be used for municipal planning, utility management and any use where accurate parcel and street information is required. It's still the mainstay for municipal and utility GIS.

In the past few years, since the development of digital orthophotogrammetry, faster computers with greater storage capacities, better data compression methods and higher resolution satellite-based remote sensing, a new form of GIS has evolved. Unlike the CAD-based GIS, this raster-based system uses the new image processing technologies. In a raster based GIS, each screen pixel represents a defined area on the Earth's surface and is identified with X, Y and Z coordinate values. For uses requiring higher resolutions, such as municipal land planning, digital orthophotogrammetry is used. This mapping yields the same horizontal accuracies as the traditional CAD type of stereo-compiled vector maps. It also displays a greater amount of planimetric information for a much lower cost. The method of acquiring the aerial photography is the same. The major difference lies in the development of the map.

Remote sensing is normally defined as digital images of the surface of the Earth obtained from high-flying aircraft or orbiting satellites. Satellite imaging (another term used to describe remote sensing) has been in development and use by the military since the late 1960s. As technology evolved, the quality and resolution of satellite-based remote sensing increased greatly. Today there are several companies ready to launch remote sensing satellites that will provide one meter resolution. This means that users will be able to identify an object one meter across from roughly 600 miles away in space. This represents an accuracy level commensurate with 1:2400 mapping. For many planning and modeling applications, this is more than adequate. Keep in mind that these images will be orthorectified and based on GPS ground and airborne positioning.

Multispectral Information

Another important aspect of remote sensing is the ability to obtain more than reliable and current mapping or planimetric data. It will also provide something called multispectral information. The Landsat satellite began providing this information in the early 1980s. Most of us have seen coloured photos of various sections of the Earth taken with Landsat. The resolution of the multispectral remote sensing is much coarser than the panchromatic mapping systems, but when combined (fused) with the higher resolution imaging, it is a powerful geospatial tool for GIS.

Raster-based GIS Applications

Although vector-based (CAD) GIS is still an important and vital tool for multipurpose land information systems, utility and municipal infrastructure management and land planning, the newer raster-

based GIS applications are beginning to make a major move into the market. The opportunities are endless for unique applications where enterprise-wide solutions are either not needed or not affordable. These image-processing applications can range from precision agriculture to forensic analysis for law enforcement agencies. In most cases these unique applications will be results-oriented and will not be done "in house" by the client. They will, however, be based on real-world coordinate systems and data. Maps of dubious accuracies and reliable ground truth will not be converted into the GIS. Current imaging will be obtained for each unique application or solution. As the ability to develop DTMs and DEMs increases, the potential uses will multiply. This is happening as you read this article. The new technologies of scanning the ground with airborne-based lasers and radar (LIDAR and IFSAR) are producing centimetre-level elevation models. These will be powerful geospatial tools in the years to come.

What does this mean to the surveyor? As I see it, these new technologies are giving us a wealth of new opportunities to provide geospatial solutions. In many cases these applications can be carried out with one or two skilled technicians. The data can be acquired on the commercial market quickly and at a low cost. It would be the role of the professional surveyor to provide the positioning, registration and modeling. As an example, in California, because of last year's El Nino rains, there has been increased growth in vegetation. This vegetation will be burning this fall. A major insurance company requested a local firm to obtain multispectral remotely sensed imaging of the state and then to analyze, identify and report on the increase of fuel for the upcoming fires. From this information, they will be able to assess their risk and label potential high-risk areas for the various state and local agencies responsible for fire fighting. This is just one of many application opportunities for the use of raster-based GIS. I am sure there are many more in readers' local areas.

How Surveyors Can Get Involved

To take advantage of this emerging market for GIS applications, surveyors will need to become educated in technologies such as remote sensing, image processing and airborne positioning. The major investment will be in time: time for research, time for training and time for skill building. The investment in capital equipment such as computers and software is minimal. Most of today's image processing software will run well on a good desktop PC. For most cases, data acquisition will be from commercial suppliers on a per-square-mile basis.

The military has been using this technology for years. The DTM in the head of a Tomahawk cruise missile did not come from a ground survey of the flight path. Target identification, classification and location comes from satellite imaging. As these classified and secret technologies move to the commercial market, our supply of tools for GIS will increase at an even greater rate. The opportunities to supply discrete and unique GIS solutions will continue to grow.

Fred Henstridge is a principal of Psomas and Associates in Costa Mesa, California, and the director for International Program Development. He is also a Contributing Editor for the Professional Surveyor.

Original Editor's Note: This article was written in late October of 1998. In the July issue of the 'Link (2000)' there was a press release in which reference was made to a statement made by United States President Bill Clinton that a release of military restrictions on GPS data had taken place ... finally!

GPS Applications in Civil Engineering

By: Ahmed El-Rabbany - Ryerson Polytechnic University
Adam Chrzanowski and Marcel Santos - University of New Brunswick

Reprinted with Permission, from the Ontario Land Surveyor - Summer 2001

Civil engineering works are often done in a complex and unfriendly environment, making it difficult for personnel to operate efficiently. Being able to provide a high accuracy positioning in a cost effective manner, GPS has found its way into the civil engineering industry, replacing the conventional methods in most of the cases. With GPS, machineries are being automatically guided and controlled. This is especially useful in hazardous areas, where human lives are being endangered. For those situations where the GPS signal is obstructed, such as in open pit mines, GPS has been successfully integrated with conventional equipment. A number of integrated systems have been successfully developed, including GPS/Total Stations, GPS/Lasers, and GPS/Inertial Navigation Systems (INS). INS is a relatively environment independent system consisting mainly of accelerometers and gyroscopes, which can be used for autonomous positioning and attitude determination. This article shows how GPS can be used in the various civil engineering applications.

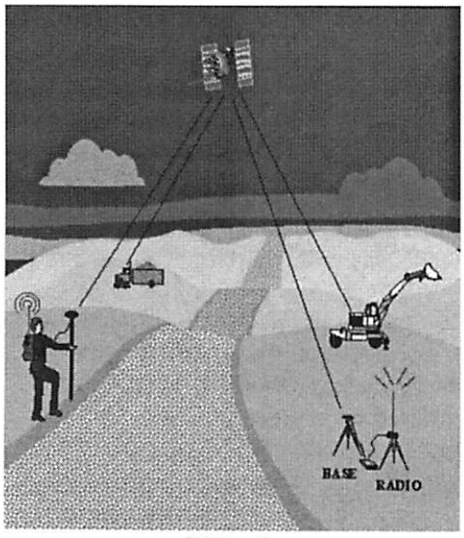


Figure 1.
GPS for Construction Applications

GPS for Construction Industry

The ability of GPS to provide real-time sub-metre and centimetre level accuracy has significantly changed the construction industry. Construction firms are using GPS in many applications such as road construction and earth moving, fleet management and other civil engineering applications (see Figure 1).

In road construction and earth moving, GPS, combined with wireless communication and computer systems, is installed on board the earth-moving machine. Designed surface information, in a digital format, is uploaded into the system. With the help of the computer display and the real-time GPS position information, the operator can view whether the correct grade has been reached. In situations when millimetre-level elevation is needed, GPS can be integrated with rotated beam lasers.

The same technology (i.e. combined GPS, wireless communications and computers) is also used for foundation works (e.g. pile positioning) and precise structural placement (e.g. prefabricated bridge sections and coastal structures). In these applications, the operators will be guided through an on-board computer display, eliminating the need for the old conventional methods.

GPS is also used to track the location and usage of the equipment at different sites. By sending this information to a central location, the contractors would be able to deploy their equipment more efficiently.

Moreover, vehicle operators can be guided to their destinations. In fact, some products are on the market today to specifically serve the asset tracking needs of fleet management operators, for example the Magellan Asset Vision™ system (Figure 2). Asset Vision is a mobile communication and tracking unit featuring GPS and cellular technology in a black box that offers a complete solution with its own data and unit management software. It can track and monitor engine diagnostics, front and rear attachment hours, equipment location, and several other user defined parameters.

GPS for Mining and Tunnelling Surveys

Until recently, conventional surveying was the only

method available for staking drill patterns and other mining surveying. As a result of the harsh mining environment, however, stakes were often buried or displaced. In addition, drill operators had no precise way of determining the actual bit depth. Likewise, there was no way of monitoring the drill performance in the various geological layers or monitoring the haul trucks in an efficient way. More recently, however, the development of the modern positioning systems and techniques, particularly the real-time kinematic GPS, has dramatically improved the various mining operations. In open-pit mines, for example, the use of real-time kinematic (RTK) GPS has significantly improved several mining operations such as drilling, shoveling, vehicle tracking and surveying. RTK GPS provides centimeter-level positioning accuracy, and requires only one base receiver to support any number of rovers. As the pit deepens, however, part of the GPS signal may be blocked by the steep walls of the mine causing a positioning problem. This problem, however, has been successfully overcome by integrating GPS with other positioning systems, mainly the pseudolite system.

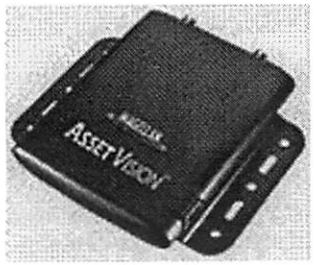


Figure 2.
Magellan Asset Vision System

The mining cycle includes several phases, with the ore excavation being one of the most important phases. Excavating the ore is made by drilling a predefined pattern of blast holes, which are then loaded with explosive charges. The pattern of blast holes is designed in such a way that it optimizes the size of the rock fragmentation. As such, it is important that the drills be precisely positioned over the blast holes, or otherwise redrilling may be required. An efficient way of guiding the drills is through integrating GPS with drill navigation and a monitoring system consisting of an on-board computer and drilling software. Some systems utilize two GPS receivers, mounted on the top of the drill mast, for precise real-time postion and orientation of the drill. The designed drill pattern is sent to the onboard computer via radio link, which is then used by the integrated system to guide the drill operator to precisely position the drill over blast holes (see Figure 3). This is done automatically without staking out. In addition, the on-board computer displays other information such as the location and depth of each drill hole. This is very important for the operator to view whether or not the target depth has been reached. As well, the system accumulates information on the rock hardness and the drill productivity, which can be sent to the engineering office in near real-time via radio link. Such information can be used not only in monitoring the drill productivity from the engineering office, but also in understanding the rock properties, which could be used for better future planning.

