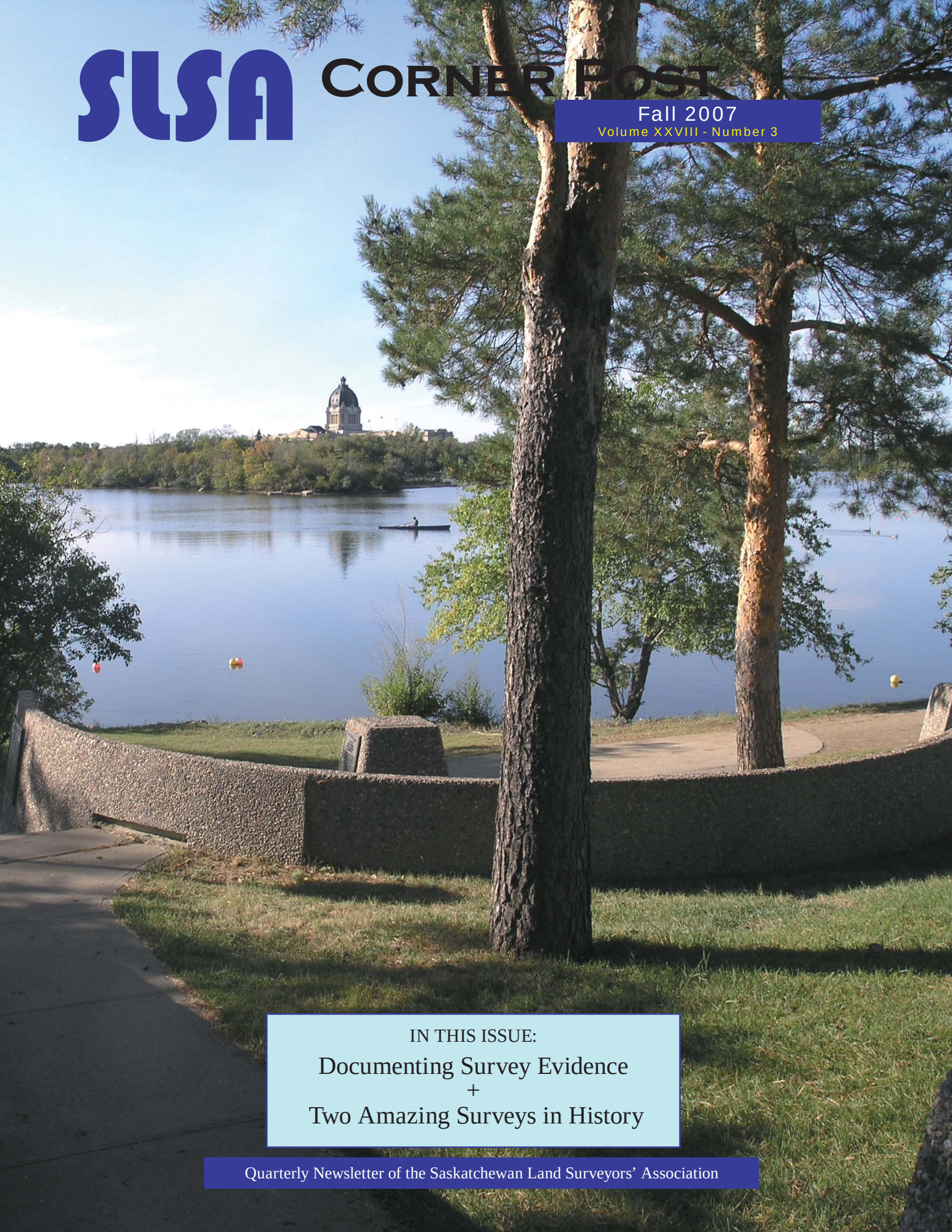
SLSA Corner Post

Fall 2007
Volume XXVIII - Number 3



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Quarterly Newsletter of the Saskatchewan Land Surveyors' Association

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SLSA Corner Post is published by the Saskatchewan Land Surveyors' Association for circulation to its members.

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

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Office Hours

Office hours are:

9:00 a.m. to 12:00 p.m.
1:00 p.m. to 4:00 p.m.

on all regular business days.

In this Issue

In This Issue

Regular Features

Cover Story

The Surveyors Monument (foreground), on the south shore of Wascana Lake in Regina, enjoys increased attention because of its proximity to the new Wascana Lake Lookout on Pine Island. Most of Wascana Park is seeing more pedestrian and cycle traffic since the "Big Dig" project in the winter of 2004 - 2005 when the lake was deepened and much of the shore line re-developed to make it more functional and user friendly.

The Surveyors' Monument - which is described in detail on the SLSA web site if you click on the transitional image of the old-time/modern age surveyor - is one possible candidate for enhancement during the 2010 Centennial Anniversary of the SLSA.

President's Message

R. Dale Rosnes
SLS, P. Surv.
President

Upcoming Events

Oct 11 - 13	ANSLS AGM, Ingonish, NS
Feb 28 - 29	ABCLS AGM Kelowna, BC
Apr 24 - 26	ALSA AGM Lake Louise, AB
May 5 - 8	ACLS AGM, Victoria, BC
May 8 - 10	ANLS AGM, St. John's, NL
May 29 - 31	SLSA AGM, Cypress Hills, SK

The summer has come and gone. We have enjoyed a bountiful harvest of tomatoes, beets, beans, peas and other favourites.

I would like to welcome Jill Burridge (nèe Cheverie) as the first woman land surveyor since the SLS Association was established in 1910 and incorporated in 1913. Jill received her SLS commission No. 293 on August 13th.

Many of our sister associations have also had women join the profession of land surveying. In January 2005, Teresa Myrfield received BCLS commission No. 773, a hundred years after forming an association of land surveyors in that province. In Alberta, Jarmila Maria Satrahas received ALS commission No. 403 in 1976. I articled for a short time under Judy Morrison, who was the second woman to receive a commission (No. 428 in 1977) as an ALS.

One of Judy's quotes that has remained with me was *"The most important piece of equipment a surveyor has is a shovel."*

Lesley Ewoniak received her ALS commission No. 758 in Feb 2006. In a June 2006 ALS News article, she wrote that the number of *"women commissioned or registered as articling students with the Alberta Land Surveyors Association account for only 11.5% of the total membership and only 2% of the Association of British Columbia Land Surveyors' membership."*

It is indeed satisfying to know that women are seeing land surveying as an attractive profession. I believe we can look forward to seeing more women getting involved with the association.

The Saskatchewan government has officially given a "thumbs down" decision on joining the trade investment and labour mobility agreement (TILMA). Government Relations Minister Harry Van Mulligen indicates that Saskatchewan is committed to improving internal trade by working with other provinces and territories to strengthen the national Agreement on Internal Trade (AIT). It remains to be seen whether the government revisits TILMA in the future. Other provinces are looking at this issue, and the future for this province may hinge on what happens among them.

The association received a letter from Minister of Justice and Attorney General Frank Quennell, indicating that he is not prepared to make any pronouncements with respect to riparian rights. He believes that the issues of riparian rights should be addressed on a case by case basis. He has invited us to contact the government agencies or departments that are directly in charge of this.

The AMLS 127th AGM took place in Winnipeg on Sept 19 - 21 at the Holiday Inn Airport. A charity golf tournament took place at Kingswood golf course located in La Salle, approximately 15 miles south of Winnipeg. It was the first time I participated in a land surveyors golf tournament. I was concerned about hitting my ball across a couple of ominous looking water hazards, but overall I enjoyed the experience. SLSA members Jack Webb and Walter Volohatuke, also attended the meeting. Wilson Phillips was elected President, and Steve Bossenmaier was elected Vice-President.

Presentations were given on CCLS initiatives, TILMA and Digital Plan submissions. Halia and I as well as other visiting delegates enjoyed the kind hospitality of Irene and Les McLaughlin. Everyone enjoyed playing pool at the Triple B's.

My next trip is to the scenic Cape Breton Highlands for the 57th AGM at the Keltic Lodge Resort in Ingonish Beach, Nova Scotia from Oct 11 -13.

Congratulations Jill S. Cheverie,
SLS Commission #293.
Jill was able to file one (unregistered) plan before her last name changed to Burridge

Jill S. Cheverie, SLS, P. Surv.
Commission #293

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Council Highlights

Carl Shiels, M. Sc., P. Eng.
Executive Director

2007 – 08 Meeting #2 - Aug. 13, 2007

- Having met all of the requirements for a receipt of a commission, Council granted Jill Susanne Cheverie commission #293. It was agreed that a press release would be prepared announcing the fact that Jill had become the first woman to be granted a commission by the SLSA.

2007 – 08 Meeting #3 – Sept 10, 2007

- TILMA - Both the government and the main opposition party (Sask Party) had announced their intention not to pursue the TILMA agreement with Alberta and British Columbia.
- Riparian Rights - A letter was received from the Attorney General which rejected SLSA's request to make a clear statement on the status of Riparian rights in Saskatchewan. Various options on how to pursue the matter further were considered. One question that was raised was "Where are we starting from" (i.e. what riparian rights exist now given that the water levels in most water bodies in the province have been artificially altered.) Based on the resolution from the 2007 AGM, it was clear that the membership would not expect the matter to be dropped. It was agreed that a task force, headed by R.B. Shrivastava, would be assigned to research the matter in more detail and prepare a position paper for presentation to the Attorney General and/or the court at the first possible opportunity.
- Surveys In Error - A member had recommended that clarification be sought regarding the responsibility for correcting errors in surveys by former members. Based on the information provided by the Controller of Surveys, it appeared that this issue would be addressed by the new fund that ISC was about to establish for correction of survey errors and restoration of certain lost or damaged monuments.
- Land Surveyor in Training Agreements between Prakhar Shrivastava and W.W. Stockton, SLS, and between Gerald Johnson and E.H. Seis were approved.
- A need was identified to have a clear statement on how the funds generated through the volunteer sales of survey monuments will be allocated. There was tentative support for its use to enhance the profile of the survey profession and increase the interest of students in the land survey industry. The Executive Committee was tasked with coming up with more detailed criteria for the use of the funds.
- Board of Examiners - Council accepted the resignations of D.L. Gurnsey and G.A. Webster from the Board of Examiners and extended their appreciation for the dedication and hard work of both of these members during the formative years of the SLSA-administered Board.

  It was also agreed that efforts should be made to increase the number of Board members to at least ten as a way to reduce the work load of any one Board member, to provide a better succession arrangement, and to minimize problems of conflict of interest when setting and marking exams.

New Board of Examiners Chairman, Ed Desnoyers, SLS, P. Surv.

The Board of Examiners for Saskatchewan Land Surveyors is pleased to announce the election of E. F. "Ed" Desnoyers as Board chairman. Ed will head up an expanded Board now consisting of eleven members including:

Dan Babiuk	Mark McDonald
Barry Clark	Bob Pattison
Ron Eichel	Wilf Peters
Alan Jensen	Morley Seis
Murray Marien	Mike Waschuk

The SLSA Council increased the size of the Board to help minimize any issues related to conflict of interest and to create a succession plan for retiring Board members.

Note: Council subsequently added five new members to the Board of Examiners through an e-mail ballot. They are E.F. Desnoyers, R.J. Eichel, M.A. McDonald, R.P. Pattison and M.L. Waschuk.

- There was some initial discussion regarding the 2010 Annual General Meeting.
  - There has been tentative confirmation that Government House would be available to host the President's Banquet. All that is required is submission of a formal request with specification of the date.
  - Based on the resolution from the 2007 Annual Meeting, the date of the 2010 AGM should probably be some time in March.
  - There is a need to start more detailed planning soon.
  - Plans should include encouraging members and their spouses to dress in period costumes.
  - A special centennial edition of the SLS Corner Post could be prepared with free distribution to all land surveyors in Canada funded by additional advertising sales.
- The next education seminars would be held at the Travelodge in Regina on November 29 & 30, 2007. A full day of seminars was also being planning in conjunction with the 2008 AGM in Cypress Hills.
- The P.R. Committee has already committed to promote careers in the land survey industry at career fairs in Assiniboia, Swift Current, Maple Creek, Estevan, Weyburn, Regina and Saskatoon. Other opportunities will also be sought.

WE GOT MAIL!

Dear Editor:

I would like to congratulate the editorial staff of the Corner Post for putting together a great summer issue. The articles and information on Riparian Rights were particularly interesting and informative. With regard to the letter from our president to the Attorney General, I hope our association does not let this issue die. Perhaps we will get a more positive response after the next election.

In 2004 we surveyed a well-site on the Onion Lake Indian Reserve. The particular quarter section had been transferred to Reserve status as a Treaty Land Entitlement selection. In the transfer agreement the bodies of water have been retained by the province. When we plotted Lake No. 10 from the township plan it appeared to encroach on part of the lease area.

Through the Regional Surveyors Office we were able to obtain a copy of Article 6 of the Saskatchewan Treaty Land Entitlement Act (1993, C. 11). Section 6.03(a) reads as follows: "The boundary of the Entitlement Reserve shall be the Ordinary High Water Mark for such water body". When we established the O.H.W.M. on the ground the bank of Lake No. 10 was some distance from the well-site and the well-site was therefore entirely on Reserve lands.

One must then ask the question, "Why is T.L.E. land treated differently from other land by the province and in particular by the Department of Agriculture & Food?" The answer to this question is quite simple. If a dispute were to arise in the future the province knows that the Feds would not hesitate to go to court and the province knows that it can't win.

The issue of Riparian Rights in the province needs a final resolution and I hope the SLSA can be instrumental in making this happen.

Yours truly,
Wayne Stockton

Period Dress for the 2010 Centennial Anniversary AGM

Imagine 100+ men and women strolling up to Government House in Regina all dressed in styles from 1910. The media would have a hay day!

For that to happen, planning will need to start now. Get your spouse/partner involved. First, we need to know what 1910 fashions looked like. Please pass along any photos, websites, pattern catalogue leads etc that would help both professional and amateur seamstress get started. These will all be added to the SLSA website. One important hint - no zippers! They weren't invented (by a Canadian) until 1913! A couple of website found so far are:

www.vintageblues.com/history_main.htm
www.costumegallery.com/1910/Men/Suits/

Councillor's Corner

Jade McLeod
SLS, P. Surv., P. Eng.
Councillor, Year 1

"A First for Saskatchewan?"

I recently returned to somewhat familiar surroundings, taking employment with Midwest Surveys Inc. in Regina. Familiar it is, in that earlier this year Harding, Boss and McLeod Surveys Ltd. joined Midwest. I graduated from the University of Calgary in 2000 and obtained my SLS commission in 2004 while employed by Harding, Boss and McLeod.

In 2005, I took a position with Caltech Surveys Ltd. and remained there until my recent move to Midwest. I would like to thank Caltech and in particular Mark MacDonald, Justin Meyer and Conrad Swenson for my introduction to the world of oil and gas surveying. I am quite fortunate to have had exposure to both sides of our industry at such an early stage in my career.

Late last week a developer client contacted Harding, Boss and McLeod with an interesting situation. An excavator, working for a builder, unearthed a vertical section of steel casing while digging a basement for a new residential home. Our client asked if it was possibly an abandoned oil well.