GPS is also used for centimeter-level accuracy guidance of shoveling operations (Figure 3). Shovels are used in loading the ore into the haul trucks, which then transport it and unload it in stockpiles. With an integrated GPS and shovel guidance and monitoring system, elevation control can be automated. With the help of the system display, shovel operators will be able to keep the correct grade. This is

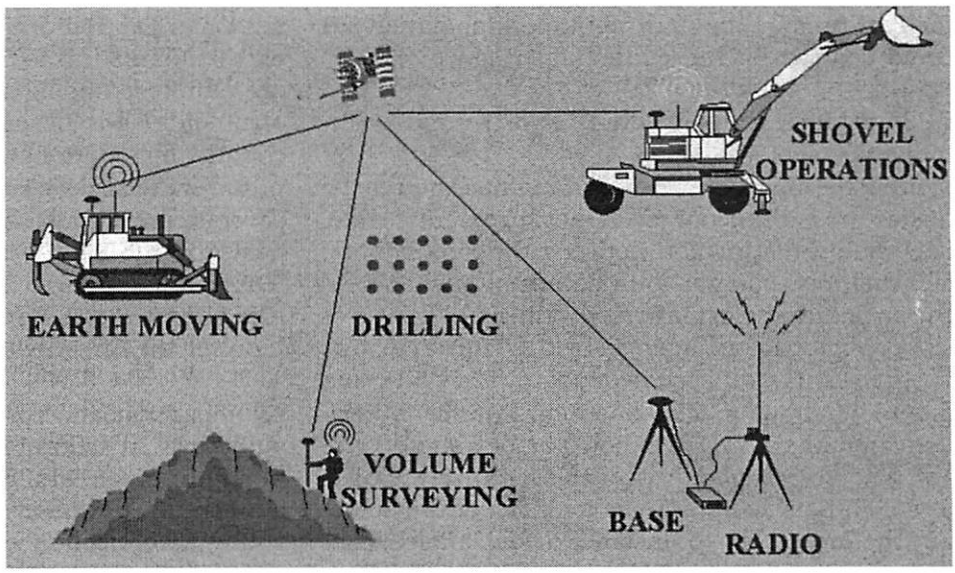


Figure 3. GPS for Open-Pit Mining

done automatically without the need for grade control by conventional surveying methods. Similar to the drilling, shoveling productivity can be sent to the engineering office in near real-time via radio link for monitoring and analysis.

In transporting the ore, haul trucks use continuously changing mining roads and ramps. Unless efficiently routed, safety and traffic problems would be expected, which causes an increase in the truck cycle time. The use of GPS, wireless communication and a computer system on-board the haul trucks solve this problem efficiently. With the help of a computerized dispatch system, haul trucks can be guided to their destination using the best routes. In addition, the dispatch center can collect information on the status of each haul truck as well as the traffic conditions. Analyzing the traffic conditions is particularly important in making more appropriate road design.

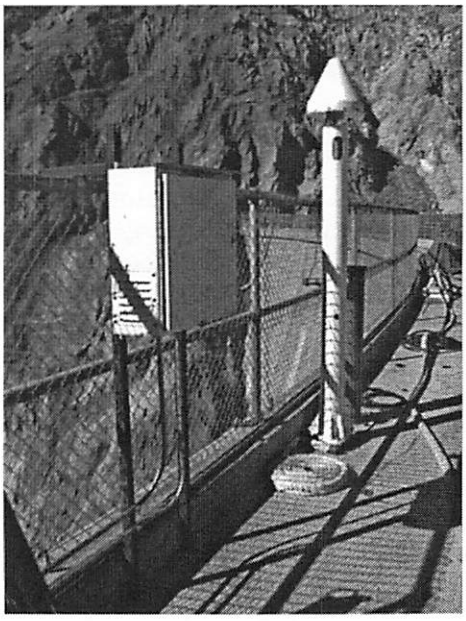


Figure 4.
GPS for Measuring Bridge Deformation
(Courtesy of Magellan Corporation)

GPS is also used in other phases of the mining cycle, for example, checking the coordinates of the individual points and in volume surveying. Either the real-time or the non real-time kinematic GPS could be used for these functions (Figure 3).

GPS for Monitoring Structural and Ground Deformations

Monitoring of structural deformations requires the highest possible accuracy of measurements. Here, one should distinguish between the slow motion deformations such as dam deformations, and cyclic structural deformations produced by effects of fast changing loads, such as bridge vibrations due to changeable traffic loads or TV towers vibrations due to wind gusts. GPS has found many applications in both cases. Here, however, one should give a word of warning to those who overemphasize the use of GPS as a stand-alone tool. Generally, structural deformations, for instance deformation of concrete dams, require millimetre and, sometimes, even sub-millimetre accuracy of displacement monitoring. This is still not achievable with GPS in an economical way. Besides, GPS requires good visibility to the satellites and is susceptible to errors arising from the signals reflected from the structural surfaces (so-called multipath effect). Nevertheless, when combined with other high precision monitoring techniques, GPS becomes a valuable tool in implementing, for example, the recently developed (University of New Brunswick) concept of integrated monitoring schemes. According to the concept, the structural monitoring scheme is divided into three components: (1) local structural monitoring using geotechnical/structural instrumentation (e.g. extensometers, plumb-lines, strainmeters); (2) global structural monitoring using terrestrial geodetic techniques (e.g. electronic total stations and digital levels) for connecting together the structural instrumentation and (3) area monitoring network in which GPS ties together the main points of the global monitoring network and connects them to control points in the stable ground. The concept of the integrated monitoring has recently been implemented at the Eastside reservoir project of the Metropolitan Water District of South California. Three large earthen dams (up to 3.2 km long and 80 m high) are monitored using a number of geotechnical instruments as a local monitoring scheme, several robotic total stations with automatic target recognition creating the global monitoring network, and several continuously working GPS receivers connected to the South California GPS reference system creating the area monitoring network. The picture shows one of the GPS receivers that is used to monitor the integrity of Pacoima dam.

Another application of the high accuracy static GPS surveys is in ground deformation measurements in mining areas. In these applications, GPS is usually combined with terrestrial geodetic surveys providing a connection between the local terrestrial monitoring network and control points established outside the area affected by mining. A research

group from the University of New Brunswick introduced a pioneering use of GPS in ground subsidence studies in oil fields in Venezuela already in 1986. Since then, GPS has become a routine tool in ground deformation measurements. A typical example is monitoring of ground subsidence in potash mines in New Brunswick where GPS has routinely been used since 1991.

GPS may be also applied for the monitoring of cyclic structural deformations. Under this category are, for example, bridges and TV towers. Cyclic deformations, in the case of bridge vibration, are provoked by vehicle loading. Winds and variations in temperature are also a source in deformation with seasonal and periodic signature. The amount of deformation may vary with the types of materials used in the construction of the bridge and with its length but it may reach tens of centimetres for a 1 km-long suspended bridge, in its centre. In the case of TV towers the major source is wind gusts. Bridges and towers may be seen as kinematic deforming bodies. Generally, when monitoring structural vibrations, GPS receivers should be located at several points along the monitored structure, particularly at the locations where maximum amplitude of cyclic deformation is expected. For example, in monitoring the world's longest suspension bridge (Akashi bridge, Japan), a GPS receiver is installed at the mid-point of the bridge while two others are installed at the main towers. Figure 4 shows another example in which the Ashtech Z12™ dual-frequency receiver is used for monitoring the bridge deformation. As GPS data collection rate is currently limited to 10 Hz, an INS system may supplement the GPS system, in some cases, to monitor the high frequency portion of the structure vibration.

ACKNOWLEDGMENTS:
The authors would like to thank Dr. Mohamed Abusalem from Ashtech Inc., USA, for providing the two pictures, which appear in the article.

REFERENCE:
El-Rabbany, A. (2001). "An Engineer's Introduction to the GPS".
ISBN: 1-58053-183-0. Artech House Publishing.

A RIVER'S MECHANICS & A SURVEYOR' OBLIGATIONS

By James F. Doig, CD, B.Sc., B.Ed., NSLS, CLS
Reprinted from The Nova Scotian Surveyor, Spring 2001

Editor's Note: The following is a second analysis of this important court case. See the March 2001 SLS NEWSLETTER for Dr. Brian Ballantyne's article on this case.

Of the several matters at issue in Robertson v. Wallace,[1] two have considerable significance for the land surveyor. The one concerns the extent to which a boundary along a river changed when the river changed its course. The other deals with whether a land surveyor was negligent in registering his plan, and assisting one owner to get a new certificate of title, without giving notice to the owner of the lands adjoining.

THE RIVER

In August 1890, south of Calgary, James MacMillan DLS made a survey which located the west bank of the High River (now the Highwood River) as it flowed through the NE ¼ of Section 7, Township 18, Range 28, West of the 4th Meridian. See Fig. 1.

The Highwood River entered the NE ¼ at a single point, but left it at two. Opposite the oxbow, as it met the road allowance, the river divided to create an island. One branch flowed easterly into the NW ¼ of Section 8 and then went northerly, while the other continued northerly into the SE ¼ of Section 18.

MacMillan's survey was later incorporated into the Township Plan.

Subsequently the NE ¼ was divided between two parties, with the river as their common boundary. The separate parcels eventually passed through their families to Mrs. Phyllis Robertson who came to live on her lands in 1957, and to Mrs. Donna Wallace, who lived elsewhere, but had taken title from her brother in 1989.

Mrs. Robertson's lands were described in 1909 as:

> **"That portion of the North East Quarter which lies to the South East of the North Westerly Bank of the High River shown on Township Plan dated 30th May 1893 containing 48.22 acres more or less."**

Mrs. Wallace held lands described in 1914 as:

> **"That portion of the North East Quarter which lies to the North and West of the High River as shown on the township plan dated 30th May 1893 containing 111.78 acres more or less."**

During the period 1890 to 1917 the Highwood River had flooded on a number of occasions, and the course of the river changed materially. The new Township Plan of 1918, which incorporated a 1917 survey, reflected those changes. The most noticeable of these was that the oxbow to the west was sealed off and the river now flowed out of the quarter in only a single channel - the eastern one. The northern flow along the west side of the island had ceased.

As time passed the owners of the Robertson and the Wallace properties became uncertain about the location of their mutual boundary. There appears to have been an area of middle ground from perhaps the mid-1950's to the mid-1980's that both parties believed they owned. At one point a fence was put up that both families periodically maintained, but the fence was intended to separate grazing cattle, not to mark a boundary. No action was ever taken to resolve the overlapping claims.

In 1984, when Mrs. Wallace's mother owned the Wallace lands, a surveyor was engaged

> ***"who gathered information on the river boundary and the existing fences."***

He then reported that there had been a substantial movement in the Highwood River between 1890 and 1917, and that the river in 1984 more or less

followed the course shown in the 1917 survey. But for ten years things never went beyond these investigations.

THE SURVEY

In 1994, wanting to sell her portion of the quarter along with other lands she owned, Mrs. Wallace retained a land surveyor ..

> *"to survey the boundaries of and measure the area of her interest in the quarter."*

The surveyor reviewed the report made by the 1984 surveyor, knew Mrs. Wallace wanted to sell her land, was aware of the long standing disagreement between the Robertson and Wallace families, and was also aware of the fence used to separate the owners' cattle.

Having advised Mrs. Robertson by letter that he would be surveying the Wallace boundary, the surveyor surveyed the west bank of the Highwood River. In so doing, he came to the conclusion that a process of accretion and erosion had changed the banks of the river, and accepted the present day west bank as the boundary of the Wallace lands. He then registered a plan which purported to increase Mrs. Wallace's holdings in the quarter by some 20 acres, and helped her obtain a new certificate of title. Mrs. Wallace sold her holdings on the strength of the new certificate. When Mrs. Robertson found out what was going on, she brought an action against Mrs. Wallace, the surveyor and his firm, the new purchasers, and the registrar of land titles for damages.

The first Robertson challenge to the survey's validity was to claim the fence on the far side of the river as a conventional line. But evidence was insufficient to support this. Next, relying upon two provincial decisions[2], was the assertion that the river boundary was "frozen" in terms of the 1893 Township Plan. To this claim, and to the contrary, the court preferred two decisions of the Supreme Court of Canada.[3]

Given that the boundary was not fixed, and that riparian rights applied, all parties were agreed that there was no issue with the present location of the South West part of the Highwood River. The river there having shifted slowly and imperceptibly over time, through accretion and erosion, the boundary had moved with it.

The contention arose to the north where there was clearly an oxbow and to the northeast where there had been a large island with a west and east channel flowing round it.

Mrs. Wallace's surveyor, and now himself a defendant, in order to support his assessment of erosion as the vehicle of change there, called another surveyor who had done historical searches of title. Years ago, the second surveyor testified, corrosive action in the larger east channel meant that the west channel had dried up and stopped flowing.

Mrs. Robertson called a witness who..

> *"was qualified as an expert in the field of surficial geology, and was able to give expert evidence in relation to the history of movement of river channels and changes in meandering rivers."*
>
> *"He testified that the oxbow that is visible on the aerial photo[4] would have been cut off by an avulsive process prior to the 1890 survey. However, at the time of that process, there would be a neck of land that would be on the east side of the river and as a result of a chute cutoff (an avulsive process), the river would have moved too close to its current course putting that neck on the west side of the river. This avulsive process would have happened between the surveys of 1890 and 1917. He cannot be any more specific of the timing of that event.*
>
> *In relation to the island area ... it was the evidence of Mr. Osbourne[5] that sometime between the 1890 and 1917 surveys, the west channel of the river became inactive, and the channel on the east side became the only channel .... He pointed to the numerous floods between 1890 and 1917 and said in his opinion a flood likely enlarged the east channel, and it would be a perceptible event at the time the west channel dried up...."*

The court accepted this evidence as to the movement and the cause for the movement of the Highwood River from 1890 to today:

> **"I find ... that the west channel around the island in the Highwood River in 1890 dried up as a result of flooding, not as a result of slow erosional process on the east channel, or a slow drying up of the west channel."**

The court's decision on the boundary between the Wallace and the Robertson lands, subject to the Crown's ownership of the bed of the river, is shown by the heavy black line in Fig. 2. In this diagram the MacMillan survey of 1890 is superimposed on the Wallace surveyor's plan of 1994 for purposes of comparison.

In the north and east of the NE ¼, the boundary is the bank of the river and its western channel of 1890. In the south and west of that quarter, erosion and accretion have, for a space, taken the west bank of the river into the township adjoining to the south. The Robertson ownership, however, has followed the bank in that location only as far as the township boundary.

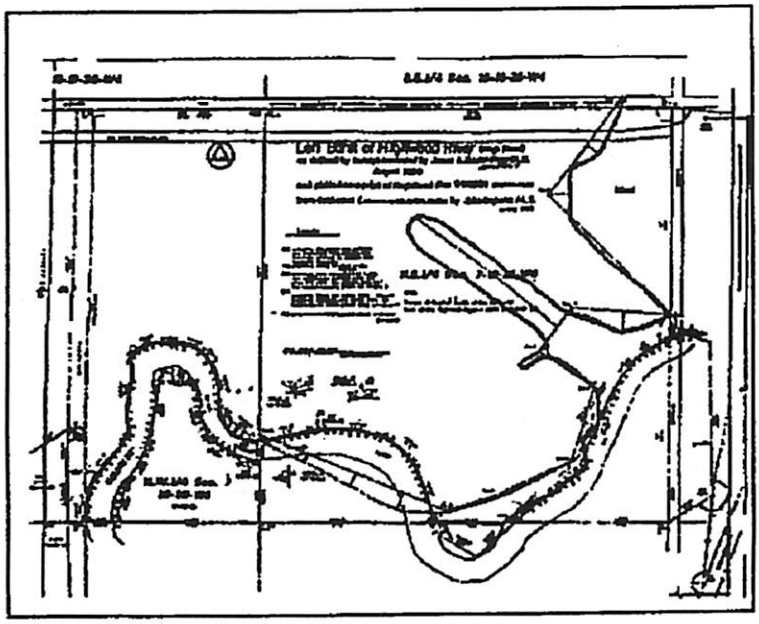


Figure 2.

Comment

A terrain feature that has relevance to a boundary retracement should routinely be referred for expert opinion. Had a geologist been involved earlier in the survey of the Highwood River, the Wallace-Robertson boundary might have been re-established without as much contention. Everyone might have been spared the worries and expenses of going to court. And the new owners of the Wallace property might well have escaped any involvement at all.

AVULSION

Robertson is the first reported case I have seen where avulsion actually decided the location of a contested boundary. My previous encounters were simply those occasions where avulsion was being held out as a theoretical concept, a possibility: a sudden change in a watercourse, as opposed to the gradual and imperceptible alteration that results from the work of erosion and accretion. Three questions came to mind: What causes avulsion? Are there indications that avulsion might occur? Are there features in the landscape that suggest avulsion has occurred?

I sought assistance from Dr. Robert P. Raeside, Head of the Geology Department at Acadia University. His observations follow:

"Avulsion is a natural river-bed process, generally associated with low-gradient rivers that build up a levee or high bank, and then suddenly breach the levee, and carve a new rivercourse across the flood plain. The classic examples are from the lower Mississippi floodplain, but it can happen on any stream. I have seen examples of avulsion in mountain streams in Cape Breton Island, where the river has changed course after a flood.

If you have access to a good atlas of the USA, you will find in Louisiana the Atchafalaya River (often shown as a canal), which appears to drain from the Mississippi, downstream from Baton Rouge, to Atchafalaya Bay, near Morgan City. The Mississippi flows several metres above the level of the Atchafalaya (courtesy of the US Corps of Engineers, who

artificially maintain the levee). If it were allowed to pursue its natural course, the Mississippi is due to avulse into the Atchafalaya system, and establish a new delta 150 km west of its modern location.

Evidence for past avulsions includes such features as the existence of two channels down which altitude drops, the occurrence of ox-bow lakes (ponded water left in a curved lake, formerly a meander in the river), and the establishment of a new base-level for water flow (meaning, the river flows at a lower altitude after avulsion than before).

Evidence for impending avulsion would be the existence of a river flowing higher than its floodplain — not all that uncommon a feature, as rivers build up their banks as levees, as I noted above. This is especially prominent in the prairies, as deep-rooted vegetation (trees) tends to stabilise a river's banks, and the river bed builds up by sedimentation. In a flood, a break in the bank is immediately exploited by the raging river, and it flows down across the former lands on its bank, quickly carving out a new channel."

Aware of these fundamentals of avulsion, a surveyor engaged in retracing a river boundary is better equipped to appreciate the need for expert opinion.

THE OBLIGATIONS

The circumstances briefly: on completion of his survey of the Highwood River, Mrs. Wallace's surveyor registered his plan at the land titles office, helped Mrs. Wallace obtain a new certificate of title, and told the Robertsons (in response to a telephone enquiry) that a copy of his plan could be secured from the title office.

Duty of Care

The first question that arose was, to whom did the surveyor owe a duty of care? The court held that he had obligations to three parties: Mrs. Wallace, who engaged his services; Mrs. Robertson, the owner of the adjoining lands; and those who purchased the Wallace lands.

His obligation to Mrs. Wallace was clearly a contractual one. His obligation to Mrs. Robertson arose, said the court, because he was ..

"involved in determining a boundary around Mrs. Wallace's property. The boundary is not just of her property, but it also by definition deals with the boundary of Mrs. Robertson's property. She was someone directly in his contemplation as being affected by his work."

The surveyor's obligation to the purchasers (though he had never met them) arose from the fact that he

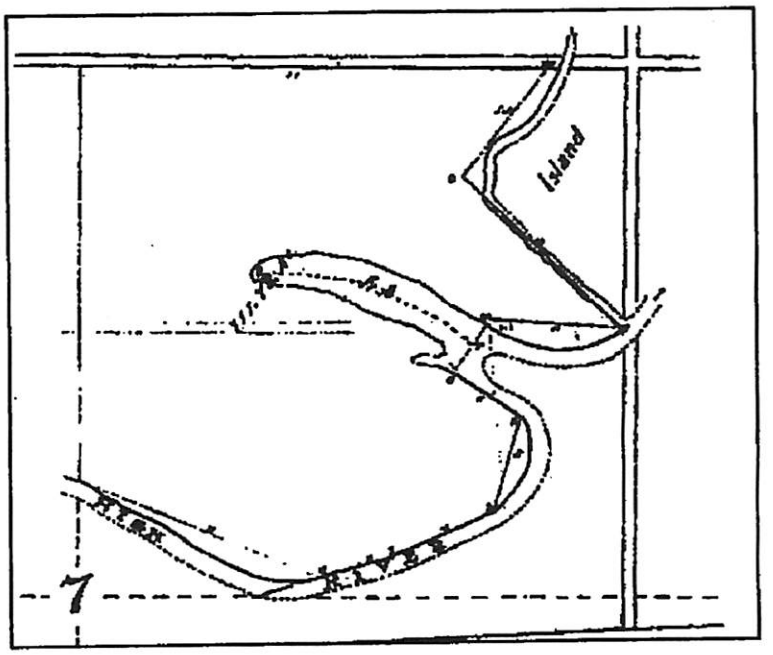


Figure 1

knew his survey was being made for the purpose of a sale and knew it would be relied on by these particular individuals.