Abandond oil well in centre of basement excavation

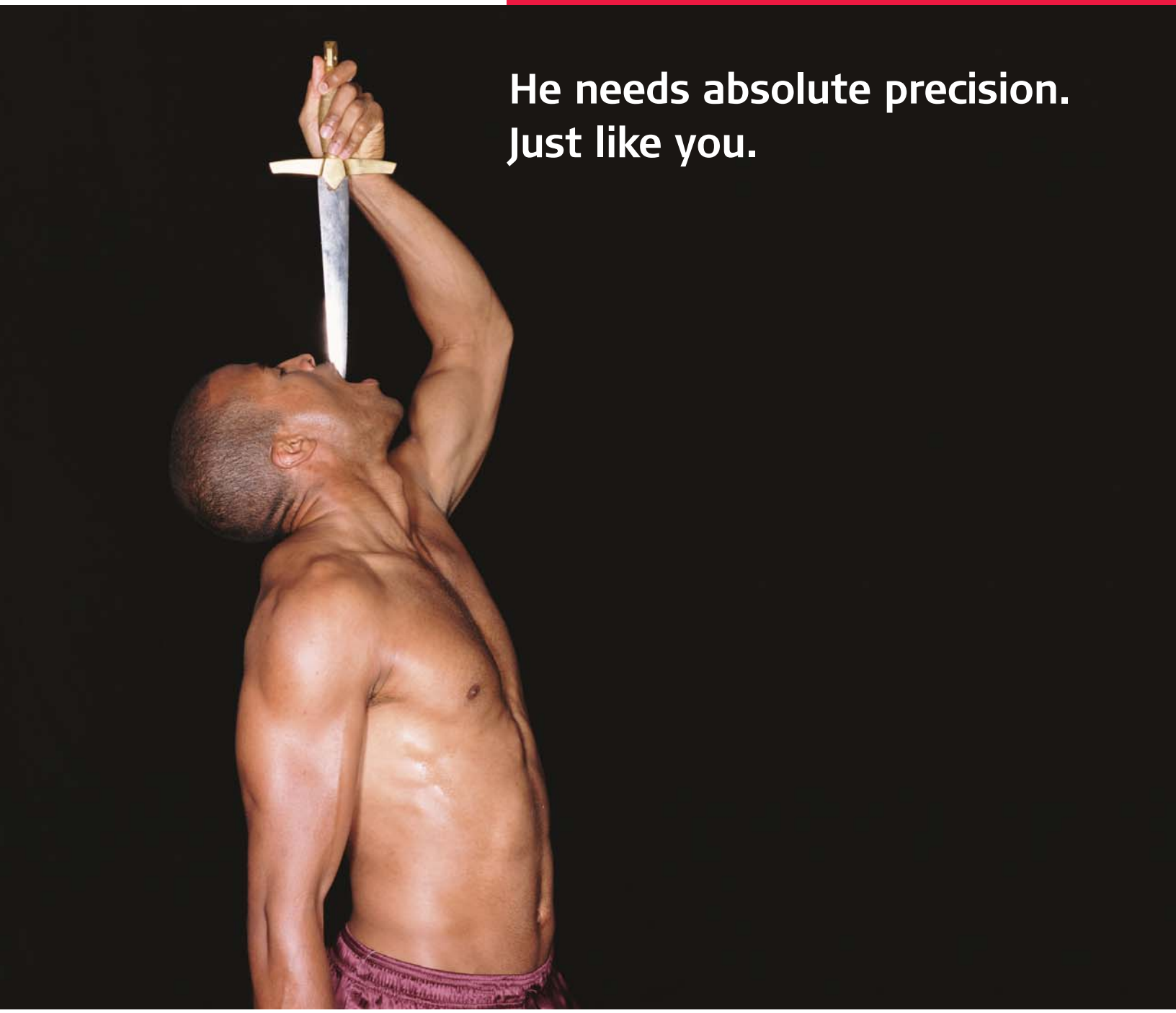
I went to the Saskatchewan Oil and Gas Info Map to see if there was an abandoned oil well in that area. Sure enough, there was one in that quarter section. By looking at the coordinates; it certainly seemed possible that the excavator had indeed uncovered the abandoned well. To confirm matters, I ordered the well site plan, the receipt of which brought an end to the speculation.

This situation led me to recall a presentation that I had seen on the Saskatchewan Orphan Well and Facility Liability Management Program. The program, which was to go into effect in spring/summer 2007, was designed to deal with the abandonment and reclamation of wells and facilities where the owner no longer exists or cannot be located.

After making a couple of phone calls, I reached someone at Saskatchewan Industry and Resources (SIR) who is closely involved with the program. Following our discussion, this individual felt that the program may indeed apply to this situation. I proceeded to inform our client of the program and passed on the necessary contact information.

Unfortunately SIR seems to be backing away from covering the costs of remedying the situation as they believe that it may be possible to locate the original owner somewhere in the United States. Our client is presently awaiting a meeting with SIR later in the week. In the meantime, attention has shifted towards cleaning up the site to meet environmental standards as well as to the removal of a portion of the steel casing to allow development of the area to proceed.

Undoubtedly this should have been discovered during the planning stages. Without an interest on title leading to the investigation of such a possibility, one certainly would not expect to come across an abandoned oil well while working in an area that seems so far removed from oil and gas development. Surely if Community Planning had referred the application to SIR, this would have been noticed and dealt with earlier on. Obviously the seemingly remote possibility didn't cross their minds either.



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Island Enjoyment

By Alec McEwen

Reprinted from *"Geomatica" Volume 61, No. 2, 2007*

In *Frank Georges Island Investments v. Nova Scotia (Attorney General)* (2004), 23 R.P.R. (4th) 157, Mr. Justice Moir of the Nova Scotia Supreme Court pointed out that:

> *On all shores of this province, uninhabited islands near populated areas frequently entertain visitors. ... Such a commonplace activity only shows that the island is uninhabited, and not that the island is "being thrown open to the public".*

The preliminary issues to be determined in this case, which concerned an application by the plaintiff for a certificate of title under the *Quieting Titles Act*, R.S.N.S. 1989, c. 382, were whether intervening local residents could establish a legal interest in an island they visited for recreational purposes, whether the island had been dedicated to the public and, more doubtfully, whether the residents' enjoyment of the island constituted an established custom.

Frank Georges Island lies close to a peninsula near the village of Seabright on the east side of St. Margaret's Bay on Nova Scotia's south shore. The plaintiff claimed title on the basis of a grant of the 60-acre island by Governor Charles Lawrence to Captain John Rous, a member of his Executive Council, in 1756. Alternatively, the plaintiff claimed ownership through its adverse possession since the date of a conveyance in 1999, a period to which it tacked on the possession of previous occupants. It should be noted parenthetically that under section 21 of the *Limitation of Actions Act*, R.S.N.S. 1989;c. 258, the Crown's right to recover land is extinguished unless it brings an action within 40 years after the time when the right first accrued.

The plaintiff asserted that an 1810 deed conveyed "Rouse Island" to George Boutilier and that it passed in 1821 to Francis George Boutilier, for whom the island appears to be named. The plaintiff's claim of title derives from the Boutilier family which occupied the island and maintained a home and other buildings there for many years. The Crown denied that the island was ever granted to Rous in 1756, and argued that the trespasses that have occurred there occasionally do not support a finding of adverse possession. The Attorney General, as mandatory defendant under a quieting of titles application, is reported to have said that:

> *From time out of mind the Island has been regarded as, and used by the public as a "pleasure island" and has been freely trespassed upon by members of the public who have used the Island in a manner consistent with public enjoyment of Crown lands generally and in a manner not inconsistent with Crown ownership of the Island, but inconsistent with any asserted private ownership of the Island.*

Mr. Justice Moir emphasized, however, that the question of title to Frank Georges Island is a matter to be determined by trial and "is not important to the decision I have to make", which concerned only the application by the interveners, whose appearance before the court was supported by the Attorney General.

The ten interveners who appeared in court (reduced from almost four dozen persons who originally filed statements of intending attendance) and who lived in the Seabright area or owned property there, gave evidence through oral testimony or affidavit that they used Frank Georges Island for recreational purposes, as did youth groups and other community organizations. The evidence included an assertion that no one had lived on the island for 30 years, which conflicted with a reference to a fishing shack and an aquaculture operation that were there from 1990 until about 1996. One expression of concern was that the proposed subdivision and development of the island would adversely affect the local environment and the personal enjoyment of the interveners' properties.

Section 10 of the *Quieting Titles Act* (the long title of which is An Act to Provide for the Judicial Ascertainment or Rights in Real Property) provides for intervention in quieting of titles actions:

> *10(1) Any person, who thinks that he may be affected by the claim for the certificate, may be heard on the application for directions and may be permitted to intervene as a defendant at any time, by the court or a judge, but shall not be permitted to contest the claim unless the person is added as a defendant.*

10(2) The person shall apply to a judge in chambers to be made a defendant after giving two clear days notice of application to the plaintiff, and the judge shall permit the person to intervene as a defendant unless it is clear that the person has no interest that may be affected by the proceedings.

The question to be, determined by the court is the meaning of the word interest.

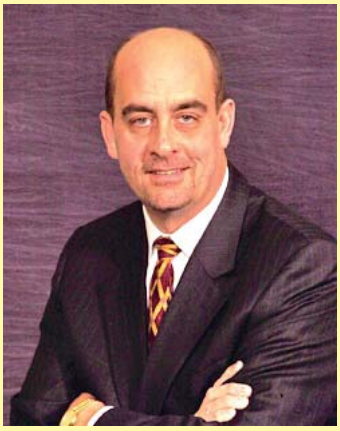
After much consideration of the historical context and purpose of the *Quieting Titles Act*, including references to the use of the word *interest* in other sections of the statute and in additional authorities, Mr. Justice Moir concluded that the word "has the primary sense involving a right, title, claim or legally protected share in something" and that the interveners had no such interest.

The judge found no suggestion that the interveners had any claim to the island or any part of it under a grant, nor could they claim adverse possession because none of them asserted ownership. Prescriptive rights of way could not be claimed because the applicants' lands are separated from the island by a body of water. In his view, the only avenue for inquiry is whether the island is subject to privately enforceable public rights. Those rights would arise only if the island could be shown to have been dedicated to and accepted by the public for use as a park. Since no evidence of such dedication and acceptance was offered, any claim based on it must fail.

Finally, the court considered the possible existence of a customary title to Frank Georges Island. Under English common law, custom must be shown to have existed since "time immemorial" or "during the time whereof the memory of man runneth not to the contrary," a date that was fixed by a 1275 statute as September 3, 1189. That requirement obviously has no application to Canada, nor has a Canadian court ever decided what might constitute time immemorial in this country. The beginning of legal memory would, however, have to be earlier than the period to which the applicants refer, because Frank Georges Island was inhabited under at least a colour of title in the nineteenth and early twentieth centuries and was not being used a park by the local public in those days.

In dismissing all ten applications, the judge declared that the only ways by which Frank Georges Island could be a public park would be by statute, deed or dedication, all of which were clearly excluded in the present case.

New President of ISC Announced



Scott Hodson

Information Services Corporation (ISC) of Saskatchewan recently announced Scott Hodson as its Acting President and Chief Executive Officer (CEO). Hodson joined ISC in 2004 as the Director of Customer Services and later rose to the position of Chief Customer Officer (CCO), a position he continues to hold with his new role. As CCO, Hodson remains responsible for customer service excellence, achievement of growth strategies and brand and product development.

Hodson assumed his role as acting President and CEO of ISC July 26, 2007, following the resignation of Mark MacLeod after a successful five year tenure as President and CEO. Under MacLeod's leadership, ISC had three consecutive years of profitability.

The corporation also established a good working relationship with the SLSA during that time. MacLeod actively sought feedback and listened to surveyors' suggestions about improving the system, and went further to support the Association's education system through the contribution of $10,000 towards the establishment of an education crate.

MacLeod also assembled a senior management team focused on the areas of financial management, customer service delivery and product innovation.

Hodson plans to continue on a similar path in the future, with emphasis on customer service and growth.

GIS In Saskatchewan

By John Potter, P. Eng.

Reprinted from "Geomatica" Volume 61, Number 2, 2007

Over the last two years Saskatchewan has been steadily advancing its mapping and geomatics agenda in alignment with government program requirements. Saskatchewan operates its geomatics activities through a distributed service model with enterprise management and strategic oversight provided through a geomatics council of senior executives. This means that although the mapping expertise and resources largely operate as individual units, within the various departments and agencies of the Government, they all take guidance and strategic direction from the enterprise Geomatics Council. These units also work co-operatively together on a regular ongoing basis to develop common goals and share information on plans and progress.

Geomatics activities are focused towards advancing four primary goals:

- Create new or enhanced service delivery solutions
- Facilitate collaborative business models
- Foster economic development and growth
- Support significant improvements in decision making

All departments of government have access to and are building thematic maps on a common base framework of digital map information. Base layers consist of cadastral (parcel), topographic data (water, roads, elevations, etc.) and imagery. The cadastral map is continuously updated in conjunction with the land titles registry process.

Saskatchewan is working towards open access to all mapping information and most thematic data can be acquired now from relevant agencies at no charge. Project plans are underway to make mapping products from all departments and agencies more easily accessible through a single online portal over the course of the next year.

Maps are constantly used to serve a multitude of needs for government programs, industry and citizens. The Government of Saskatchewan uses geographic information systems (GIS) and geospatial data to support business programs in most of its primary departments and agencies. Some of the recent mapping activities undertaken are further detailed below.

Agriculture

The Saskatchewan Pastures Program manages extensive tracts of land to properly handle the grazing of large numbers of livestock annually. Geographic features of pastures such as fences, trails, gates, dugouts, corrals, troughs, wells, pumps, windmills and buildings are mapped. These are then integrated with soil texture and forage condition data to identify individual range sites and establish optimum livestock stocking rates for each field within each pasture.

The province generates electronic maps from over 300 items from the 1996 and 2001 Census of Agriculture showing data at the census subdivision (rural municipality) level helping the public see the distribution of various crops, livestock and other agriculture-related statistics in the province.

Through mapping applications, provincial land managers can view agricultural Crown land and incorporate other map layers such as recent satellite imagery, soils, land cover and topography (surface water, elevation contours, buildings, etc.). This application helps to more effectively identify and manage the resources available on the eight million acres of Crown land, including sand and gravel deposits, petroleum and gas development and agro-forestry opportunities.

Over the past few years, the Government of Saskatchewan has used GIS, geographic data and remotely sensed imagery to produce maps in support of agriculture as follows:

- Identify specific risk areas and target policy development and program delivery to enable focused funding decisions, for example, improving understanding of regional variations in drought conditions allowed tailoring the Province's drought programs to obtain the greatest benefit from available funds
- Compile baseline environmental risk assessment data for long term evaluation of changes in soil, air, water and biodiversity conditions in partnership with other provincial and federal agencies, as part of the requirements of the Agriculture Policy Framework
- Understand crop mixes unique to an area to identify site locations for value added industries such as fiberboard plants
- Identify concentrations of intensive livestock operations to determine potential ethanol production sites
- Integrate data about insect populations, crop disease, soil moisture and climatic conditions to project severity of insect outbreaks to aid producers in their crop planning and farm management decisions
- Evaluate potential timber inventory on agricultural Crown land, verifying seeded acreage for crop insurance claims or cultivation leases on Crown land and the extent/impact of spring flooding

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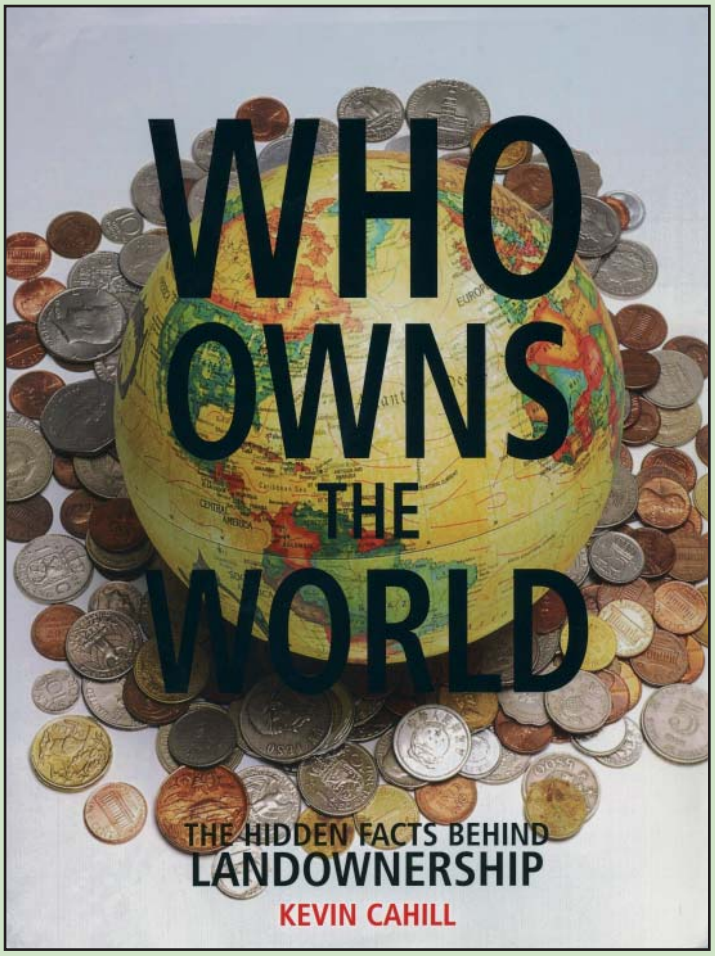
Book Review

"Who Owns the World - The Hidden Facts Behind Land Ownership"

By Kevin Cahill, Mainstream Publishing - London & Edinburgh

As Reviewed By G. Ken Allred, ALS, CLS

The compilation of data in this book is almost overwhelming yet when you put it into context it spins a good case for some of the injustices of landownership over the years and around the world. Cahill sheds a light on land ownership that most of us might at first find hard to accept but yet when one rationalizes the author's philosophy it makes you think about who does really own that piece of land for which you thought you had title. It is clear that there is no such thing as absolute ownership – a concept that most of us have learned to accept but the power of the state to limit one's ownership in land is sometimes rather alarming when it is spelled out in black and white.