Standard of Care

Next, said the court, came the question whether the surveyor:

"...had a duty not to proceed to register the plan at Land Titles, or actively assist Mrs. Wallace to obtain an amended title without advising Mrs. Wallace of the risk that his opinion could be challenged and the need to provide notice to the potentially affected land-

owner, Mrs. Robertson, before changing the description of the boundary...."

There was considerable testimony on this point from three surveyors who had been qualified as experts in survey practice and standards in Alberta. The Manual of Good Practice and the Code of Ethics were referred to. Not all agreed with each other in every matter of detail when testifying about the foregoing. But all did agree that a section from instructions ..

"applying specifically to surveys done for the Government of Canada"

.. does provide guidance in other situations.

"In any case of a disputed boundary, the surveyor can only advise the disputants and give his opinion as to the correct or most equitable position of the boundary. In addition to this, he should take care not to perform any act that might have the effect of prejudicing the case of either party. So long as the dispute continues, no surveyor can lay down the boundary since its determination is of necessity a judicial act and must be judged in court according to law after the hearing of evidence."[6]

The court found that the surveyor had breached his duty of care to Mrs. Wallace, to Mrs. Robertson, and to the purchasers.

Among other things, he had failed to advise Mrs. Wallace that he could provide his opinion about the boundary, but that opinion was open to challenge. In Mrs. Robertson's case, he ..

"actively took steps to make his opinion the description of the [Wallace] land."

And he broke a duty to the purchasers by ..

"obtaining a certificate for Mrs. Wallace, which he knew would be vulnerable to challenge by Mrs. Robertson."

Comment

The foregoing material summarizes issues that arose in a complex case whose reported decision runs to 38 pages of medium-sized print. A number of items, which deserve more attention in their own right, have simply been mentioned here in passing: e.g. whether a river boundary could be "frozen" in time, and the situation of the couple who were waiting to purchase the Wallace lands.

Izaak de Rijcke's synopsis of the Robertson case, *"Boundary Surveys and the Duty to a Client's Neighbours"*[7] also says something of the liability of the land titles registrar. Moreover, he sees the decision as timely at a point "when many jurisdictions in Canada are considering, or in the process of, converting land registry records to a form of land titles."

Whatever topic happens to be of interest at the moment, however, one must bear in mind that a case is only an authority for what it actually decided. The full reports of decided cases must themselves be read, so that one becomes aware not only of all the points at issue, but of the often unique statutory provisions that affect them.

Robertson occurred within a land titles jurisdiction, and much of it deals with what happened when a surveyor's plan of a disputed boundary was registered without a neighbour's knowledge. Would or could the outcome be the same within a land registry jurisdiction?

END NOTES

1. *[2000] 9 W.W.R. 141, Alberta Court of Queen's Bench. My thanks to Isaak de Rijcke, LLB, OLS for sending me a full copy of the reported decision.*
2. *Rockland Holdings Ltd. V. 309458 Alberta Ltd. (Feb 13, 1987), Doc. Calgary 8601-23704 (Alta. Q.B.) And Hawkes Estate v. Silver Campsites Ltd. (1991), 55 B.C.L.R.(2d)145(B.C.C.A.)*
3. *The well known Chuckry v. R. and Clarke v. City of Edmonton cases.*
4. *Presumably west of the 1890 oxbow in the river.*
5. *Assumed by Dr. R.P. Raeside, Acadia University, to be Dr. Gerry Osbourne, University of Calgary, "who is probably the top person in western Canada in the field of river mechanics."*
6. *Manual of Instructions for the Survey of Canada Lands, Chap. B7 at p. 58. For a more extensive quote from this section of the manual see Survey Law in Canada, p. 294.*
7. *Geomatica, Volume 54, No. 3, p. 348, 2000*

Computer Programs in the SLSA Office

By A. Carl Shiels, Executive Director

Over the past five years, the SLSA administration has been purchasing new computer programs, and updating existing ones, in order to increase efficiency and provide better service. From time to time, I will provide brief glimpses at some of these programs and how they are being put to good use.

CorelDRAW® 9.0 is just one of the graphics preparation and manipulation programs purchased recently

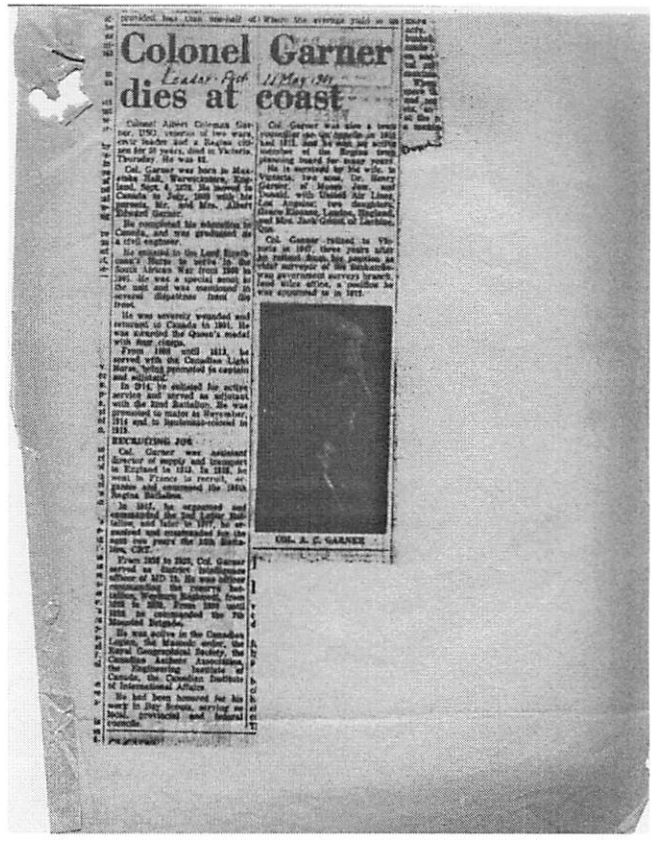
for the office. Although it is an extremely powerful graphics program, it is also being put to use in a 'spare-time' project to preserve the old member files of the Association.

Those who have been involved with the SLSA administration over the years will be aware that all of the original files of SLSA members going back to Commission #1 are housed as hard-copy files at the Association office. Some contain photos and newspaper clippings which have, over the years, started to turn yellow and become very brittle. To my knowledge, these are the only copies of the files so the information they contain is quite vulnerable to deterioration and even complete loss in the unlikely event of fire or water damage.

Corel Draw® 9.0 has a feature that allows it to import scanned images and place them in pages of a 'book'. It is this feature that is being used to preserve the old member files.

The contents of each member's file is being scanned into one or more 'books' depending on the number of documents in their file. The maximum number of pages per 'book' is arbitrarily kept to fifty to keep the file sizes managable. For normal text documents, the scanning resolution is set to 150 dpi to keep the file size to a minimum. However photos, many of which are the old portrait type (see next page), are scanned at 300 dpi - the maximum resolution of our scanner - for higher quality images and good quality print reproduction later.

Once each 'book' is completed, it is saved as a CorelDRAW® (CDR) document but it is also converted to a PDF file. This conversion can now be


Colonel Garner dies at coast

Death notice for Colonel A. C. Garner, SLS (Commission #3)

accomplished with a one-step process thanks to the latest version of Adobe's® Acrobat® Distiller™. When installing version 5.0 of Distiller™, one has the option of also installing it as a printer. In that way, any file prepared with a program that can print to a Windows® printer, can be 'printed' to a PDF file. Since PDF files are rapidly becoming one of the most common standards for large documents distributed on the Internet, almost everyone will be able to read and print these valuable old documents.

Eventually, when all the files have been converted to digital form, the PDF versions will be copied to CD's for archiving. (A so-called 'CD' burner is one of the items on my 'wish list' for the 2002 budget year.) One copy of these archive CD's - along with the hard-copy originals - can then be sent to the Provincial Archives for permanent and more secure storage.

Research historians such as Jack Webb, and family genealogists, will be able to get copies of the files of deceased members quickly and easily over the Internet by simply applying to the Association Office. But most importantly, these valuable old documents will have been duplicated and distributed for secure preservation for generations to come.

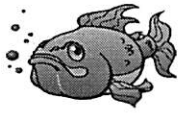
I would appreciate hearing from anyone who would like to assist in this project. The sooner it is completed, the better I will sleep!

Very high quality portrait of Colonol A. C. Garner, SLS (Commission #3)

A Fish Tale

A man was stopped by a game-warden with two buckets of fish leaving a lake well known for its fishing. The game warden asked the man, "Do you have a license to catch those fish?"

The man replied to the game warden, "No, sir. These are my pet fish."



"Pet fish?!" the warden replied.

"Yah, you bet. Every night I take these fish here down to the lake and let them swim around for a while. I whistle and they jump back into their buckets, and I take 'em home."

"That's a bunch of hooey! Fish can't do that!"

The man looked at the game warden for a moment, and then said, "Here, I'll show you. It really works."

"Oh. I've GOT to see this!:' The game warden was curious now.

The man poured the fish into the lake and stood and waited. After several minutes, the game warden turned to the man and said, "Well?"

"Well, What?" the man responded.

'When are you going to call them back?" The game warden prompted.

"Call who back?" The man asked.

"The FISH."

"What fish?" The man asked.

Continued from page 80 - "Councillor's Report"

Thompson spent the years from 1802 to 1806 travelling and trading from the Peace River area to Fort William on the shore of Lake Superior. He returned to Rocky Mountain House in the autumn of 1806, now a partner in the North West Company and anxious to fulfill the "Columbia Enterprise," the company's dream of a practical route to the Pacific and China.

In the spring of 1807 to avoid the Peigans. He went up-river from Rocky Mountain House, through the later named Howse Pass to the Columbia River where he built Kootenay House.

For the next three years he explored, surveyed and established trading posts in present-day British Columbia, Washington, Oregon, Idaho and Montana. In 1810, Thompson was ordered to reach the Pacific, "with all speed," to contend with the American effort. Early in 1811, Thompson crossed the Athabasca Pass and pushed on to the Columbia. Unavoidable delays prevented him from reaching the mouth of the Columbia River until July 15, 1811, four months after the Americans had arrived and built their post, Astoria.

During his 28 years in the fur trade, he had travelled 88,000 km. He had filled in the map of western Canada. His great map covered an area of 3.9 million square kilometres and parts of it were still being used into the 20th century.

Following the War of 1812, Thompson was appointed to the commission established to define the boundary between Upper Canada and the United States. Ill health and failing eyesight plagued his last years and prevented him from completing his memoirs of his western travels. Canada's greatest geographer died in 1857 near Montréal, in poverty and virtual obscurity.

If you have an opinion as to the Association helping to fund the monument at Invermere please contact the writer.

Continued from page 84 - "Iron Survey Post ..."

Dear Sir:

Thank you for your letter of January 16, 2001 regarding "Iron Survey Post Punctures Natural Gas Main."

Last year, Alberta Land Surveyors placed over 180,000 statutory iron posts. In addition, our members restored or re-established numerous other legal boundaries and corners. While safety is our concern as well, we believe that calling Alberta One Call is impractical, given the number of posts planted each year and the fact that Alberta One Call does not identify underground utilities to the same precision as required by Alberta Land Surveyors.

As we discussed, this issue was raised by Alberta Resource Development last year. At first, they too encouraged Alberta Land Surveyors to notify Alberta One Call and quickly realized the magnitude of the situation. During our discussion, the emphasis changed to promoting the different mapping series available. An article entitled Alberta's Rural Gas Distribution Pipeline System was written by Alberta Resource Development and published in the September 2000 issue of our quarterly magazine, ALS News.

Over the course of our ninety year history, the Alberta Land Surveyors' Association has worked with the oil and gas industry and many others involved with Alberta's natural resources to ensure that pipelines and rights of way and other interests in land are safely and accurately mapped, not only as to where they are supposed to be, but also as to where they are actually located.

As you can see, this is an issue that seems to transcend delayed posting subdivisions.

The Alberta Land Surveyors' Association would be pleased to work with ATCO Gas and others to clearly define the scope of the issue and find a practical and reasonable solution that will best serve everyone.

If you have any further details on the examples cited in your letter, I would be pleased to receive them.

Brian Mundy, Executive Director
Alberta Land Surveyors' Association.

Surveyors/Audiophiles

Review by Bill Glassey

Reprinted with Permission - The Evergreen State Surveyor, Summer, 2001

Sailing to Philadelphia
Mark Knopfler
©2000 Mercury Records (London)

I believe this is a major milestone for surveyors! An internationally known rock and roll artist has recorded a tribute to land surveyors. Mark Knopfler, former lead guitarist and vocalist for Dire Straits, has released a new album entitled "Sailing to Philadelphia". The title track is a moving celebration of Charles Mason and Jeremiah Dixon and their original survey of the Mason-Dixon Line. "Sailing to Philadelphia" is a sensitive and touching duet in the first person, with Mark Knopfler singing the part of Jeremiah Dixon and James Taylor singing the part of Charlie Mason. They seem to understand the calling and psyche of the surveyor.

Enjoy!

Sailing to Philadelphia

I am Jeremiah Dixon
I am a Geordie boy
A glass of wine with you, sir
And the ladies I'll enjoy
All Durham and Northumberland
Is measured up by my own hand
It was my fate from birth
To make my mark upon the earth...

He calls me Charlie Mason
A stargazer am I
It seems that I was born
To chart the evening sky
They'd cut me out for baking bread
But I had other dreams instead
This baker's boy from the west country
Would join the Royal Society...

We are sailing to Philadelphia
A world away from the coaly Tyne
Sailing to Philadelphia
To draw the line
The Mason-Dixon Line

Now you're a good surveyor, Dixon
But I swear you'll make me mad
The West will kill us both
You gullible Geordie lad
You talk of liberty
How can America be free
A Geordie and a baker's boy
In the forests of the Iroquois...

Now hold your head up, Mason
See America lies there
The morning tide has raised
The capes of Delaware
Come up and feel the sun
A new morning is begun
Another day will make it clear
Why your stars should guide us here...

We are sailing to Philadelphia
A world away from the coaly Tyne
Sailing to Philadelphia
To draw the line
The Mason-Dixon Line

(lyrics reprinted with permission)

Real Time Construction Staking

by D. K. Nasland, PE, PLS, and David Paul Johnson, PLS

Reprinted with permission from the California Land Surveyors Association website

Surveying has become a hightech discipline. This is a radical change compared to the 1950s, when surveyors developed skills on the job. Today we commonly use global positioning systems (GPS) for control networks and monitoring. However, many surveyors are still skeptical about its use for construction staking. There is legitimate concern over the heights or elevations returned by GPS receivers. We believe these can be managed with appropriate network design and project calibration.

Historically, surveying instruments have developed elevations referenced to the Geoid. When adjusted properly, the horizontal axis of a surveying instrument (level, etc.) is perpendicular to the pull of gravity, and therefore parallel to the surface of the Geoid.

The Geoid Surface is always perpendicular to the pull of gravity or in other words, always at right angles to the direction of a plumb line. However, with GPS, the Earth is modeled as a smooth regular ellipsoidal figure. Because any ellipsoid is a purely mathematical figure. It is not effected by the pull of gravity the way the geoid is.

A geoid height or Geoid separation is the amount of separation or distance from the mathematical ellipsoid surface to the gravity geoid surface. Because the geoid surface undulates up and down due to changes in gravity, geoid heights also fluctuate from one observation point to another.

Generally speaking, geoid heights for California are in the range of (-32 m) negative thirty two meters. This means the geoid is about one hundred feet below the ellipsoid in California.

When enough project bench marks are also observed with GPS, then GPS ellipsoid heights may be combined with geoid heights to develop reliable orthometer heights (a.k.a. elevations).

A little over a year ago, our firm was considering buying GPS receivers. While doing research, cost and billing projections, we talked with as many current users as possible. Real-time kinematic (RTK) equipment was just being released for the general surveying community, and one prominent GPS surveyor asked us why we would even want to use RTK.

We went ahead, but it has taken our firm some time to develop faith in a tool in which you cannot see or feel any part of the element being measured. Now we have completed a successful staking project, and we believe our experience will be useful to others. With help from the Trimble Organization, Sunnyvale, Calif., we developed the following procedures for this staking project.

We established a network of horizontally and vertically surveyed positions that accurately defined the site. We surveyed, using GPS, the same control points and developed instructions to be used in RTK that defined the geoid (gravity model) for this specific site. We set the construction stakes and validated the work in progress.

This staking project was a 250 acre site in Ramona, Calif. The subdivision approval process consumed more than 4 yr., and the final documents specified almost 200 acres as permanent open space.

Due to terrain and environmental considerations, there are only 20 home sites. Construction staking included almost 4,000 meters of private access roads and more than 5,000 meters of boundaries marked open space. We also staked the 20 pad sites and their access roads.

Several characteristics made this project ideal for RTK staking. First is the topography; the high and thick brush on this site is typical of coastal sage prevalent in Southern California coastal mountain slopes. There are shrubs, trees and sages that intertwine with adjacent plants, making it impossible to walk through at times. This tangle can limit visibility to less than 3 meters.

Traditional survey methods using optical instruments and chaining or electronic total stations would have required many instrument setups, high rods and a lot of brush cutting for sight lines. And marking the open space alone would have involved a significant amount of site control with conventional surveying methods. RTK minimized the number of setups and visibility problems.

We were required to mark the open space at each lot line and angle point no more than 90 meters apart. For practical purposes, we also had to mark the open space often enough so that the next point in line could be seen.

"RTK minimized the number of setups and visibility problems"

The second reason we decided to use RTK at this site was because the site was large enough to realize the benefits of the method. Also, the area had been surveyed and controlled rigorously in 1990 using conventional methods, so we were able to control and validate the RTK work.

The site topography includes several meadows separated by steep brush-covered hills rising more than 50 meters above the meadows, some of which also have high sage. The meadows will contain the access roads and driveways to each building pad. The building pads are designed to take advantage of the views and are placed as high on the hillsides as practical.

Local mapping requirements determined that we should base our project on the North American Datum of 1983 (NAD83). We had an abundance of first- and second-order survey control monuments in the area, so fulfilling this requirement was not difficult.

Twenty horizontal and vertical control points were previously established for use with an aerial photogrammetric mission. We positioned each point within a surveyed network that allowed some redundancy and used these for our current RTK GPS Survey.

First, we established a network that accurately defined the site. In general, the network can be an existing one or composed of newly established positions, but it should be readily accessible. The network should also nominally surround the working site. It should be designed, surveyed and adjusted with sound surveying practice.

Next, we surveyed, using GPS, the previously established control points. Then we resurveyed each position with RTK. We included enough redundancies to give satisfactory checks. We calibrated the survey to the published positions, set the construction stakes and made sufficient verifications to validate the work. We checked into the previously established control network and restaked several construction stakes for quality control. In some cases, we changed the rod height and measured the point just set. We then compared the vertical element of the stake to the design value.

Finally, if things did not look right, we found out why. These procedures are fairly simple. Because RTK is fast, we actually spent very little time in the checking mode. Most positions are established in only a few seconds.

CHECKING OUT

In 1990, our firm located all property monuments still existing and surveyed them together with vertical benchmarks into the site network. The methods from 1990 used total stations for the horizontal network and automatic levels for the vertical element of the control. We constructed 20 additional horizontal and vertical control monuments that we had used as photo control for an aerial mapping program. The new aerial control monuments were also properly spaced and sufficient in number to be used as the control for defining the geoid for our RTK project area. (See GPS Demystified).

In January 1996, we resurveyed each of the aerial-control points along with several first or second-order geodetic control points with real-time GPS methods. This operation took a little more than a day.