Kevin Cahill obviously has a great respect for Hernando de Soto and his book The Mystery of Capital (See Als News Vol. 30-2, p.25) but he takes a different tack as set out in chapter 1:

[This book] argues that property law in the developing world is at best internally and institutionally corrupt, having been created by thieves trying to legitimize theft and maintained by the descendants of the original thieves, for their private benefit and no one else's, and at worst destructive to both democratic and economic progress.

This theme sets out the author's philosophy throughout Part 1.

Part 2 of the book is a compendium of statistical information on virtually every country in the world. Statistics are reported not just on size and population but also economic details and nature of government and land ownership. Assuming the statistics are relatively accurate (the author quotes several different sources) part 2 is a valuable reference work in itself.

The book contains a number of obvious errors although not significant to the overall theme of the book. There may be further errors but they certainly are not obvious without a ton of research to rival the research performed by the author.

The use of large numbers is somewhat confusing but the author has obviously chosen to reduce all areas to acres (even for large countries like Canada) and to refer to all figures in the millions or lesser amounts rather than expressing large number in billions or trillions. This may be confusing to some but puts everything in the same numerical framework even though some of the figures seem overwhelming.

You might get the impression from the foregoing that the author is a bit of a cynic, and no doubt he is, however he does make a very good case to back up his arguments.

Can a Land Surveyor be Wrong Without Being Negligent?

By Will O'Hara

Reprinted from *"Ontario Professional Surveyor" Volume 50, No. 3 - Summer 2007*

Introduction

Most professionals try hard to be perfect - or at least good. And if not good, they aim to be competent.

There are many good reasons for this. In many jurisdictions in North America there are professional standards and codes of conduct that impose ethical duties on professionals to be competent. The laws of negligence also impose standards on professionals in every discipline, and if the professional fails to meet these standards, he or she will face liability.

Most of us are not perfect. Even the best professionals make mistakes and face exposure to liability. Often our first reaction when we make a mistake is to say: "I might have been wrong, but I sure wasn't negligent."

Is there a difference between being wrong and being negligent? If there is, what practical difference does it make? The answers lie within an area of judge-made law, an area of the common law that is constantly evolving. Let's see what the judges say.

Negligence

Negligence in the context of professional liability is usually described as the failure to meet the standard of skill and care possessed by a person of ordinary competence in the same calling,[1] or in general terms "the failure to use the requisite amount of care required by the law in the case where the duty to use care exists."[2] Negligence is a finding made by a court of law and it usually carries with it the obligation to pay damages to the party affected by the negligence.

Standard of care

There is no question that professional land surveyors can be negligent. This universal truth is accepted throughout the common law world. The American approach is described in this way:

The liability of a surveyor for his errors does not differ from that of professional people generally. He may be held responsible for such damages as are sustained as the result of his negligence and lack of skill. He is obligated to exercise that degree of care which a surveyor of ordinary skill and prudence would exercise under similar circumstances.[3]

The subtle distinction in the law in various states was outlined in Graves v. S.E. Downey Registered Land Surveyor, from the Maine Supreme Judicial Court:

The duty of care that the Superior Court imposed in this case required the Graveses to demonstrate that S.E. Downey's work on the survey was below that of an ordinarily and reasonably competent land surveyor in like circumstances. Courts in other jurisdictions have articulated the duty of care of land surveyors in similar ways. For example, in West Virginia a surveyor is held to the standard of care that a "reasonably prudent surveyor" would have applied with regard to the same project. Both Maryland and North Carolina state that a surveyor must "exercise that degree of care which a surveyor of ordinary skill and prudence would exercise under similar circumstances." We agree with the Superior Court that the duty of care a land surveyor is obligated to provide is that degree of care that an ordinarily competent surveyor would exercise in like circumstances.[4] (citations omitted)

The Canadian approach was described by the Ontario Court of Appeal in 1881:

A surveyor is under no statutory obligation to perform the duty, but undertakes as a matter of contract, like any other professional man, to do the service required of him; and ... there must be evidence of a want of reasonable skill and knowledge or of gross negligence before he can be made liable.[5]

Gross negligence is not required to show liability on the part of a land surveyor. The question now is whether there was a failure on the part of land surveyor to "use reasonable care and skill" of a person in that profession.

Error in judgment

Not every error amounts to negligence. Sometimes a professional can be wrong without being negligent. This fine but important distinction was made clear by Lord Denning, a judge with a rare gift of clarity:

> *Apply this to the employment of a professional man. The law does not usually imply a warranty that he will achieve the desired result, but only a term that he will use reasonable care and skill. The surgeon does not warrant that he will cure a patient. Nor does the solicitor warrant that he will win the case.*[6]

The distinction was explained with an example in *Wilson v. Swanson*, a case dealing with medical negligence:

An error in judgment has long been distinguished from an act of unskilfulness or carelessness or due to lack of knowledge. Although universally-accepted procedures must be observed, they furnish little or no assistance in resolving such

a predicament as faced the surgeon here. In such a situation a decision must be made without delay based on limited known and unknown factors; and the honest and intelligent exercise of judgment has long been recognized as satisfying the professional obligation.[7]

The authors of Professional Liability in Canada warn that the public - and the courts - will be more tolerant of errors made by some professionals than others. They argue that the courts accept the view expressed by Lord Denning in legal cases or medical cases, but they expect a standard approaching perfection in other professions, such as engineers or architects.[8] Land surveyors are likely to fall within the latter group, as their work is more scientific, they have more control over their work, and are not usually forced to make instant judgment calls like doctors in the middle of an operation or lawyers in a jury trial.

Land Surveyors

Land surveyors can clearly be wrong without being negligent. The Chief Justice of Prince Edward Island adopted the law as stated in Survey Law in Canada:

In an action in negligence, the mere fact that there has been a mistake does not mean that the surveyor is liable in negligence. A surveyor is not a guarantor and, if the mistake or error in judgment occurs despite the surveyor having conformed to proper and prudent practice in accordance with the standards of the profession, there may be no liability.[9]

On a cursory reading, statements like these may give comfort to land surveyors, but they deserve a closer look. In any action for professional negligence it will be necessary to determine whether the land surveyor has "conformed to proper and prudent practice in accordance with the standards of the profession" as a first step in determining liability. This is where the contest begins. A judge will want to hear evidence about the proper and prudent practice of others in the profession. This will require expert evidence to establish what the accepted practice was. An expert will describe the current practice and describe the legislation governing specific procedures.[10] Then there will be evidence about whether the practice was actually followed.

In many cases where an error was made there will be (perhaps coincidentally) examples of where he or she did not "conform to proper and prudent practice in accordance with the standards of the profession". This is especially so when the services that were provided are subjected to the closest scrutiny. Any examples of transgressions or short comings will provide a basis for a court to conclude that the land surveyor was not only wrong, but negligent.

The concept that "an error of judgment is not negligent" has been criticized in the English case of *Whitehouse v. Jordan*, a medical malpractice case:

> *...an error of judgment "is not necessarily negligent." But, in my respectful opinion, the statement as it stands is not an accurate statement of the law. Merely to describe something as an error of judgment tells us nothing about whether it is negligent or not. The true position is that an error of judgment may, or may not, be negligent; it depends on the nature of the error. If it is one that would not have been made by a reasonably competent professional man professing to have the standard and type of skill that the defendant held himself out as having, and acting with ordinary care, then it is negligent. If, on the other hand, it is an error that a man, acting with ordinary care, might have made, then it is not negligent.*[11]

Based on this statement of the law, it is important to look at the nature of the error and ask whether it would have been made "by a reasonably competent professional man professing to have the standard and type of skill that the [professional] held himself out as having, and acting with ordinary care." If the answer is no, then the error was a negligent error.

Practical differences between being wrong and being negligent

The critical difference between being wrong (making an error that was not negligent) and being negligent (making a negligent error) is that liability flows from being negligent, but not from being wrong. With liability comes the obligation to pay damages, which usually means calling on your errors and omissions insurer, paying a deductible and paying increased liability insurance premiums.

It is possible for a land surveyor to make errors that would be considered negligent but for the fact that there were no damages caused by the error. In *Parrot v. Thompson & Monty*[12] the Supreme Court of Canada stated that without damages caused by the land surveyor's error there can be no negligence. Again, this is a judge-made rule of law. The aim is to avoid clogging up the courts with needless law suits. The rule may allow a careless professional to avoid liability for a clear error in some rare circumstances, although it would not insulate the professional from disciplinary proceedings.

Conclusion

Based on the statements of law from the judges who make the common law, it is possible for a land surveyor to be wrong but not negligent. The courts do not expect perfection and will not insist on land surveyors warranting or guaranteeing the results of their work. The courts do insist that land surveyors comply with the generally accepted standards and procedures in the profession, especially when the standards are clearly set out in legislation. Assuming there are damages, those who do not meet the standards will be wrong

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TILMA *(Trade, Investment and Labour Mobility Agreement)*

By Bruce Beairsto, ALS

Reprinted from "ALS News" June, 2007

About a year ago, I put up my hand up in a Council meeting to be one of the Alberta Land Surveyors' Association's representatives on a TILMA working group. I didn't know much about TILMA at the time but I knew it had something to do with labour mobility and, as the Association's Council Liaison to the Registration Committee, I figured it made sense for me to get involved.

I didn't know a lot about TILMA then and there is still a great number of things about the agreement that I don't know but I wanted to pass on to you, the membership, what I have learned about the Alberta-British Columbia Trade Investment Labour Mobility Agreement (TILMA).

When I first got involved with TILMA, the first questions I asked myself was, how did this agreement come about? Quite frankly, two right-of-centre governments in Alberta and British Columbia (Alberta's Klein government and the then newly-elected Gordon Campbell government in British Columbia) decided to get together to discuss a number of common issues. Over the years, the two provincial governments have signed a number of agreements but perhaps the agreement that has got the most attention is the Trade Investment Labour Mobility Agreement.

In general, the TILMA agreement is designed to promote freer trade and a greater flow of goods and services between the two provinces. While Canada has had the agreement on internal trade for more than a decade now, it was the feeling of some that it didn't have any teeth if a province failed to comply. TILMA has teeth and a government could be fined up to five million dollars if it does not comply.

Many politicians in government have come out strongly in favour of the agreement and are actively promoting an Alberta-British Columbia economic juggernaut within Canada.

Many of you will remember Justice Cote's speech from the 2006 Annual General Meeting about self-governing professions: "We've all grown up with that and we assume that exists for the same reason that the sun rises in the east and sets in the west, because it is in the necessary nature of things and it has always been that way. But that's wrong, It isn't in the necessary nature of things, and it hasn't always been that way. I think, and I dare say, most of you think it's the best system. But, as we've seen from the modern world, what seems to us to be the best way of running things isn't always what happens. What has seemed to be a long-established way of doing things can change pretty quickly."

I certainly do not view TILMA as a threat to the survival of the profession. But, many of us have regarded our registration process as the natural and proper way of registering Alberta Land Surveyors. Taking a lesson from Justice Cote, we better learn to consider change and embrace it.

At our most recent Council meeting, we reviewed a newspaper article from the Lawyers Weekly with the headline of, "Initiative announced by competition bureau puts self-regulated professions under the gun." In the article, it states that "from an economic perspective, excessive regulation may operate as a barrier to entry or discourage innovation, which may in turn result in higher prices and less consumer choice." My immediate reaction when I learned of the TILMA agreement was to tell the government where it could go in not very polite terms. However, when you sit down and look at what the agreement actually says and what we need to do to truly protect the public interest, this is really an opportunity for the land surveying profession. The government has made it quite clear that this is going to happen. We have been given fair warning by Justice Cote and the bureaucrats in the competition bureau have publicly declared that they don't want self-governing professional regulatory organizations to create unnecessary or excessive barriers to entry.

With that in mind, I asked myself a second question. What does the Trade Investment Labour Mobility Agreement actually say? It is not my intent to reprint the entire agreement here but let me give you a brief synopsis of the agreement as we reported it at the Annual General Meeting this year. Alberta and British Columbia signed the Trade Investment Labour Mobility Agreement on April 28, 2006. It came into effect on April 1, 2007 and includes a two-year transitional period for labour mobility measures. TILMA is to be fully implemented by April 1, 2009.

Unless a measure is clearly identified as an exception, it is subject to the rules of the agreement. Exceptions to the agreement include provincial measures for water, taxation, royalties, labour standards, occupational health and safety, procurement or health and social services, social policies and aboriginal policies and programs. Under the agreement, workers who are certified for a

given occupation in one province are supposed to be recognized as qualified in both. Professionals and trade workers will still be required to register with the regulatory authority for that occupation; however, they are not supposed to be required to do any material amount of additional examination or training. Any professional regulatory organization, such as the land surveying profession, whose practices are inconsistent with the terms of the agreement may maintain a practice if they can demonstrate that the scope of practice or occupational standard difference is necessary to achieve a legitimate objective such as the protection of health or the environment. I expect that the land surveying profession will continue to be listed on the transitional list as we will continue to have some differences between the practice of land surveying in Alberta and British Columbia.

Now that I had a better understanding of the agreement itself, I asked myself a third question. What can the Alberta Land Surveyors' Association do to expedite the registration of British Columbia Land Surveyors in Alberta while, at the same time, still protecting the public interest? The Alberta Land Surveyors' Association formed a working group consisting of Larry Pals, Rob Scott and myself to look into this issue. The Association of British Columbia Land Surveyors also formed a three-man working group and we agreed to get together to figure out how each other's system worked and what we could do. We asked ourselves if the written professional exams are necessary. Are we testing British Columbia Land Surveyors on things that they had been previously tested on when they received their BCLS? We agreed that the three written professional exams are still necessary. We propose that British Columbia Land Surveyors who want to obtain their Alberta Land Surveyor commission will still have to write the Surveying Profession, Statute Law and Practical Surveying examinations. We were concerned that making the exams available twice a year would be seen as a barrier and an unnecessary delay. We are proposing that we move to allow TILMA candidates to write the exams on demand. We will need a large number of exams in the database in order to make this work and Council has asked the Registration Committee to look at the possibility of conducting computer-based examinations. The Registration Committee has also been asked to investigate the possibility of articling students preparing a question for the practical surveying examination in lieu of the third project report. These things may or may not happen. I don't know. It is just too soon to tell yet. However, we are seriously looking at these possibilities.

The ALSA and ABCLS working groups then looked at the project reports. We decided we could get rid of them for TILMA candidates as the candidates would have been required to prepare project reports in the course of getting their original commission in their own province.