Our procedure was to set up a base receiver over one of the first-order stations and then occupy each of the aerial-control and geodetic points. After an initial tie was made at each point, we changed the antennae height by a set amount and retried the point. Each point took less than 2 or 3 min. including confirming satellite lock. Each occupation

results in two observations of the same point.

The varied terrain meant that we needed a dense radio network to traverse the project site without constantly moving radio repeaters. We rejected the option of a higher-powered radio due to the sharply changing terrain and used a low powered repeater layout that worked for us.

Production ranged from 1,200 to 2,200 meters per day of open-space layout. If we had used conventional surveying techniques, we estimate production would have been 500-1,200 meters, with much effort spent in clearing the line. We probably would have spent a lot of time assuring the line of sight between markers. Staking the pads and driveways was also rapid. The elevations returned by RTK were all within 2 cm of expected results.

We began the project with two Trimble 4000 SSE receivers. Trimble loaned us a new 4000 SSI so we could compare production. The difference was amazing. The SSI cut several minutes from the initialization time and also maintained satellite lock better, allowing the operator to work in thicker tree cover than before.
We had several nontechnical difficulties. There were many rattlesnakes, and a very heavy tick population, and we even discovered fresh mountain lion tracks. However, the crew took the proper precautions, wearing snake leggings and proper clothing as well as using repellent. We never saw the mountain lion, although there have been several attacks and one death within about 25 km of the site.

In the end, we staked this site as designed, and the results matched very closely with design expectations. We finished within our budget. No one was eaten by a mountain lion, developed Lyme disease or was bitten by a rattlesnake.

GPS DEMYSTIFIED

The GPS satellite network was initiated in 1978 by the Department of Defense and became a full constellation of 24 satellites in 1993. The satellites (the space segment) maintain closely monitored 12 hr orbits, approximately 20,000 km above Earth. They have radio receiver/transmitters that send updated satellite position information into individual satellites from Earth-based monitoring stations (the control segment) around the globe. The updated fixes are transmitted to GPS receivers, (the user segment) and are used for general navigation as well as precise long-distance geodetic measurement.

While civilian GPS receivers used alone for navigation purposes are only accurate to about 100 meters in any direction, multiple GPS receivers capable of geodetic measurement, used concurrently, can resolve positions consistently to the subcentimeter level. Using a method known as differential positioning, precise vector measurements between simultaneous GPS-receiver observation points can be applied to a solidly anchored (published record) point of beginning. This process renders subsequent precise positions for all observations points of that specific GPS survey. The three-dimensional position coordinates can be mathematically transformed into standardized state plane coordinates or a local job coordinate grid.

"There were many rattlesnakes, and a heavy tick population and we even discovered fresh mountain lion tracks."

RTK requires a radio link between each GPS receiver and the base GPS receiver. The base GPS receiver broadcasts its position along with satellite and time in data block. Roving receivers use the information in the data blocks to determine their position within about 1 cm in real time. If the receivers maintain radio link and satellite lock, horizontal and vertical positions can then be determined in seconds and used for construction staking purposes.

There are two ways to make the necessary radio link. One can use a high-powered radio to transmit GPS RTK base station information over an entire job site. The other choice is to use several low-powered radio repeaters linked together in order to relay RTK information from the GPS base station to the roving GPS receiver(s).

Generally speaking, each low-powered radio repeater will only cover a portion of a large job site because low-powered radios are somewhat limited to line-of-sight. On the other hand, high-powered

Continued on page 110

Madson's Compilation of Rules for Land Surveyors

Reprinted from the Minnesota Surveyor, Spring 2001

These rules were found in the Carver County Surveyor records of Carlisle Madson. They appear to have been written in the early 1970s. While some of these rules may not be supported by judicial findings, they are certainly general guidelines for a land surveyor to consider.

Rule One - To avoid liability the surveyor should err on the side of safety. Always try to do a little more than an ordinary prudent surveyor would do under the circumstances.

Rule Two - It is the land surveyor's duty to correctly locate and mark property lines as described in a deed furnished him (or her) and to relate lines of possession to title lines. The surveyor cannot and does not assume the responsibility of proving that a given deed is correct and legal; that is a function of an attorney or court of law

Rule Three - Search and search well! If it is there, find it. If it isn't, be able to say with certainty that it isn't there.

Rule Four - Liability results when the surveyor fails to do correctly the things that he (or she) purports to do.

Rule Five - The surveyor is a fact finder. He (or she) goes upon the land armed with all the documentary evidence that is available and searches for markers, monuments and other facts. After all the evidence, facts, measurements and observations are assembled, the surveyor must come to a conclusion from the facts.

Rule Six — Never set a corner (monument) in disagreement with improvements without first satisfying yourself that you are not only right, but that your right will prevail in court if necessary.

Rule Seven - Discovery of a another surveyor's monument does not relieve the surveyor of the obligation to look further. The found monument is only proof in the event that superior evidence cannot be discovered. Therefore, the surveyor must seek all other evidence and use the official monuments as though they were the last resorts.

Rule Eight - The conclusions that flow from the evidence may produce proof. Evidence in itself is not proof of a fact; a conclusion or inference that may be drawn from evidence is the proof. In coming to conclusions from evidence, the most important need of the surveyor is the ability to recognize and know what is the best evidence of that available.

Rule Nine - The best evidence of a monument's original position is a continuous chain of history by acceptable records, usually written and dating back to the time of the original monumentation. A found monument without a background history is of little value as evidence; and, a set monument is worthless if unidentifiable in the future.

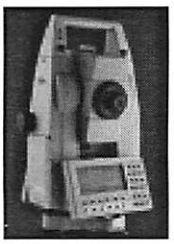
Rule Ten - In civil cases having to do with land surveying and real property, it is only necessary to prove a "preponderance of evidence;" it is not necessary to prove "beyond a reasonable doubt' as in criminal cases.

Rule Eleven - It is of the utmost importance that a surveyor seek and find all of the evidence at the time of the initial survey, and this must be done irrespective of costs. The major cause of disagreement between surveyors relates to the lack of discovery of all available evidence. If every surveyor uncovered all of the evidence, differences would be reduced to a minimum, and their surveys would have a finality of location!

Rule Twelve - A surveyor may be able to compute, make drawings, use instruments and stake engineering projects, but, until he (or she) understands property line law and law of evidence, he (or she) is not qualified to make property locations

Best of both worlds

Leica's new TCRAplus. Robotic and Reflectorless in one amazing package.



Robotic and reflectorless. Great new ideas but, until now, worlds apart. Leica Geosystems is the first to combine these two technologies into a single total station — bringing you the best of both worlds. Leica's visible reflectorless EDM lets you reach hard-to-get-to targets quickly and safely. With Leica's tight EDM beam — smaller than a dime at 175 feet — you know you're measuring with more accuracy and confidence than with any other reflectorless EDM. In addition, Leica's best-in-industry robotics really boost your productivity. Leica's new super-fast automatic target recognition is fast, accurate, and stays locked on target even in the roughest conditions! There are new robotic functions such as Check Backsight, instant switch to reflectorless mode, and more. And, of course, TDS onboard. To experience productivity and flexibility that's truly out of this world, call your local Leica Geosystems representative today.

You can also visit Leica Geosystems at www.leica-geosystems.com

Leica Geosystems

Leica Geosystems Ltd.	*Halifax (902) 468-5122*	*Québec (418) 527-9453*	*Vancouver (604) 278-3898*
Calgary (403) 253-6747	*Montréal (514) 422-9453*	*Toronto (416) 497-2460*	*Edmonton (780) 413-0791*

ALSA Post Sales

In the year 2000, the Alberta Land Surveyors' Association sold over 180,000 iron posts and 49,000 marker posts. It was the best year for post sales.

The weakest year, not surprisingly, given the state of the economy, was 1995. In that year, the Association sold only 112,000 iron posts and 30,000 marker posts. Given such variance in post sales, it can make budgeting difficult. Our expenses do not vary too much as the economy rises and falls (that is, the Association still has certain statutory obligations). Therefore, Council has been careful to ensure that the Association does not take on expenditures it could not afford when the economy slows down.

The strongest month for post sales is October. More iron posts are sold in October than any other month. In fact, in October 1997, 22,690 iron posts were sold. The second strongest month for post sales was September 1997 when 21,680 iron posts were sold.

The Association keeps a close watch on sales trends for post sales. In conjunction with Russel Metals, we try to project six months in advance what sales are likely to be based on post sales for the last six months and seasonal variations. This way, we try to ensure that Russel Metals always has enough pipe in inventory.

WCBE Moves

Effective June 1, 2001, the Western Canadian Board of Examiners (WCBE) is no longer located at the University of Calgary. The WCBE has moved to the ACLS office in Ottawa with Jim Simpson as Registrar. All inquiries should be directed to:

Western Canadian Board of Examiners
for Land Surveyors
c/o Association of Canada Lands Surveyors
1390 Prince of Wales Drive, Suite 400
Ottawa, ON K2C 3N6
Tel: (613) 723-9200
Fax: (613) 224-9577
e-Mail: board@acls-aatc.ca

Who Owns a Theoretical Road Allowance?

By Steve Yanish, ALS

From the ALS News, June 2001

There is some debate between municipalities and petroleum exploration companies regarding who is responsible for the administration of road allowances in Alberta. Some municipalities feel they are the administrative body for all road allowances.

For the purpose of the present discussion, there are three different types of road allowances: surveyed developed, surveyed undeveloped and unsurveyed (theoretical).

The title to all roads in Alberta is vested in the Crown. Indeed, the Municipal Government Act, Part 3, Division 2, Section 16(1) says, "title to all roads in a municipality, other than a city, is vested in the Crown in right of Alberta." However, in Section 18(1) of that Act, the Crown grants a municipality "direction, control, and management of all roads within the municipality." Clearly, municipalities have administrative authority of roads in their respective municipalities.

In the Government Organization Act, Schedule 14, Section 1, "highway or road means land used or surveyed for use as a public highway or road." Obviously, from this description, a surveyed developed road allowance is a road. Although a surveyed undeveloped road allowance is not used as a road, it has been surveyed and therefore, is a road. An unsurveyed (theoretical) road allowance is not used as a road and has not been surveyed. Thus, it is not a road.

To define whether a road has been surveyed, we must look at the Surveys Act and how land is surveyed in Alberta. Part 2 of the Surveys Act describes how a system of surveys shall be established in Alberta. Section 29 says:

> *"The Minister may direct that public land be surveyed under the supervision of the Director (of Surveys)*
>
> *(a) in the Alberta township system ... or*
> *(b) in lots of a size and shape and with allowances for roads that the Minister considers advisable."*

When new land is surveyed in Aberta, it may or may not be surveyed in accordance with the theoretical grid (township system). According to Section 30(3) of the Surveys Act,

> *"no land is considered to be surveyed until the official plan has been confirmed by the Director (of Surveys)."*

By examining official township survey plans that have been produced for over a hundred years, the surveys are rarely established according to the theoretical township system. Therefore, the locations of theoretical road allowances are simply part of an imagined reference grid used for positioning. This grid is no different than using a North American Datum (NAD) coordinate system or a military grid system for positioning.

In summary, because a theoretical road allowance is not surveyed and since the municipalities have administrative authority of surveyed roads only, responsibility for administering theoretical road allowances remains with the Crown. The location of the theoretical road allowance should have no bearing on the positioning of wells, access roads, pipelines or other surveys that define boundaries except to be used as part of the reference grid.

Check out these web pages:

- **www.ucls.org/cedu/sac.htm**
  (What is a Professional Surveyor?)

- **www.ca-surveyors.org/Articles/articles.htm**

Continued from page 103 - "Real Time ... Staking"

radios are better able to cover a larger job site and are generally not as limited when it comes to line-of-sight operation. Because the low-powered radios have a shorter range, they do not require a federal radio license, however, because of the greater range, the high-power radios require federal licensing.

D.K. Nasland, PE, PLS, is senior vice president of Nasland Engineering and a licensed land surveyor in Arizona, California and Nevada. D.K is a past president of the San Diego Chapter of CLSA. David Paul Johnson, PLS is a Trimble GPS salesman for Allen Instruments, the Founding chairman of the Southern California GPS Users Group, and a former seminar chairman for the Orange County Chapter of CLSA.

Continued from page 79 - "Council Highlights"

M. A. MacDonald - Practical Experience Report
His practical experience having been completed and approved, the Executive Director was to advise M. A. (Mark) MacDonald that he is eligible to write his professional examinations in April, 2002.

R. G. King/D. R. Hanson
Council approved a Land Surveyor in Training Agreement between R. G. King and D. R. Hanson, SLS.

Political Forum
The president explained that he would be attending the Political Forum in Saskatoon in October. Council agreed that it was appropriate for the President to continue developing the profile of the Association at the political level.

"David Thomson in Bronze"
Council considered a request from the Windermere Historical Society for a contribution to their project aimed at erecting a bronze monument to David Thompson and his wife. Council supported such a contribution subject to confirmation of the nature and extent of support from other survey associations.

The meeting adjourned at 2:30 p.m.

Great Imponderables

When an agnostic dies, does he go to the "great perhaps"?

Why is the time of day with the slowest traffic called rush hour?

Do you think Houdini ever locked his keys in his car?

Why is there a road sign that says "Braille Institute, Next Exit"?

Can atheists get insurance for acts of God?

If procrastinators had a club, would they ever have a meeting?

If the No. 2 pencil is the most popular, why is it still No. 2?

Have you ever wondered why just one letter makes all the difference between here and there?

When you go into a hotel, you always see reception. Why do you never just see ception?

If time heals all wounds, how come the belly button stays the same?

If a lawyer and an IRS agent were both drowning, and you could only save one of them, would you go to lunch or read the paper?

Isn't it strange that the same people who laugh at gypsy fortune tellers take economists seriously?

If genetic scientists crossed a chicken with a zebra, would they get a four-legged chicken with its own bar code?

If practice makes perfect, and nobody's perfect, why practice? Why is there always one in every crowd?

If all the world is a stage, where does the audience sit?

Who decided "Hotpoint" would be a good name for a company that sells refrigerators?

How do you know when it's time to tune your bagpipes?

Your Solution Company

LAND MEASUREMENT SYSTEMS INC.

Authorized Dealers Of:

• Seco • CST •
• Topcon Positioning Systems •
• Nikon Survey Systems •
• Site Products •
• Schonstedt Locators •
• Stoneblaze Vests •
• Thunderbolt •

Introducing The HiPer from TOPCON

As Low As $1058.00 Per Month (o.a.c.)

All in One

L1/L2 RTK Receiver, Antenna, Radio and Batteries. The whole package weighs less than 1.65 kg, and will last up to 20 Hours on a single charge.

Also Available: L1 Only.

Call us for your HiPer Demo Today!

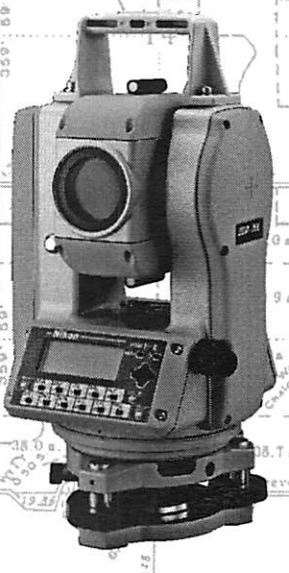
Ask Us About Our Trade Up Program

*We will pay up to **$5,000 US** for your Static receivers towards the purchase of a TOPCON Dual Frequency RTK Package.*

Nikon Reflectorless NPL-350

Major Features

- Coaxial focusing system reflectorless EDM
- 100 Meters Reflectorless
- 5000 Meters to a Single Prism
- 0.5 sec. high-speed tracking measurement time



As Low As $258.00 Per Month (o.a.c.)

LAND MEASUREMENT SYSTEMS INC.
3, 1915 - 32nd Ave. N.E., Calgary, Alberta T2E 7C8
Tel: (403) 291-9575 • Fax: (403) 291-9576 • www.lmssurvey.com
Toll Free: 1-877-291-7503

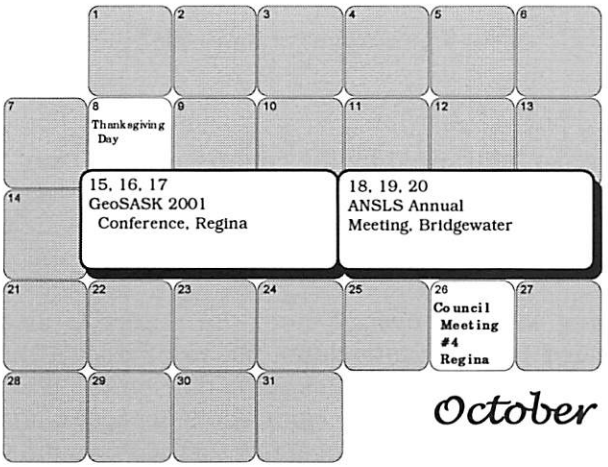
Continued from page 86 - "Survey Techniques"

In this regard be extra careful when searching plans through the new Land Titles SPIN (Survey Plan Index) system. The graphics of this system are from the provincial mapping base and cancelled plans, abandoned plans, and monument plans do not show up in the mapping base. What you see may not be all the plan information available. You will also have to check the plan listing to be certain there are no cancelled, abandoned, or monument plans in the area of your survey.

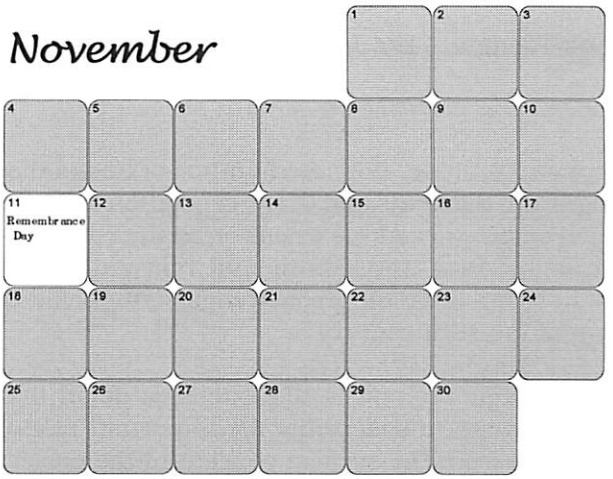
I also believe that Part E, Section 4, of the Manual of Standard Practice, Guidelines for Retracements and Restorations may be the most important part of our Manual. I encourage all land surveyors to review this section and apply the guidelines to your future re-establishments

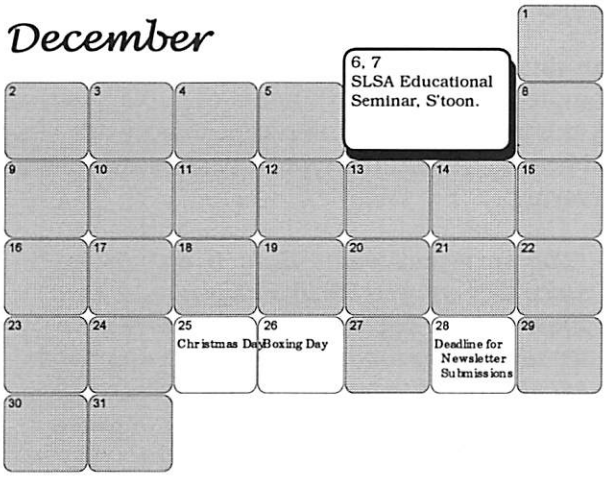
Looking Ahead...