The working groups also agreed that TILMA candidates would be required to pass the oral qualifying examination and that we would endeavour to get those qualifying examinations scheduled as quickly as possible. From my own personal perspective, I am beginning to question whether that qualifying examination is necessary if the TILMA candidate went through the qualifying examination when they originally obtained their commission. Our agreement with the ABCLS may end up stating that if a BCLS has passed a sufficiently rigorous qualifying examination, then the candidate will not have to undertake another qualifying examination in Alberta.

These are just some of the issues we are struggling with. We have our own individual opinions and we are moving forward - rapidly.

The final question I asked myself is if the membership has any opinions, comments or observations about TILMA. If you do, please contact me, Larry Pals or Rob Scott now.

We are open to any suggestion as long as it satisfies what the politicians have told us we must do.

Time is of the essence.

95 - " Can A Surveyor Be Wrong . . . "

and negligent. The consequences of being negligent are far more severe than the consequences of being wrong.

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Rules of the Game: Parallels with Forensic Investigations

by Donald A Wilson, LLS, PLS, RPF

As seen online in The Professional Surveyor, May 2007, Volume 27, Number 5.

With the proliferation of crime shows on the television networks these days, the general public has gained an understanding and an appreciation of what criminal investigators do, even though they get it "Hollywood style". Along with the stories comes appropriate terminology and jargon, things like ballistics, blood spatter, tire patterns and DNA evidence. What the average person probably never considers is how similar any other type of investigation might be. And likely the average retracement surveyor does not think twice about how many of these types of things he or she routinely does, perhaps with different labels or known by different names, and certainly for a different purpose.

Evidence collection, scene protection and processing, paperwork and photography are important procedures regardless of the type of investigation being conducted. Survey evidences does not make big news, but murder investigation generally hits the front page and the evening news, some becoming best-selling novels and television or movie hits.

Scene of the Crime vs. Crime Scene

The scene of the crime and the crime scene are not the same. The scene of the crime is the place where the crime actually took place, whereas the crime scene may be anything and everything that relates to the scene of the crime. A crime scene is not only the actual location of the crime, it is also all the other areas that relate to it. For example, the total crime scene for a modern day crime might include international considerations as well as dozens of physical locations and individuals, hundreds if not thousands of exhibits and many witness statements.

Consider a homicide where the victim was slain in his or her home, the site cleaned up and the body disposed of in a remote location. Then the murder weapon was disposed of at a different time at an entirely different location. The scene of the crime is the home, but the crime scene includes at the very least the locations of the body and the weapon and may include much more, depending on what might be uncovered in the investigation.

Now consider a property retracement survey. How many scenes are involved in addition to the physical site of the property? At the least, the abutting properties and their surveys, the chains of title with their descriptors, testimony of former owners and other knowledgeable individuals, related properties sequentially or simultaneously created, conflicts of evidence and highway records are all involved, along with perhaps many more. Potentially many other scenes in addition to the physical site are routinely part of a survey investigation.

Scene Reconstruction

Crime scene reconstruction includes scientific scene analysis, interpretation of scene pattern evidence and laboratory examination of physical evidence. It also involves systematic study of related information and the logical development of a theory. Property study and retracement is a close parallel in that the site is analyzed from its appearance and the interpretation of existing evidence of location and occupation. Related information in the form of title documents and elements are a necessity, while peripheral information in the form of previous surveys, abutting surveys, highway and other utility information and related information is often helpful, and sometimes necessary.

Generally a theory is developed as to how the title and boundaries were first established and how either may have changed since their origins. Conclusions are drawn based on whether the evidence supports the theory of what the property is or looks like.

Scene Protection

The investigation of the scene of the crime is usually protected by surrounding it with yellow crime scene tape, so it is not contaminated or, as they say, compromised. Most property boundary scenes have already been compromised, some long ago, before the retracement investigator arrives. However, that does not preclude protection to prevent further destruction of the scene and its evidence. At the site, corner markers may have been moved, destroyed, deteriorated and otherwise compromised. Even as far away as the county court house or other repository, relevant records may be altered, stolen or destroyed.

Evidence Collection and Preservation

While paint fragments, spent cartridges and other types of physical evidence may be collected from a crime scene for later comparison and analysis or even for presentation in court, the retracement surveyor does not have such luxury. Corner trees, yards of fencing material and physical corner monumentation cannot be removed from their locations. Sometimes samples may be procured, but for the most part evidence must be left as found and intact. However, all such evidence can be located through the survey measurement process, photographed and later depicted on a diagram generally known as a survey plan or plat. And hopefully a return

to the scene can be made at a later date to find all, or at least some, of that evidence still in place. There is usually no such thing with a crime scene, as it must be cleaned up and most items of evidence either removed or at least filed elsewhere for future reference.

Trace Evidence

We hear of trace evidence and immediately think of gunshot residue, wood splinters, glass fragments, paint chips, hairs and fibres. Retracement surveyors are often looking for wood fragments to identify the remains of a wood stake or post, stump holes where a corner tree or a bearing tree once stood, or soil discoloration from rusted metal objects or rotted-away wood. Remains of fences long fallen down and deteriorated are frequently important pieces of evidence in the location of property boundaries. Paint flecks and remnants of flagging tape may indicate the presence of a marker or the place where one once stood.

The rules for any investigation include protecting and processing the scene, preserving the evidence and proper procedures for analysis, reporting and presentation, whether the situation is a major crime scene or a simple lot survey.

Photographs

Few crime scenes are ever investigated without an abundance of photographs being taken to preserve the condition of the scene and its contents. Out of necessity, bodies must be moved within a short time, and it does not take long after the initial investigation for a scene to look entirely different from when it was discovered. Retracement surveyors should consider that their scene may change as well. People have been known to alter or destroy evidence, severe weather and other earth processes sometimes change the character of a site and the development process for the installation of improvements can also cause changes. Soil testing and other types of construction can alter a site to where it is unrecognizable from what the observer initially saw. If the court were to visit a site long after the retracement was done or the survey was finished, the scene might look entirely different from the way the surveyor described it from his or her recollection. Photographs will aid in fixing a scene at a point in time.

Scientific Analysis

Much of the evidence in a criminal investigation becomes the subject of testing. Fingerprint and DNA comparisons, ballistics testing and chemical tests all comprise a series of processes necessary to arrive at proper conclusions. Boundary evidence may also be subject to tests for wood fragment identification, aging of trees and other wooden evidence, soil testing, fence wire identification and comparison and mathematical analyses of the current survey and past measurements.

Interrogation / Interview of Witnesses

Generally a number of witnesses are interrogated or interviewed in the criminal investigation process. Concerning land ownership and location, knowledgeable persons are contacted to inquire of unrecorded documents, recollections of the location of boundary markers and the use of the property. Some may become witnesses if litigation ensues to corroborate other testimony or conclusions. Former owners, abutting landowners, visitors, record keepers and others familiar with a land parcel may be potential sources of valuable information.

Profiling

To successfully retrace an earlier surveyor means learning about the individual and his or her habits. The type of equipment used, measurement techniques, allowances for error and type of monumentation the surveyor sets all factor into following the individual's footsteps. The successful retracement surveyor learns the previous surveyor's idiosyncrasies, habits, preferences and procedures.

Serial killers are sometimes caught using profiling techniques, and crime patterns can often be recognized for certain perpetrators. The same is true for surveyors following certain set procedures and becoming creatures of habit for the sake of efficiency and consistency. Any surveyor having practiced in an area for a period of time becomes familiar with the earlier surveyors they are following as they begin to recognize consistency in the type of monumentation set, the way trees are marked, certain notations in field books and on plans, as well as equipment and procedures used.

The procedures used in a criminal investigation and other types of investigation are often very similar, or even the same, although sometimes known by different names. Since they are all part of forensics of interest to the legal system, all need to be performed correctly, consistently, objectively and with concern for keeping within the law and in protecting people's rights. There are rules for each, some written and others unwritten. The rules for any investigation include protecting and processing the scene, preserving the evidence and proper procedures for analysis, reporting and presentation, whether the situation is a major crime scene or a simple lot survey.

Don Wilson is president of Land & Boundary Consultants, Inc.; and part owner of and the lead instructor in Surveyors Education Seminars, a member of the Professional Surveyor /Red Vector Dream Team providing online courses for continuing education; and a regular instructor in the University of New Hampshire Continuing Education System for 25 years. He is also co-author of several well-known texts.

"Goddess, Mother of the World"

How the Height of Mt. Everest Was Discovered

By Jon Krakauer

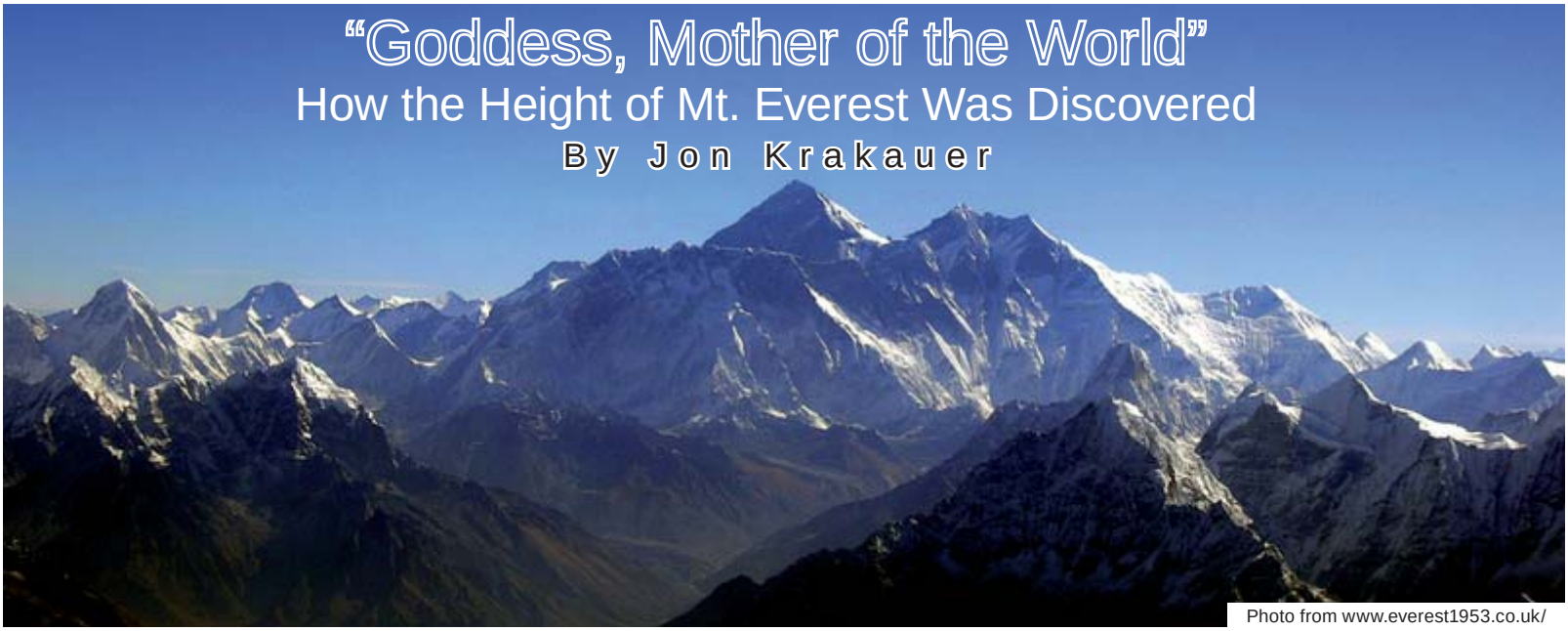

Photo from www.everest1953.co.uk/

*Mountaineer Jon Krakauer survived a climbing disaster on Mt. Everest, and wrote a book about it in 1997, "**Into Thin Air**", from which this is excerpted.*

Reprinted from the Maryland Surveyor ... November 1998. As Seen in "The Link" Volume 30, Number 3 – September 2007

The actual particulars of the event are unclear, obscured by myth. But the year was 1852, during the British Army's great Trigonometrical Survey of India in the northern hill station of Dehra Dun. According to the most plausible version of what transpired, a clerk rushed into the chambers of Sir Andrew Waugh, India's Surveyor General and exclaimed that a Bengali computer named Radhanath Sikhdar, working out of the survey's Calcutta bureau, had "discovered the highest mountain in the world." (In Waugh's day a "computer" was a job description, not a machine). Designated "Peak XV" by surveyors in the field, who had first measured the angle of its rise with a twenty-four inch theodolite three years earlier, the mountain in question jutted from the spine of the Himalayas in the forbidden kingdom of Nepal.

Until Sikhdar compiled the survey data and did the math, nobody had suspected that there was anything noteworthy about Peak XV. The six survey sites from which the summit had been triangulated were all in northern India, more than a hundred miles from the mountain. To the surveyors who shot it, all but the summit of Peak XV was obscured by various high escarpments in the foreground, several of which gave the illusion of being much greater in height. But according to Sikhdar's meticulous trigonometric reckoning (which took into account such factors as curvature of the earth, atmospheric refraction and plumbline deflection) Peak XV stood 29,002 feet above sea level, the planet's loftiest point.

Modern surveys using lasers and state-of-the-art satellite transmissions have revised this measurement upward a mere 26 feet to the currently accepted altitude of 29,028 feet, or 8,848 meters.

In 1865, nine years after Sikhdar's computations had been confirmed, Waugh bestowed the name Mount Everest on Peak XV, in honor of Sir George Everest, his predecessor as Surveyor General of India. Tibetans who lived to the north of the great mountain already had a more mellifluous name for it, Jomolungma, which translates to "Goddess, Mother of the World," and Nepalis who resided to the south called the peak Sagarmatha, "Goddess of the Sky."

But Waugh pointedly chose to ignore these native appellations (as well as official policy encouraging the retention of local or ancient names), and "Everest" was the name that stuck.

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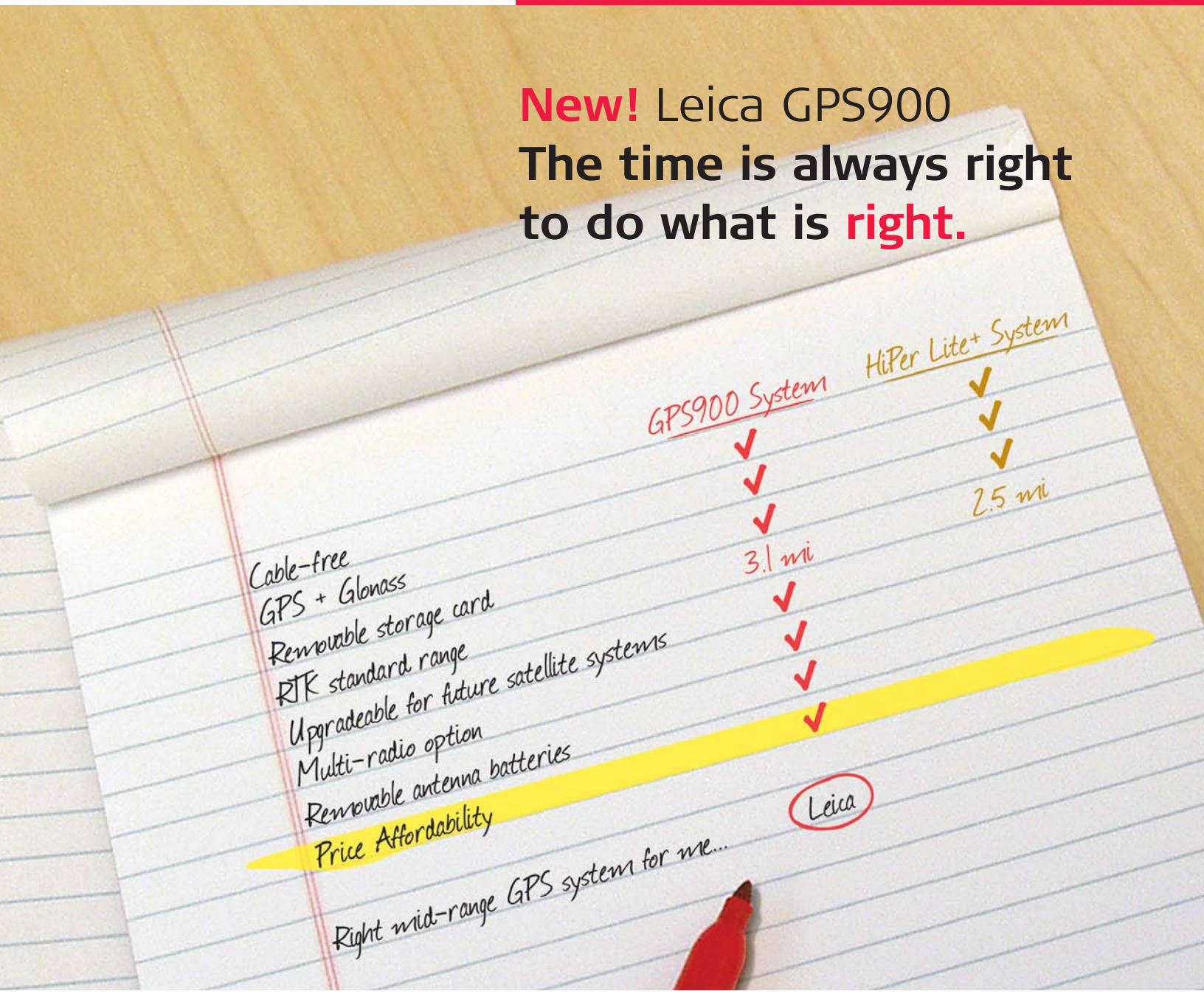

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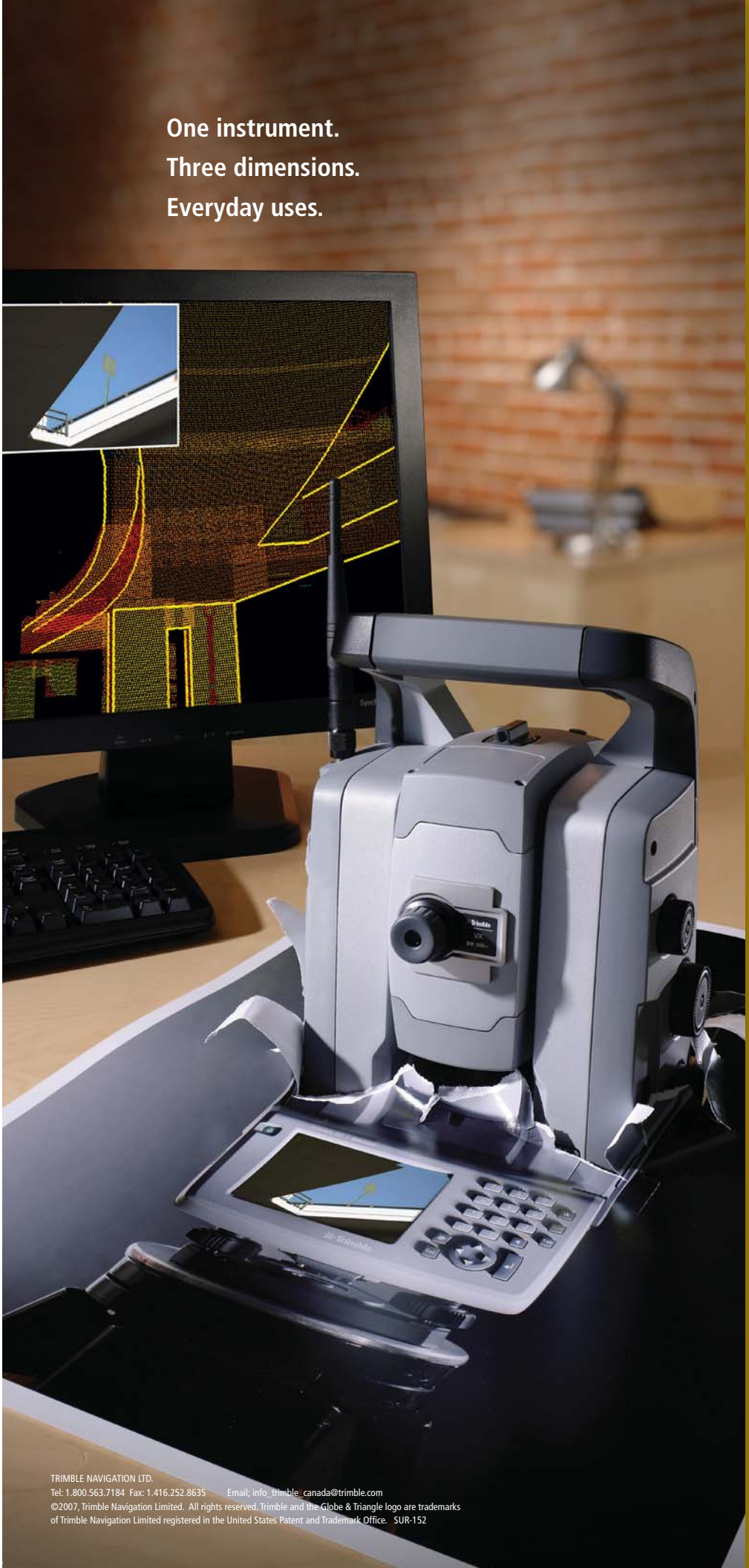

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Video Evidence and the Land Surveyor in a Changing Technology Environment

By Oliver MacLaren and Mike Barry, University of Calgary

From "*ALS News*" June, 2007

INTRODUCTION

The land surveyor has long filled the role of data collector, processor and interpreter of data as boundary evidence. In some jurisdictions, the surveyor's role can be considered to extend beyond that of expressing an expert opinion and be considered the field judge.

A long-established principle is that the raw data from field observations and measurements as evidence should be available for inspection, checking and reprocessing long after the original surveyor has passed on. Hence the longstanding rule that observations should not be erased, but crossed out and the new "correct" observation written in next to the crossed out observation. Even if a blunder has been made, the incorrect observation should still be readable in the event of a later, perhaps independent, inspection. If the observations are complete, easily interpretable and unchanged, then a surveyor who did not make the observations can reprocess them and, under cross-examination, probably confidently remark on their quality and on the quality of what was deduced from them by the original surveyor.

Technology has changed the nature of the surveyor's data now, to the extent that most of it is in electronic format, and it poses problems for the long-established data as evidence rule. It is difficult for a surveyor doing an independent audit of another surveyor's work to confidently state that the observations are authentic and that there has been no editing of the data. For example, GPS-derived vectors are not measurements. Rather they are reductions of measurements and can be considered calculations. As mentioned above, long-established practice is that one can erase a calculation and recompute the result, but one cannot erase an observation. Thus, GPS and other similarly electronically captured observations should be retained in their original form. Even then, there may be questions as to the data's authenticity in court as, unlike hand-written observations, it is more difficult to detect tampering or editing in electronic data.

Nowadays, multimedia data such as photographs, audio files and video files may play an important part of the evidence collected relating to various aspects of rights in land, including boundaries. This is not entirely new, as the second author dealt with a case of extinctive prescription over a servitude (easement) in South Africa where the deciding evidence was an 8 mm film of children playing alongside a fence in the 1960s. The film clip was regarded as being sufficiently persuasive to show that the plaintiff had used the disputed land for more than thirty years as if no easement existed over it. The defendant then conceded without proceeding to trial.

The second experience was a video that was used to dispute the author's and another surveyor's adjudication of the position of the high water mark of the ocean at Cape Aghulas at the southern tip of Africa. The other surveyor was unfortunate to be served the subpoena and part of the trial proceedings consisted of watching numerous videos which the plaintiffs had taken contesting our adjudication of the position of the high water mark. In this instance, the case was thrown out of court on a technicality (in essence, the plaintiffs were told they should not call the Supreme Court out of recess merely because they wanted to go fishing!), and the admissibility of the videos did not enter proceedings.

Additionally, Aboriginal case law in Canada has indicated increased acceptability of oral histories as evidence; thus, a greater role for multimedia data can be contemplated in Canadian land law. We discuss the fundamentals of the law of evidence in the context of these changed circumstances, with particular emphasis paid to the sufficiency of videotape evidence in disputes relating to land use and of course capturing boundary evidence using videos.

VIDEO AS AN ACCEPTABLE FORM TO PRESENT EVIDENCE

The use of video as an evidentiary tool is a logical progression from the court's acceptance of conventional photography to aid triers of fact (judges, juries, dispute resolution tribunals) in coming to a decision in a dispute. Indeed, as technology becomes more adept in recording human behaviour, the courts have generally responded in an accommodating manner, striving to see how the technological advancement can be integrated into the existing rules of evidence. To this end, the 1996 Supreme Court of Canada case *R. v. Nikolovski*[1] is helpful, as Justice Cory indicates the acceptability of presenting evidence in video format:

> *The powerful and probative record provided by the videotape should not be excluded when it can provide such valuable assistance in the search for truth. In the course of their deliberations, triers of fact will make their assessment of the weight that should be accorded the evi-*

*dence of the videotape just as they assess the weight of the evidence given by **viva voce** [spoken] testimony.*

Of further instruction from the above statement are the references to the weight accorded the evidence, an indication that a video recording will be subjected to the same evidentiary standards that meet other forms of evidence. Therefore, to understand whether a particular videotape will be accepted in court, a working knowledge of the principles of evidence is required.

LEGAL PRINCIPLES AFFECTING VIDEO EVIDENCE

There are a number of factors which have to be considered when contemplating the use of a video recording as evidence. These include whether the evidence is relevant to the issue in question, what type of evidence the court will classify the video to be, whether authentication is required and other admissibility concerns (Is it in its original form or has there been some tampering? How is the opposing side disadvantaged by their inability to cross-examine witnesses in the video?), and the weight accorded a videotape in the scheme of all the evidence presented in a particular case. Hearsay evidence can be admitted if the court considers it reliable and necessary.

Relevance

While the *Nikolovski* case indicates the videotape to be an appropriate method of presenting evidence generally, whether the evidence will be admissible as an exhibit in court is a different question altogether. This admissibility question is concerned with what the evidence purports to prove, and it begins with an understanding of the legal concept of *relevance.*

Generally, evidence is relevant if it has the tendency to make the-proposition for which it is tendered more probable (i.e. the evidence is probative — it serves to substantiate or test a proposition or inference) and the fact sought to be established concerns a matter in issue between the parties (i.e. the evidence is *material*). In *Anderson v. Maple Ridge*[2], the Supreme Court of Canada indicated that this is a determination left to the trial judge and deemed to be a matter of her logic and human experience. While this definition is admittedly vague, concerned parties may take solace in the fact that the threshold for proving whether evidence is relevant is very low. Indeed, the rule of general admissibility spelled out in *Morris v. R.*[3] reflects this assertion, indicating that all evidence that is logically probative is admissible, and is only excluded when it is *unduly prejudicial* (i.e. when it would be exaggerated; when it would confuse the jury; or when it is used for an unfair purpose).

As applied to the taking of videotape evidence, it is this balancing of the probative value of the evidence vs. the prejudicial effect which is of initial importance to the surveyor.

While the *Anderson* case indicates that potential prejudicial effects can sometimes be overcome with a caution or warning to the trier of fact to avoid using the evidence in a prejudicial way, a wiser approach would be to adopt filming techniques that minimize prejudice. In this regard, the writings of Elliot Goldstein are very helpful.[4] In terms of subject matter, Goldstein discourages the use of sympathy-arousing pictures, gruesome pictures, over-emphasis on particular matters, and innuendo of suspicion. It is the video-recorder as the dispassionate observer that will be of most assistance for the trier of fact, and embellishments (or even a discernable perspective) by the filmmaker will only detract from the evidence's value.

In addition to how content is presented, Goldstein also outlines a number of technical factors that could contribute to the evidence being found to be unfairly prejudicial. These include video editing, audio editing, tape and film speed distortion, colour distortion, optical distortion, as well as various other means of potential distortion that may arise from changes in technology. A person looking to tender a video recording for use as evidence should be cognizant of these potential criticisms, and be prepared to disclose the techniques that have been adopted to ensure the evidence is a true representation of what it purports to be.

As a preliminary standard, the legal concept of *continuity* should be respected for any video that is produced in contemplation of litigation. Continuity refers to the ability to show a chain of custody from retrieval of the exhibit to the courtroom, and operates as a method to prove that the evidence was retrieved from a particular place and has not been tampered with.[5]

Authentication

Generally, video evidence is tendered in two different ways; either as real evidence or as demonstrative evidence. Demonstrative evidence consists of charts, models, and re-enactments and serves as a tool to assist the trier of fact in understanding other evidence in the case. In a trial involving land claims, for example, demonstrative evidence might be a diagram of the lands in dispute, a map of a geographical area, or perhaps aerial photos of the land plot, which contribute to the judge's understanding of particular features at issue in the case. Demonstrative evidence doesn't need authentication, but its worth depends on whether it is an accurate representation of what it purports to show. The judge needs to be satisfied that the demonstration will genuinely assist the trier of fact and not distort the fact-finding process. In essence, the concern remains whether the probative value outweighs the prejudicial effect.[6]

Alternatively, real evidence is tendered not as some helpful aid but as evidence itself. In contrast to demonstrative evidence, real evidence needs to be authenticated. Again, we can make use of a trial involving land claims as an example. Where customary land use was an issue at trial, videotapes of people actually *using* the land would be an example of a videotape tendered as real evidence. Rather than acting as an aid, the videotape is tendered as evidence that the land is *in fact* used in a particular way. Goldstein outlines four different persons who are capable of authenticating real video evidence: The camera operator; a person present when the videotape was recorded (a bystander); a person qualified to state that the representation is accurate (a guard watching a monitor); or an expert witness.[7]

Following a determination of whether or not authentication is required, the usual steps involved in authentication involve calling a witness with personal knowledge of the object, asking the witness to describe the object before showing it to the witness, allowing the witness to examine and identify it as genuine, and asking that the object be entered as an exhibit, with an appropriate stamp applied by the clerk.

Weight

Once a videotape has been accepted as an exhibit at trial, of principle interest to the party tendering it should be the evidentiary weight accorded to it. Rather than involving a legal test, weight is a judicial tool that allows for a more cautious approach to evaluating evidence than admissibility/exclusionary dichotomies permit. While a low threshold for determining relevance may guarantee a videotape's initial admissibility, its ultimate *value* relies on the judge's determination of weight. A determination of this kind permits a judge to admit a wide array of evidence, and postpone an evaluation of the sufficiency of the evidence until all of submissions have been made.

Goldstein outlines a handful of factors in presenting video evidence that may affect weight: the veracity of the authenticating witness; the kind, form, degree, and nature of any distortion, the quality of reproduction and degree of clarity; and, the length of time the associated parties appear on videotape.[8] As can be observed, these considerations are subtler than the evaluation of evidence at the admissibility stage, but otherwise differ very little. As a general guide, while relevance is concerned with the balance of probative evidence vs. prejudicial effect, weight should be construed as an evaluator of both the sufficiency and the bias of the evidence.

While considering how a judge or jury will perceive the videotape, the tendering party should be equally aware that opposing counsel will be afforded an opportunity to make arguments concerning weight (just as they are afforded an opportunity to make arguments on admissibility). Video material that is produced in anticipation of future litigation should therefore appreciate the importance of consistent documentation, neutrality, objectivity, and similar virtues that uphold the purity of the recording, while simultaneously striving to minimize any surrounding factors that may contribute to an apprehension of bias.

Finally, weight accorded to a given piece evidence may differ from judge to judge, and will be entirely reliant on the facts of the case. There is no predicting what value a piece of evidence will ultimately hold at trial; rather, in the case of videotape evidence, the prudent gatherer should merely be aware of the court's appreciation of intelligent, thorough and unbiased investigation techniques.

Hearsay & the Ability to Cross-examine

Hearsay is a statement made out of court which is offered as proof that what is stated is true. Generally, hearsay evidence is inadmissible in court both because it is unsworn testimony (it is not under oath) and also because there is no opportunity for cross-examination on the statements.[9] For example, returning to our issue of customary use in a land claim case, a videotape containing community members commenting on how they use their land would be subject to the hearsay rule and possibly deemed inadmissible: the comments are not under oath, neither have the comments been subjected to contemporaneous cross-examination.