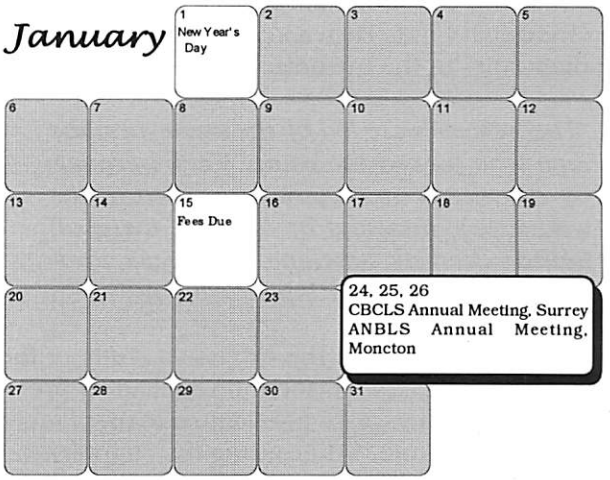
2001 - 2002

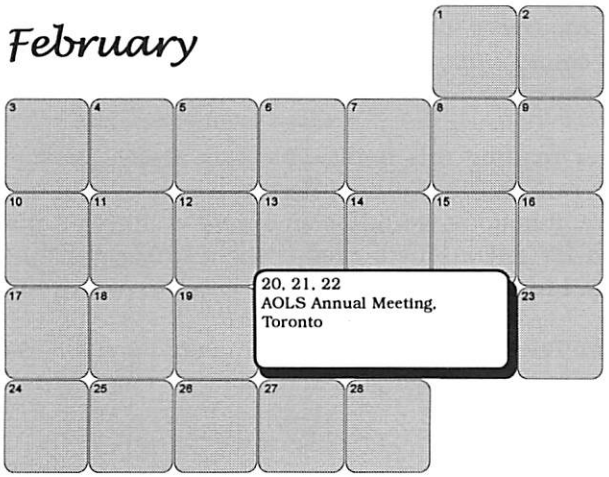


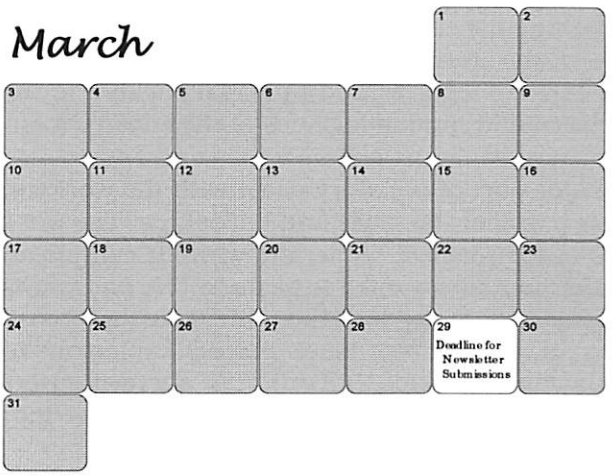
October











Nothing Like It In The World

The Men Who Built The Transcontinental Railroad 1863 -1869

Book Review - By John Freemyer, L.S.

Reprinted from the Minnesota Surveyor, Summer 2001.

Stephen Ambrose, the noted author of books that range from the Lewis and Clark expedition to World War II sagas, turned his attention to the construction of the first transcontinental railroad. A feat that he refers to as "the greatest engineering achievement of the 19th century."

Of particular interest is the extensive detail that Ambrose uses in describing the important role of surveyors from the earliest concept of the project to final completion when the Central Pacific Railroad met the Union Pacific Railroad just north of the Great Salt Lake. He wastes no time in describing their role. In the introduction he writes:

> *"The 'others' were led by the surveyors, the men who picked the route. They were latter-day Lewis and Clark types, out in the wilderness, attacked by Indians, living off buffalo, deer, elk, antelope, and ducks, leading a life we can only imagine today."*

Ambrose acknowledges the extensive study of the building of the transcontinental railroad in previously published books, but he wanted to dwell more on "how it was done." Alternating his chapters between the Central Pacific and the Union Pacific, he describes the progress of railroad planning and building. Instead of lengthy detail about any one aspect, the story is told in a rapid pace style, from the early visionaries and financial backers to the material and human logistics of the construction.

A major part of the story deals with the workers, their pay, their life style and hardships. The work was accomplished, "generally without complaint, by free men who wanted to be there." No one knows exactly how many lost their life, but there were many dangers. From black powder explosions to avalanches to hostile Indians. The surveyors were said to be "careless of danger" in part because they were so "entranced by the country around them." In one described incident, a lead surveyor "wandered away from his party and was caught by a band of Arapahos. He was riddled with arrows."

Along with the overall story the reader is also treated to many interesting pieces of trivia. One such piece deals with the origin of time zones. "What is called 'standard time' came about because of the railroads. Before that, localities set their own time. Because the railroads published schedules, the country was divided into four time zones."

With this book, Ambrose may have done more to promote past accomplishments of surveyors than any other noted author is recent history. It's clear that he understood the type of person attracted to surveying.

> *"The surveyors came first. It was fitting, since they enjoyed life in the open more than most men. They were like the early-nineteenth-century mountain men, adventurous, capable of taking care of themselves, ready for whatever the wilderness threw at them. They were out in front of civilization, enjoying the views, the air, the campfire, the game cooked over it, drinking pure water from the rivers, creeks, and lakes, exploring the country, mapping it. For the surveyors it was pure joy."*

After reading this book, you may always look at our railroad in a little different perceptive. In any case, this book would be an excellent library addition for anyone with even a slight interest in history. I highly recommend it.

John Freemyer, LS, is a Carver County Surveyor and past editor of Minnesota Surveyor.

All The Best Tools. All In One Place.

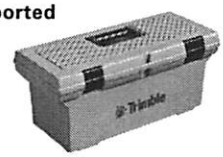
GPS TOTAL STATION® 5700 | eRTK GPS SYSTEM | DINI® DIGITAL LEVEL | TSCe™ CONTROLLER | GEODAT® WIN CONTROL UNIT | TRIMBLE GEOMATICS OFFICE™ SOFTWARE | TERRAMODEL® DESIGN SOFTWARE | 3000 MECHANICAL TOTAL STATION | 5600 ROBOTIC TOTAL STATION | DR200+ REFLECTORLESS TECHNOLOGY

Buying survey gear just got a lot easier. Because now the innovators who brought you the first EDM, the first Robotic Total Station, and the first RTK GPS system have joined forces to bring you the most complete and integrated set of surveying tools in the world. From digital levels and robotic total stations to real-time kinematic GPS receivers and GIS handhelds, everything you need to speed your projects from concept to completion is available from a single source.

We call this unified product offering the "Trimble Toolbox"– a totally compatible toolset built with the latest in survey technology and designed to streamline your entire workflow. Our universal controllers let you switch between conventional and GPS instruments with "plug and play" simplicity. GPS and terrestrial measurements are automatically correlated and combined into a single dataset.

In the office, a single software application handles all your data reduction and processing needs, accepting measurements from ten different types of instruments and automatically translating your data into over a hundred different CAD, survey and GIS formats.

With the Trimble Toolbox you've got one compatible system and one software environment, all supported by one global company committed to a single goal: making you the most productive surveyor you can be. What could be simpler?



The Trimble brand now includes Geodimeter and Zeiss Geodetic Systems.

WWW.TRIMBLE.COM

Trimble

SPECTRA PRECISION

Spectra Precision is now part of Trimble

TRIMBLE CANADA LTD., ENGINEERING AND CONSTRUCTION DIVISION (416) 252-4691 FAX: (416) 252-8635

Sokkia Survey-Grade GPS System

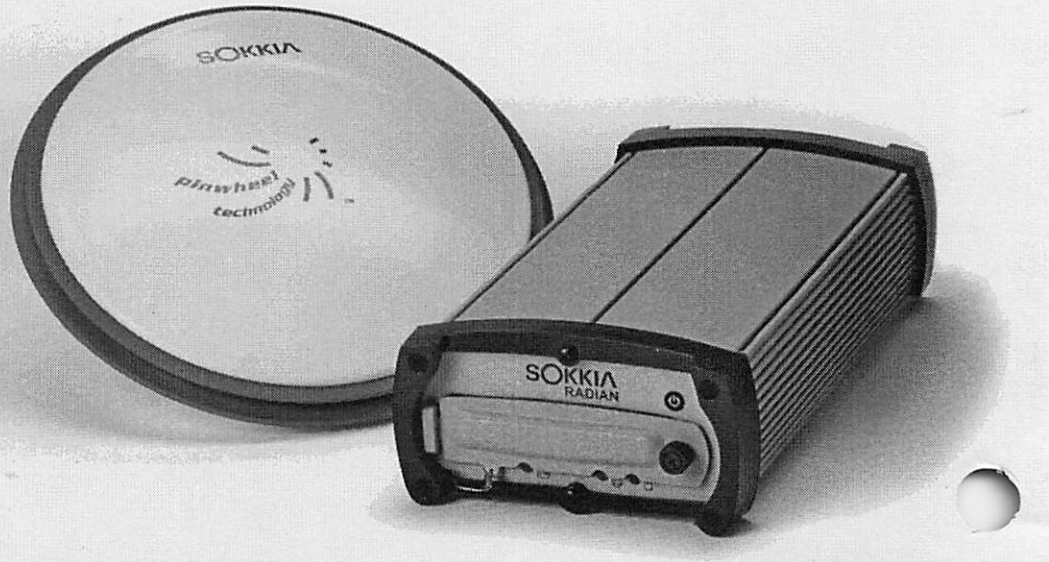
A flexible system designed for post-process and real-time (RTK) surveying applications

Real-Time Promotion!

Now, you can get a full dual-frequency RTK system at single-frequency receiver prices!
Sokkia is offering Radian RTK systems, complete with radio kit and

RTK controller, for only **$41,995** cdn

Monthly payments as low as **$1299**
(on approved credit)*



New SK-600 antenna with "Pinwheel" technology – less than 1mm phase center offset for super-accurate positioning.

Sokkia Radian RTK Package Includes:

Two Radian receivers, upgraded to dual-frequency and RTK options
Base Radio Kit
Rover Radio Kit
Base Radio Power Kit
RTK Controller
(*SDR33 RTK 2MB, or TDS FS/3 with Survey Pro GPS)

*Price based upon 36 month financing at current market rate, subject to change. Taxes not included. Financing available through Sokkia Credit Corporation. Other options may apply. Offer valid August 1, 2001 through October 31, 2001. This offer not valid in combination with any other promotion, some restrictions apply, offer subject to change at any time.

GPS technology can improve the way your organization conducts business, but your job needs may vary. That's why Sokkia's Radian and Radian IS survey GPS products are now available in three firmware options: single frequency L1, dual frequency L1/L2, and dual frequency L1/L2 with RTK capability. This newly expanded product line offers "scalable" solutions, designed to meet the needs of your current scope of work, while offering you the flexibility to expand in the future.

SOKKIA www.sokkia.com

Local Sokkia Office, SOKKIA CORPORATION
1412 Home Rd. N.W. Calgary, Alberta, T3B 1G7
Tel: **403.286.9002** Fax: **403.286.7565**
rene.boudreau@sokkiacorp.com