Until the 1990 Supreme Court of Canada case *R. v. Khan*[10], the hearsay rule was regarded as virtually absolute, subject to various narrow categories of exceptions (such as admissions, dying declarations, declarations against one's own interests and spontaneous declarations.)[11] The judgment in *Khan* instead indicates two legal requirements to allow for the introduction of hearsay evidence: reliability and necessity.

Rather than acting as an aid, the videotape is tendered as evidence that the land is in fact used in a particular way.

1st Requirement for the Inclusion of Hearsay Testimony: Reliability

In determining whether hearsay evidence is to be admitted, Justice McLachlin indicates in *Khan* that the trier of fact must first ask whether the evidence is reliable. Issues that may be relevant to this determination might include the time when the statement was given, the general demeanor of the party making the statement, and the absence of any reason to expect fabrication. In *Khan*, a disinterested declaration was found to hold the requisite quality of reliability, in that the statement was not made in favour of the party's interest.

Following this lead, the judgment in *R v. B. (K. G.)*[12] provides a structured elaboration on this requirement of reliability, including an outline of the mitigating factors of videotape evidence with respect to hearsay testimony. Importantly, three key factors which contribute to the reliability of hear-

say testimony are elucidated: *oath*, *presence*, and *cross-examination*.

In regards to the oath, Justice Lamer in R v B indicates that

> *"[T]he presence of an oath, solemn affirmation or solemn declaration will increase the evidentiary value of the statement when it is admitted at trial. The witness should be warned by the statement-taker that the statement may be used as evidence at a subsequent trial if the witness recants, and be advised of the specific criminal sanction that will accompany the making of a false statement. ... As does the formal swearing of the witness in the trial process, this warning and the administration of the oath should serve to bring home to the witness the gravity of the situation and his duty to tell the truth."**

Secondly, Justice Lamer addresses the ability of videotaped testimony to capture the *presence* of the witness, observing that "in a very real sense, the evidence ceases to be hearsay in this important respect, since the hearsay declarant is brought before the trier of fact" through the use of the video recorder. *Presence* is indicated as the "witness's reaction to questions, hesitation, degree of commitment to the statement being made, etc.," and its value resides in the ability of the trier of fact to "assess the relationship between the interviewer and the witness to observe the extent to which the testimony of the witness is the product of the investigator's questioning." For this assessment to be complete, the statement must be videotaped in its entirety.**

Thus, a video recording's ability to capture both the oath and the presence greatly contributes to a finding of reliability when evaluating whether hearsay testimony should be admitted at trial. Where a video recording remains deficient, however, is in its ability to allow for a contemporaneous cross-examination at the time the statement is made, which Lamer concludes "is the most important of the hearsay dangers." While his judgment indicates that the inability to contemporaneously cross-examine can be quickly remedied by providing an opportunity to cross examine at trial, the helpfulness of such a suggestion is questionable when one considers why the hearsay evidence is being offered in the first instance. If the witness is on hand to be cross-examined during the trial, it would be far easier to avoid the legal particularities surrounding the hearsay statement in favour of *viva voce* testimony. Lamer recognizes this, of course, and in doing so provides great assistance to those looking to introduce videotaped testimony at trial by holding that "the inability to cross-examine should not be a barrier to substantive admissibility," where other, unnamed, "circumstantial guarantees of reliability may suffice to render such statements substantively admissible." In light of such guarantees, the absence of cross-examination is to instead inform a determination of weight.

Alleviating the Decrease in Reliability Associated with an Absence of Contemporaneous Cross Examination

When considering video evidence in relation to land, one of the ways Lamer's suggestion of alternative guarantees of reliability might be heeded is through the testimony (and associated cross-examination) of an expert witness.*** For instance, in a situation where a multitude of statements is required to demonstrate the customary usage of a portion of land, by combining expert testimony with other measurements made by the expert (e.g. a land surveyor's own measurements, an archaeological record), the expert may be in a better position to be cross-examined on the truth of the testimony than each individual community member who has provided a videotaped statement.

To this suggestion the Canadian case law, while still somewhat unsettled, convincingly indicates that where an expert's opinion is based in part upon hearsay evidence (the videotaped statements) and in part upon admitted facts (historical measurements, the archaeological record) the matter is purely one of weight.[16] From such a position can be predicted that as sole reliance on the hearsay testimony as the basis for an expert opinion goes down, the weight attributed to the opinion will increase. Such a position serves as validation for J.H. Holloway's 1952 comments that "a surveyor should never give any consideration to hearsay evidence which is not thoroughly confirmed by other independent evidence."[14] While the courts have become more flexible, these historical comments remain an instructive guide.

Footnotes

* For Canadian purposes, Lamer indicates that this warning should refer specifically to ss. 137, 139, and 140 of the Criminal Code, and the elements of and sanctions for those offenses should be repeated by the statement-giver. In Alberta, oath taking powers have been granted to the land surveyor by virtue of s.13 of the Surveys Act.

** If the video recording involves questioning, leading questions should be avoided by the examiner. There are two types of leading questions: a question that suggests the answer and a question that assumes a fact in dispute. Stuesser's "An Advocacy Primer" (note 5 at 191) is instructive: "[I]t is trite law that the party who calls a witness is generally not permitted to ask the witness leading questions...The principle behind the rule is that in direct examination you are presenting witnesses favourable to your case, who are sympathetic towards your client and who are susceptible to your suggestions. Therefore, suggestions on your part are not permitted." An examination full of leading questions may incur significant objections, and is likely to be given little weight at trial.

Summarizing the above, it is likely that pre-recorded video testimony can satisfy the first requirement of the hearsay exception if the testimony is sworn (under oath,) and the video recording is of a sufficient standard to communicate to the trier of fact the *presence* of the witness. Justice Lamer's holding in *R. v. B (K.G.)* indicates that an inability to contemporaneously cross-examine witnesses on their recorded statements should not be a barrier to substantive admissibility, and instead should be a consideration when making a determination as to the weight accorded the evidence. Furthermore, in an analysis of the law surrounding hearsay and expert opinion, the writers suggest that testimony involving expert opinion based partly on the video-testimony and partly on the expert's own findings will serve to bolster the reliability (as well as the general weight) accorded the evidence.

2nd Requirement for the Inclusion of Hearsay Testimony: Necessity

The second requirement outlined in Khan to allow for the introduction of hearsay evidence is *necessity.* Generally, necessity is interpreted as consisting of a determination of whether the reception of the hear say statement is "reasonably necessary.****

The clearest construal of this concept, cited in both *R v. Smith*[15] and *R. v. B. (K.G.),* uses the criteria set out by Professor Wigmore to define the classes which may be found to satisfy the necessity requirement:

(1) The person whose assertion is offered may now be dead, or out of the jurisdiction, or insane, or *otherwise unavailable* for the purpose of testing. This is the commoner and more palpable reason.

(2) The assertion may be such that we cannot expect, again, or at this time, to *get evidence of the same value* from the same or other sources ... The necessity is not so great; perhaps hardly a necessity, only an expediency or convenience, can be predicated. But the principle is the same.[16]

Thus, necessity generally operates to require a sufficient reason to accompany the admission of hearsay evidence into the court. To the consideration of a matter involving video evidence in relation to land, it should be stressed that whether or not necessity were to be determined is entirely fact based. Recognizing this caveat, we suggest that (in addition to the categories in which necessity might normally be determined,) *convenience* may be a factor capable of satisfying the second class of necessity as set out by Wigmore, above. If a number of statements were recorded testifying as to the customary usage of the land, and the witness statements are more useful in the context of the video displaying the land in question, the requirement of necessity might be established when the impossibility of gathering contemporaneous evidence of similar breadth and quality is considered.

RELEVANCE TO VIDEOS OF BOUNDARY EVIDENCE

Videos cameras are being used increasingly by survey field crews nowadays. The challenge is to develop methods to ensure that the video clips will be considered as valid evidence in court. In fact, the following applies to most forms of electronically captured and stored evidence.

Videos and photographs may be of major assistance in resolving boundary disputes. For example, a witness called before the Board under Section 9 of the Surveys Act of Alberta to provide testimony on a survey error may perhaps use a video to demonstrate aspects of his or her testimony, as per the high water mark dispute mentioned earlier. In this instance, the witness is subject to cross-examination and the video would merely be demonstrative. The video might provide valuable assistance in understanding the facts of the case. The witness can also be cross-examined as to the authenticity of the video and the facts that it purports to establish.

Likewise, if a land surveyor interviews a witness about evidence relating to a boundary, whether they are compelled to attend under sections 14 and 15 of the Surveys Act or not, the statement of evidence has to be signed by the witness. Recording the interview on video would also serve to provide a more comprehensive picture of the case, particularly if the interview takes place in the field, and even more so if the deponent is illiterate. However, the primary evidence would be the signed written record—unless of course the video shows this to be inaccurate.

One possible problem arises if field crews take videos of objects in the field and this video then becomes necessary as evidence in litigation. Space does not afford a detailed

Footnotes

*** Who, incidentally, may already be on hand for the purposes of Authentication. See heading Legal Requirements Affecting Video Evidence: Authentication, above.

**** In Khan, "sound evidence based on psychological assessments" indicating the potentially traumatic or harmful nature of having a child testify in an open court was suggested as a potential satisfier of the necessity requirement. R. v. Smith held that the death of a declarant before trial was also a sufficient scenario for a finding of necessity.

description of the procedure to be followed in creating and storing this video, and this we will cover in a later article. Suffice it to say, that the crew members and office staff should attempt as best they can to ensure that the video is regarded as authentic and will stand up to the evidence criteria mentioned above. It should still be useable as evidence if the person who took the video leaves the firm.

CONCLUSION

The proliferation of digital video technology in recent years has introduced alternate ways for the surveyor to record his or her observations. In contemplation of a legal role for these recordings, this paper has examined the evidentiary hurdles that must be addressed when considering the introduction of video evidence in relation to land to the courtroom. Beginning with the general acceptability of video evidence in Canadian courts, addressed above are the legal concepts of relevance, authentication, weight, hearsay, and the potential concerns created by the inability for opposing counsel to contemporaneously cross-examine the witness testimony. While the relevant statutory provisions of the particular jurisdiction in which the evidence is sought to be used may nuance the common law standards set out above, a working knowledge of the principles of evidence will allow a surveyor to confidently make recordings and observations that attach a legal weight.

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Software Review: cvlTracker by cvlSoft

BY: Jim White

Reprinted from *"the Professional Surveyor"* - Volume 26 - Number 12 ... December 2006 (as seen in "The Link", September, 2007)

cvlTracker by cvlSoft, Inc. is an integrated office management system designed for surveying businesses. Organization and efficiency are what it's all about. There are several elements to the package to control work flow, employee management, bookkeeping and office automation. The package is individually customized to fit a company's particular needs and therefore may look significantly different as it is set up for one firm to the next.

www.cvlsoft.net

Work Flow Management

The easiest way to look at this part of cvlTracker is to follow a sample project though the system. Various classifications and work item descriptions are set up at the time of installation but can be modified as needed from job to job.

When a project enters the system, it is classified by job type such as boundary survey, topographic survey, as-built survey, or construction stake out. At this point, numerous fields are available for filling in details pertaining to the project such as tax ID number, address, or sectional breakdown (again a place that reflects customization). Each class of job is assigned a series of work items in order of operation, but that order can be overridden as required by each job. In the case of a boundary survey, the order of the work items might be:

1. contract/retainer in place
2. deed research
3. office deed plots and reconnaissance maps
4. field work
5. office computations and analysis
6. drafting
7. checking/review
8. final plottings
9. legal description
10. billing

As the job proceeds, notes and phone message memos can be added as well as other attachments such as scanned deeds, CAD drawings, data collector files, legal descriptions, and correspondences. In an extreme case, a firm can opt to go to entirely digital files, scanning in all paperwork, thereby doing away with the large volume of papers that often accumulate in a file. This paperless office scenario brings data management and data security issues to the forefront, and it is discussed later in the review.

As job class and work items are created, projected time requirements can also be added. Once employees complete a work item, the time spent on that particular task is entered into the system, and a running assessment of profitability is possible.

To help organize field crews, a scheduler/routing routine is used that weighs each project by a combination of priority, completion deadline, and anticipated workload. A job sheet is printed for the employee who will handle each work item, including the project and work item particulars and also a bar coded identifier. As employees finish the work item, they scan the barcode and then enter their time spent and any additional notes or comments. A wireless bar code reader is implemented to increase office efficiency, but one was not provided for this review so I needed to type in the job numbers at each step.

When dispatching field crews for the day, the package uses the street address of each job site to suggest an efficient route. Maps and driving directions can also be printed using Yahoo's map functions.

Employee Management

Each employee working on a project is identified with a job title and is either denied or allowed to access and/or modify the various elements of the projects per that title. For example, a field crew member or drafter may not be able to mark projects as completed and paid or view project contracts, while a manager could view and modify any element of the project as needed.

cvlTracker keeps track of employee time sheets and allows for a numerical comparison of employee efficiency. It also maintains employee pay rates, employment dates, and contact information. An additional option is GPS vehicle tracking, where a receiver is placed on each field vehicle and the track log can be downloaded at the end of the day or monitored by satellite communications for real-time tracking.

The GPS options were not looked at for this review.

Bookkeeping

cvlTracker includes tools for managing cash flow by tracking receipts and payable bills. Several reports are available to assist in tracking and analyzing cash flow. The reports can also be exported to other accounting software as needed.

Office Automation and Data Management

This software uses a combination of web-based and local resources. All the data used in project, employee, and bookkeeping management is stored on cvlSoft web servers and accessed through a web browser. Secure web connections are used extensively to ensure data confidentiality (which means that the user's office must have a high-speed Internet connection). Storing the data on the web servers has two advantages: that data is backed up frequently (every few hours) and is available from any location or from remote offices. cvlSoft has multiple servers at various locations to avoid service interruptions. To access any data, an intruder would need to know your company's internal client name, a user name, and a password (this type of protection scheme is similar to that used by the Internet banking industry). Data from the backups is copied to CD, DVD, or tapes and sent to the clients. Part of the contract with cvlSoft ensures that if clients discontinue the service, they will receive all of their data in a usable format.

Another element of data management is a data mirror installed on the user's file server. Although this portion was not installed for this review, the data mirror will copy any file that is created, modified, or deleted across the Internet to cvlSoft web servers. This data is then included in the regular data backups. The fact that all files are mirrored allows the client to use whatever software he or she wishes in terms of data collection, analysis, and drafting, and all of that digital data is automatically stored in a second, secure location.

Legacy Data

Any operating company is going to have existing files for their projects prior to using the cvlTracker package. To implement the system on a really useful scale, those files need to be entered into the system. cvlTracker has a batch scanning routine in which all the paper data in an existing file can be scanned and attached to a project for future reference. Any new project can reference any older projects as "helper" files. The data from these helper files can then be shared and used on the current project. All projects can be searched by address, town, or other keys for relevant data. Help is provided online for each data screen, and a tutorial and voice message lead you through the tasks on that page, which may be paused or repeated at any time.

When the software is purchased, a technician from cvlSoft comes to the site and installs the barcode scanners, batch scanner, and related hardware and software and performs the initial customizations. In the course of this review, I used only sample data available on cvlSoft's servers, but it was easy to customize and navigate around. The program operates entirely from the familiar interface of a web browser. Even in the case where my browser died (probably due to too many simultaneous tasks), the data I had entered was there waiting for me when I restarted the browser. The program can be purchased for $10,000, or customers can choose a monthly service agreement. The agreement includes a $750 activation fee and runs between $150 and $300 monthly, depending on the hardware and programming required to implement whatever options and customizations a client may desire. This monthly fee includes unlimited data storage, free technical support, and free upgrades.

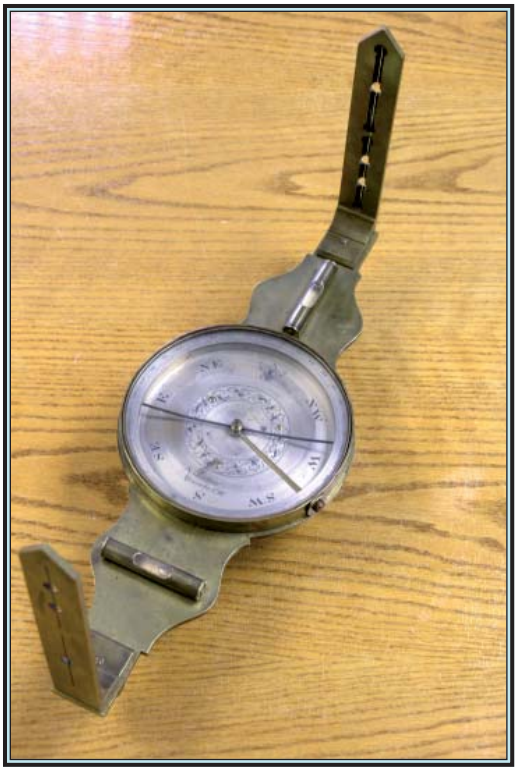
cvlTracker offers an interesting option for managing a surveying company. As surveying becomes increasingly computer-oriented with large amounts of digital data, cvlSoft is offering companies a method to manage and secure that data. Although some users may have qualms about storing all their data in a remote Internet location, cvlSoft has certainly made every attempt to protect and secure that data.

Jim White owns a private practice in Schenectady, New York, that provides surveying and software development services. He is also the software reviewer for Professional Surveyor Magazine.

So you think you know your survey instruments . .

On the Surveyors Compass that is part of the collection of survey artifacts assembled by Tom Crump and (some day) destined for a surveyors' museum, why does the compass have East on the left and West on the right?

Answer(s) will be published in the next edition of the SLSA Corner Post.



Mentoring - Who benefits?

By Janice Henshaw, Executive Director, ABCLS

Reprinted from "The Link" Volume 30 Number 3 - September 2007

Is mentoring the new mantra of the millennium?" This is a question asked in a June 2003 article written by Janice Cooney for the Conference Board of Canada. She answers,

> *"Certainly, it addresses many of the challenges that today's organizations are facing: an ageing workforce, increased competition, and the need to transfer and extend employees' knowledge."*

Cooney's research on leading organizations in this time of rapid technological change indicates that they are "considering innovative ways to retain talent, help employees learn and grow, and transfer knowledge for more experienced workers to those less experienced. Mentoring is one way organizations are doing this."

She reports that "Knowledge transfer from one generation of employees to the next is emerging as a key organizational issue. With large numbers of employees eligible for retirement soon, businesses must devise strategies to avoid a serious loss of corporate memory. Mentoring is one low-cost method of transferring skills and supporting continuous learning throughout all levels of organizations."

From Wikipedia comes the following definition for Mentor: *"a trusted friend, counsellor or teacher, usually a more experienced person."* The typical image of a mentor is a person who has a great deal of work and life experience, but Neil Bennett, in a recent discussion with the Board on mentoring, pointed out that new land surveyors, with three years of experience or less, are actually in an excellent position to provide guidance to newly-commissioned surveyors. Likewise those students on the verge of being commissioned can serve as valuable guides to those just beginning their training.

The Association of Professional Engineers and Geoscientists of BC (APEGBC) began a formal mentorship program in 1996 according to Andrea Hodgins, Professional Development Coordinator, and she notes that the role of the Mentor is different from the role of a supervisor. While a supervisor directly supervises the work of the trainee, the mentor's role is to help with broader types of questions, such as career choices, work experience, or just advice on day-to-day matters relating to professional growth.

Mentors at APEGBC are matched with trainees on the basis of industry, expertise, and geographic location. An application form is available on their website for both trainees and mentors, and a volunteer members' committee meets to look at the database of mentors available to find a good match. While it can take several months to complete this process Andrea reports that the program has been very successful, with approximately 15 matches per year, adding up to about 100 since inception.

In school, one of the best things that can happen to a student (besides weekends!) is to meet a teacher who is genuinely interested in the student's progress and willing to spend time with them on a one-to-one basis to discuss ideas and career choices. In recognition of this, UBC has initiated a Tri-mentoring program that creates opportunities for students through "clusters."

Each cluster comprises a junior student (1st or 2nd year) and a senior student (3rd, 4th or grad) of the same program and matches them with an industry-related professional. This approach provides the opportunity for junior students to connect with a senior student mentor and a working professional, while offering senior students a chance to connect with a working professional. The program also offers both the industry professional and the senior student the chance to give back to the university through their roles as mentors. The program runs each year from September to April, and could provide an excellent template for a similar system at BCIT and other universities with surveying programs.

More information about the Tri-mentoring program can be found at http://www.careers.ubc.ca/mentoring.cfm

Mentoring is also popular in private sectors. In 2002 Bell Canada launched "Mentor Match" - the company has developed an on-line matching capability that enables mentees to browse a cross-organizational pool of potential mentors, using a search tool that generates a list of suitable mentors based on information provided by mentees. The Mentor Match program is open to all permanent employees, not just those who are considered "high-potential" or executive level. Logistically, the program is self-administrative and inexpensive to maintain, and its designers have ensured that it is user-friendly and accessible by dividing it into easy-to-follow steps.

The following are some of the main principles and ideas that guided the design of Mentor Match:

- Keep it simple, yet rigorous - first and foremost, keep it uncomplicated - you sign on, enter your data, find a match, and get started
- Make it formal - a one page agreement legitimizes the partnership and sets up the meeting frequency and commitment
- Make it accessible - to all full-time employees across the organization.
- Get the Executive Team on Board - there must be complete support for the program.

- Communicate, communicate, communicate - launch the program with momentum and lots of publicity to generate excitement about the program and encourage people to sign up immediately.
- Build the Mentor pool - in many organizations, the number of mentees outnumbers the amount of available mentors - therefore prior to launch, ensure that you have a wide selection of mentors signed up and ready to participate.
- Don't blow the budget - Bell reports that the design and development of a program doesn't have to be costly or take long to develop. What it does take is focus and commitment to deliver on the needs identified by the mentees.

Mentorship is of benefit to anyone who has a sincere desire to continuously learn and develop. It is of even greater importance if a motivated employee works with co-workers who take a laissez-faire attitude to work. Mentoring can also be a great resource for people with new ideas stuck with co-workers or managers who oppose anything that threatens the status quo; mentors can validate new ideas and provide suggestions for implementation that may never occur to more junior employees.

It is easy to sit back and watch people make mistakes, to be critical, or to allow misunderstandings to go unchecked. To mentor someone is to stand up and take responsibility, to help a deserving person move forward along the path of self-discovery and the development of competent skills. It is a fulfilling process for both parties. If your fires are dampening, it may be just what you need to become inspired again.

Consider your style - if you resemble a large cedar tree and try to hold all of the management details within yourself, you will shade out everything that tries to grow below or around you. No one will reach their full potential, and motivated junior employees will assuredly leave for greener pastures. If you act more like a trellis, however, giving ready support and guiding improvements when appropriate you will not only be giving an invaluable gift to your mentee, you will definitely have a nicer garden!

HOW A MENTOR CAN HELP

The Mentoring Leadership Network at:

http://www.mentors.net/031ibrary/advice.html

provides a collection of suggestions from experienced mentors for those starting out.

Here are four to keep in mind:

1. ALWAYS BE POSITIVE AND SUPPORTIVE -The ability of the protege to grow is dependent on self esteem, which is not at risk when ASKING for advice, but which IS decreased by unsolicited "advice." Almost always your desire to "suggest" meets your needs more than the protege's.

If you really question a practice, ask questions to reveal the thinking behind a decision.

2. THE PROTEGE DETERMINES HOW MUCH HELP YOU CAN BE - Your success as a mentor is dependent on the protege's readiness and openness for learning. If you offer advice before the right time, it probably can't be understood or used yet by the protege. Remember, you'll only be able to offer an idea once or twice before doing it again is uncomfortable. Wait until the need is felt by the protege too.

3. BE WILLING TO "BACK OFF"- You'll make mistakes of timing or approach when your ideas may be very good. Be open about asking for feedback when that happens and learn from it. Don't create an impression of "pushiness" because that won't be seen as meeting a need in the protege.

4. DON'T TAKE REJECTION OF IDEAS PERSONALLY- More often than not rejection relates to readiness to learn and is a valuable clue about the protege.

BENEFITS TO THE MENTOR

- Enhances leadership, teaching, and communication skills
- Creates new support networks with other professionals in the field
- Promotes greater collegiality among professionals within and across institutions
- Provides intrinsic satisfaction (makes you feel good) by helping an emerging professional develop to his/her potential.
- Demonstrates professionalism and a commitment to personal and professional development of self and colleagues
- Promotes the professional recognition of mentors for their commitment to developing the talents of new professionals

BENEFITS TO THE ORGANIZATION

- Contributes to a positive organizational climate and promotes a clearer understanding of professional responsibilities and expectations
- May increase employee satisfaction and retention by reducing a new employee's sense of isolation
- May result in improved employee job performance, contribute to faster learning curves, and may increase employee commitment and loyalty
- Promotes a positive image of the organization and reflects employee centered values
- Contributes to the development of partnerships or allies that may be useful to the organization in the future
- Effective mentoring can be one of the best tools for building diversity p

From the Georgia Dept of Adult and Technical Education
http://www.coe.uga.edu/chds/mentoring/benefits.htm

Dealing with Mr. Handshake

By Pro-Form Insurance Services (www.proforminsurance.ca)

Reprinted from "The Link" Volume 30, Number 3, September 2007 (as submitted by John Armstrong, BCLS, Cranbrook, BC)

The following material is provided for informational purposes only. Before taking any action that could have legal or other important consequences, speak with a qualified professional who can provide guidance that considers your own unique circumstances.

You are no doubt familiar with the stereotypical Mr. Handshake the highly successful self-taught, rough-hewn businessman who, when offered a written contract, says something on the order of:

> *"Son [or Young lady], where I come from, we establish a good business relationship with a firm handshake. It was good enough for my daddy it's good enough for me."*

A number of design firms, particularly those who serve small towns and rural areas, indicate they still run into such individuals fairly often. Even in the big cities, you'll sometimes hear a client say something along the lines of:

> *"Y'know, Such & Such Associates has a contract that's about one-tenth as long as yours. It's like a breath of fresh air."*

Mr. Handshake's overriding assumption seems to be that a thorough contract is unnecessary if not insulting because, chances are, nothing serious will go wrong. And if something does go wrong, a frank person to person chat will set things right.

Often a designer and client can indeed iron out problems with a quick conversation. But rarely does that happen when there is a lot of money involved. All of a sudden, Mr. Handshake isn't quite so amicable and those verbal agreements you entered into become quite fuzzy.

So how do you deal with this situation? How do you convince Mr. or Ms. Handshake that a comprehensive written contract is far better than a simple short-form letter or, worse, a verbal agreement?

Consider the following when negotiating with someone who thinks comprehensive written contracts are a waste of time.

"A verbal agreement ain't worth the paper it's printed on," Louis B. Meyer is supposed to have advised. Still, a verbal agreement can be binding. When you start to perform services for a client, or your client starts to pay for future services, you both act as though a contract is in effect. Therefore, in the eyes of the law, one is in effect. The verbal agreement that started this transaction, no matter how brief, is a contract.

What happens if a problem arises? In that case, you and your client will refer to your respective understandings of what was agreed to. Not surprisingly, those understandings often differ. So who determines what each of you really said and meant? That responsibility falls to a trier of fact - typically a judge, jury, arbiter or mediator. Unfortunately, the trier of fact was not there to hear the verbal agreement, may not fully understanding the types of services you render and may be unfamiliar with the prevailing standard of care for delivering such services. So when a client tells you that a written contract is unnecessary, you might reply:

> *"You know, Mr. Handshake, I don't like the time and expense of these written agreements any more than you do. But I sure as heck would rather have you and I determine our fate rather than a bunch of expensive lawyers and folks who don't know us from Adam. A written agreement will help us make sure that should a dispute arise, it will be settled in accordance with the facts we agreed to, not the opinion of some outsider."*

Mr. Handshake also needs to be reassured that having a written contract does not indicate a lack of trust or weaken the importance or impact of personal diplomacy. If anything, it can enhance trust and diplomacy by creating a reasonable framework for after-the-fact discussions and modifications. A written contract can call for face-to-face meetings or alternative dispute resolution techniques such as mediation in the event disputes arise.

Written Contracts Can Be Amended

Actually, when Mr. Handshake says "We don't need a piece of paper to tell us what's right and what's wrong," he's absolutely correct.

No matter what a written agreement may say, it can be amended through mutual consent of the parties involved. A written contract does not prevent you and your client from reaching creative solutions as problems may arise.

Consider this: You and your client both sign a contract. Each of you put a copy in a file. A problem arises. What's the first thing you do? Refer to the agreement? Unlikely. The first thing you probably do is call one another and try to work it out. Your client, whether he or she knows it or not, often has the upper hand in such "work-outs." You want to keep your client satisfied in order to obtain future business. Let the client know that:

> *"We don't look at a written contract as a weapon, Mr. Handshake. We see it as a repository for understandings we have agreed to. When it comes to what your project needs relative to my discipline, I'm the doctor and you and your project are the patients. Likely, we will need to discuss a lot of issues to make things right, and we need*

to keep track of what it is we discussed. If we don't talk and we don't record what we talked about, one of us - or both of us - stands the risk of being in for an unpleasant surprise. I don't know about you, but I don't remember everything said in a lengthy meeting. Sometimes our memories differ or fade. By putting our agreement in writing, we can have a meeting of the minds, based on what we see as the road ahead. Now, as we start down that road, we may run into a few unexpected curves or detours. We'll talk about it and do our best to resolve problems because you want your project done right and I want to keep you as a client."

Don't Forget Third Parties

One important reason for a written agreement is its ability to prevent third parties from gaining the standing they need to sue you and/or your client based on a contention that they are third-party beneficiaries of your agreement. And if the agreement is verbal, the third parties may enjoy an advantage. Juries are sympathetic to third parties, especially those with whom they can readily identify as "the little guy." Tell Mr. Handshake:

"Your Daddy was a wise and fair man indeed. But he didn't have to deal with all the litigious stuff we have to contend with today. It's a whole different world."

Your written agreement with a client can address third-party liabilities. It can help prevent unauthorized third-party reliance, and can be attached to appropriate deliverables (such as reports) to help ensure any third party reviewing them understands the contractual limitations (scope, schedule, fee, general conditions) affecting them.

Where There's a Will There's a Way

Chances are Mr. Handshake has a will, in essence, a written contract with the future. It presupposes mortality. You may point out to Mr. Handshake that, if anything happens to either of you, the project will be affected, problems will be likely, dollars will be involved and disputes might arise.

"A written agreement, to a very real extent, is your will for the project, Mr. Handshake. Should something happen to either one of us, the written contract will tell our survivors what to do. They can't have our understandings. They need that guidance. We owe it to them."

Is It Insurable?

Suppose you and Mr. Handshake enter into a verbal agreement and later have a dispute you can't resolve. You go before a judge or jury who, based solely on your verbal testimonies, issues a judgment in Mr. Handshake's favor. Mr. Handshake should be happy, right? Well not necessarily.

Suppose the wording of the judgment, written by someone not well versed in laws and standards governing the design and construction industry, is perceived by your insurer as uninsurable? Mr. Handshake won the battle, but he may have just lost the war. Unless your firm can cover the damages, he may have just lost his design firm and jeopardized his project. Tell Mr. Handshake:

"I think longwinded written agreements are a pain, too. But I have a great insurance company, solid coverage and a fantastic agent. They can help us review our written agreement and assist us in making sure that it's insurable. This benefits you as much as me. An uninsurable agreement, verbal or otherwise, doesn't do either of us any good."

Short Is Not Always Sweet

Some clients will grudgingly agree to sign brief letters of agreement or similar "short-form" contracts, but they remain averse to long agreements that require more time to draft and review. The problem is that short-form agreements are, by nature, silent on a number of issues. Once again, outside triers of fact are asked to resolve disputes without the benefit of a comprehensive written agreement.

So what do you say when Mr. Handshake, says, "I don't want a contract this long"? You might reply:

"What is the harm of having a long contract rather than a short one? A long one serves to cover a range of issues that are of benefit to both of us, especially regarding third-party claims. As long as the contract is well written in reasonably understandable terms, what is the drawback? Some of the added issues might come up, and we'll be glad we took the time to include them. And if they don't come up, what's the harm?"

You might also add:

"A big advantage to drafting and reviewing a thorough contract is that it allows us to discuss the 'what-ifs' and address the answers. The more we know about the project and reach agreement on various issues, the more we set out what we expect from one another. That's not a bad thing."

True Value

Arguably, the greatest value of drafting a comprehensive contract is not the words that go onto the paper, but the process through which important issues are identified and discussed. The client can gain a better understanding of your mutual risks and what the two of you can do to manage them. The client can learn what the both of you can do to lower the likelihood of errors or omissions. And you can both set up a framework in which any problems that do arise can be addressed in a fair and equitable manner that focuses on problem resolution rather than finger-pointing and disagreement as to what you had verbally agreed to.

The contract-formation process, more than any other aspect of your project involvement, gives you the opportunity to demonstrate your professionalism and generate the communication, coordination and cooperation required for project success. And that's something every Mr. Handshake can give a thumb's up to.

- Review all Crown land adjacent to water bodies and ecologically sensitive areas to support environmentally sustainable land use planning
- Develop growing area risk zones to aid in determining crop insurance rates and coverage levels
- Map rainfall data and crop yields to assist in crop insurance claim payouts and appeals
- Generate weekly maps from crop report information submitted by a network of reporters across the province, including weekly rainfall, cumulative rainfall, soil moisture conditions, crop damage, livestock water availability, etc.

Public Safety

Saskatchewan has, over the last few years, implemented a Sask911 mapping system at each of its communications centres in the province. Each 911 call operator has access to map information at their fingertips to help in handling calls and responding to emergency situations. The dynamic map has approximately 100 layers of key thematic information available with particular layers continuously updated and maintained.

In 2006 Saskatchewan and the Government of Canada, through the GeoConnections Program, entered into a partnership agreement to produce an enhanced Emergency Situation Awareness System to assist the coordination of provincial, municipal and federal teams during emergencies and natural disasters. This project will implement a shared access Critical Incident Management System with dynamic mapping capabilities to provide situation awareness information and aid in decision making. The project is targeted for completion in 2007.

Environment

The province produced a seamless Saskatchewan Stream Network in 2005 which helps manage riparian, wildlife, fisheries, water quality and climate change programs to name a few.

The Designated Areas Project started in 2004 and is ongoing. The project creates and maintains a comprehensive and accessible digital map that accurately defines land areas in Saskatchewan that have various levels of developmental restrictions. Typically "designated lands" include the various National and Provincial Park lands (e.g. Historic Parks, Park Reserves, Recreation Sites), Environmentally Sensitive lands (e.g. Wildlife Habitat Protection Act Lands, Fish and Wildlife Development Fund Lands, Game Preserves) and some privately owned lands (e.g. Saskatchewan Wildlife Federation Lands, Private Stewardship).

A project to map oil and gas surface lease areas was started in 2006 and is continuing. Once completed it will be maintained and will play a significant role in better evaluating environmental sensitivities within land use assessments.

Saskatchewan hosts a number of online interactive mapping applications (http://giswebl.serm.gov.sk.ca/mapserver), both public or secure, related to the following focus areas:

- Saskatchewan Crown land
- Designated areas
- Saskatchewan Stream Network
- Environmental Assessment Project
- Deer kill locations
- Bird Atlas
- Wildlife (Conservation Data Centre)
- Land claims (treaty land entitlement)
- Bathymetric maps
- Available orthophotos
- Values at risk
- Groundwater management
- Water wells
- Data quality control (water wells)
- Parks quality control

The province maps fire disturbance annually and produces Web-based fire danger maps and products for internal service to support Forest Protection and Fire Management staff.

The province has, over the last three years, used GIS and mapping extensively in the Great Sand Hills land use planning consultation with ranchers, First Nations and oil and gas interests in this environmentally sensitive area. Maps were vital in laying out the situation, assessing options and engaging stakeholders in the decision making process. The success of this consultation has led to more efforts and more detailed mapping in other areas such as Greenwater, Nisbet, Fort a la Corne, North Central and Athabasca.

Land Ownership

The Land Titles Registry System is administered by Information Services Corporation (ISC) for the province. ISC also maintains and distributes a number of key base map products including the cadastral ownership parcel map, topographic maps and provincial aerial photography and satellite imagery. A number of related administrative boundary maps such as Rural Municipalities, Urban Municipalities, Indian Reserves, Parks, and Electoral Districts are also maintained.

A new mapping product, recently completed in early 2007, is the SaskGRID map. It provides a province-wide referencing system consisting of the township, section and quar-

ter-section survey system in south Saskatchewan, with a similar theoretic system through northern Saskatchewan where few surveyed parcels exist. This base map enables a standardized system for government and industry to relate numerous other databases.

A mineral cadastral GIS map product was completed in early 2007 which matches surface cadastral parcels with sub-surface mineral ownership. This product is expected to be very useful to the petroleum and mining industry in the province. A complementary "Geo-Search" tool is presently under development to enhance searching for ownership and mineral titles through a map interface.

In 2006 a number of map datasets were made freely available to the public as part of a government-wide policy to make GIS maps more accessible. These map products can be accessed from www.isc.ca

Geology

Each summer bedrock and surficial geological mapping projects, at various locations in northern Saskatchewan, are carried out with results published in the fall. Airborne geophysical surveys, over large tracts of land in northern Saskatchewan, have been done in partnership with the Geological Survey of Canada and can be accessed on the Internet.

The Geological Atlas of Saskatchewan CD-ROM and Web site is also updated and added to annually. The multi-disciplinary EXTECH IV Athabasca Basin study comprising mapping and other components is nearing completion with results to be published in 2007.

The province has scanned numerous geological reports and maps over the last three years which are available on the Internet in support of mining and exploration activities. A further initiative to scan paper petroleum well data files and mineral exploration assessment files, with the goal of making the information available digitally on the Internet, is in progress.

Saskatchewan Mapping Activities Planned for 2007

A number of key projects are expected to be initiated or completed as follows:

- Geo-portal—A single window entry point for Saskatchewan's geospatial data and business applications. Implementation of this project will be staged to initially meet the needs of key industry clients. Discovery, view and download of geospatial data from government databases is planned as well as access to required business services.
- Enterprise Map Distribution—Currently each department produces both paper maps and electronic maps as required and uses these products to support their program needs which often includes distribution to the public. This project is investigating the distribution of all Saskatchewan government map related information through a single responsible custodian, in order to better serve the information needs of industry and the public at large.
- Geospatial Imagery—Acquisition of new geospatial imagery of the province is planned for 2007 with an ongoing imagery refresh and maintenance program thereafter. The Saskatchewan Geospatial Imagery Collaborative is leading the project. The Collaborative is a partnership of 25 organizations representing Saskatchewan government agencies, federal government agencies, Saskatchewan municipalities, First Nations Tribal Councils, non-government organizations and post-secondary institutions.
- Crown Lands Administrative Management System—A common administrative system based on accurate map information and GIS analysis is planned for development in 2007 by Saskatchewan's land and natural resource management departments. The system will eventually facilitate faster public application and acquisition of appropriate permits regarding Crown and other land. Regulatory self compliance for organizations using the land will also be facilitated, through greater and easier access to up-to-date land restriction and caveat information. The system will also enable the agencies of government to better coordinate their efforts in holistically managing the land resources of the province. A staged approach towards this integrated land management system will be employed and the project is expected to take several years to become fully implemented.
- Emergency Management Map Integration Project—The Situation Awareness system with critical incident management and mapping capability, mentioned previously as a Saskatchewan/Canada partnership project, is targeted for completion in 2007.
- The Saskatchewan Updated Road Network Map Database—This is being maintained through a partnership arrangement between the Governments of Canada and Saskatchewan. Saskatchewan Highways and Transportation collects and maintains the road data and shares the information with Natural Resources Canada for inclusion in the GeoBase National Road Network (NRN).

The trend towards the greater utilization of online dynamic interactive maps is expected to continue with increased efforts towards storing, maintaining and linking map databases together to enable greater flexibility from the map information collected. Current and reliable map information has long been a key component of government operations, particularly in location based decision making. Efforts will continue to deliver innovative and cost effective map information and services to the public.

John Potter, P.Eng. is Senior Geomatics Consultant, Business and Policy, Office of Geomatics Coordination, Government of Saskatchewan

www.gov.sk.ca

An Ancient Riddle (and a Gentle Modern Jab in the Ribs) . .

? ? ? *and the Puzzle is: How Did They Do It ?* ? ? ?

By G.M. (Gaby) Neunzert

Reprinted from "Side Shots" Volume 38, Issue 3, August 2007

This is a gentle jab in the ribs to the modern surveyors who think they have all the answers and who do not necessarily consider the high degree of sophistication the ancient surveyors possessed, to be followed by some personal observations not necessarily related to the "puzzle."

About 2530 years ago or roughly 530 BC, Polycrates (570 - 522 BC) was the ruler of the Greek island of Samos in the eastern Aegean Sea, just off the coast of Turkey. He ordered his surveyor/engineer to start construction on the tunnel to provide a secure water supply for the capital city now called Pythagorion (in honor of Pythagoras who was born on this island about the time of this story and hence his proper name "Pythagoras of Samos"). Construction started about 530 BC under the direction of Eupalinos of Magara, this is about the same time as Pythagors left the island after some unpleasantness with Polycrates the local "tyrant." Before the start of construction, which lasted from 15 to 25 years, Eupalions had to consider several items, namely:

On the surface at least, the puzzle is rather simple and it involves driving a tunnel 3400 feet long from one side of Mount Kastro to the other side. Especially with GPS, the modern solution of what is fondly called a "missing course traverse," is a piece of cake; but was it that simple about 2500 years ago, when surveying a tunnel through a mountain was definitely a major accomplishment?

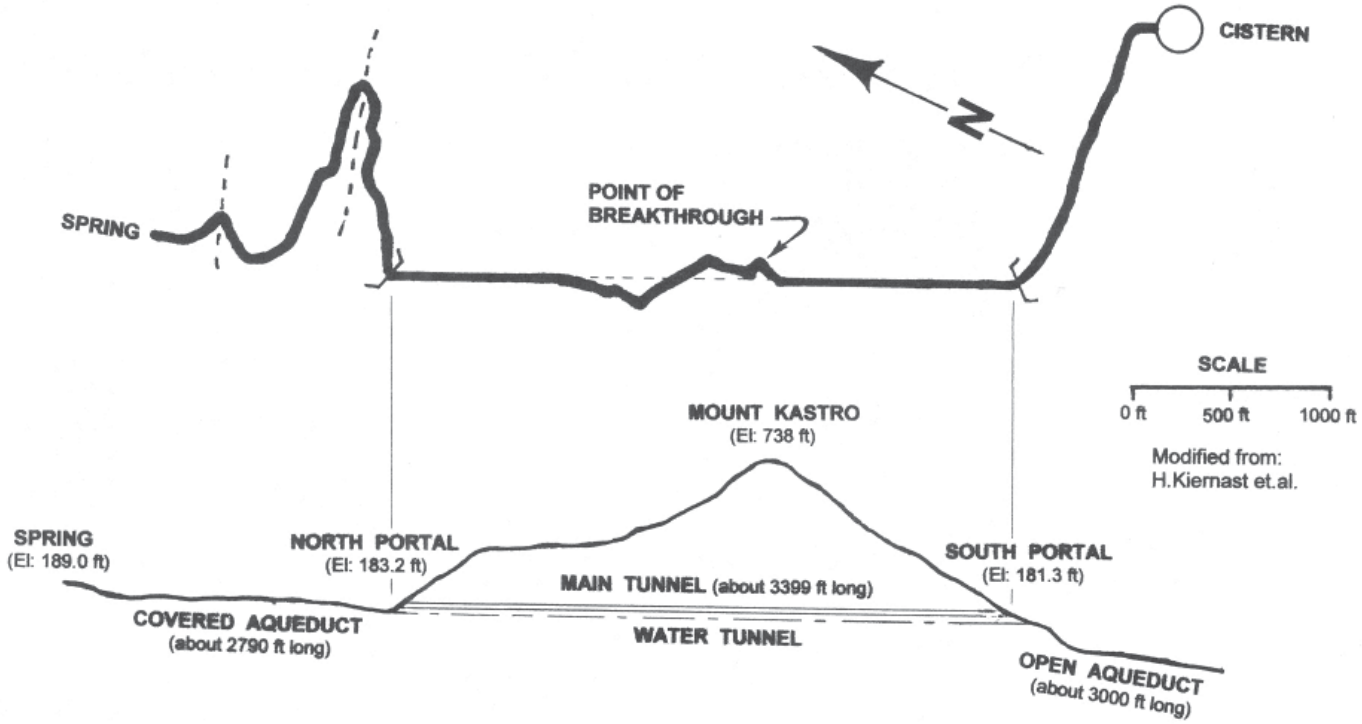


Fig. 1

Plan – Profile

First of all, even to this day, it is not possible to “wiggle in” by setting an “instrument” on top of Mount Kastro, backsighting the north portal, plunging and foresighting to the south portal. In the old days there were no optical instruments, not even a transit, no distance meters or total stations, levels or even a Gunter chain or a magnetic compass. There might have been a dioptra, a basic carpenter’s square, and very definitely a plumb bob was known.

What the ancient surveyors did is a mystery, since probably no “field notes” were kept or at any rate nothing written has survived. Euclid’s “Elements” was not written until some 200 years later and Heron of Alexandria, ca. 10 -70 AD, (remember Heron’s Formula for the area of a triangle with its sides known!) theorized about 600 years after the construction, that a traverse with the modern equivalent of rectangular coordinates from a right angled traverse, i.e. latitude and departures, was used. His “solution” was faithfully copied for the next 2000 years without questions. This however, requires a reality check when one realizes that the ancients had no trigonometric relationships or electronic calculators and hence could not calculate an angle on either end to start the alignment and ultimately meet in the middle. There might be, and this is open to conjecture, a possible way to use latitude and departure and lay out the alignment without mathematics. If the alignment can be solved, with or without coordinates, there is then a second difficulty and that is the control of elevations. Somehow the original tunnel was laid out and constructed nearly horizontally and only later was a second, lower tunnel constructed with the proper grade to make the water flow.

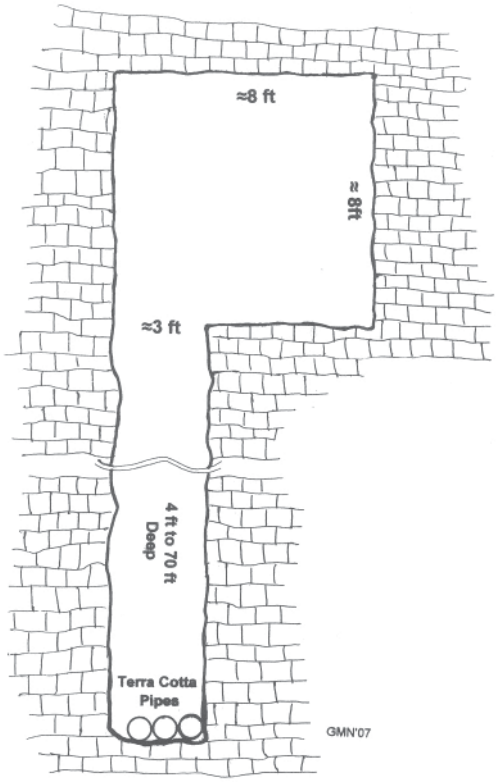


Fig. 2

Typical Cross Section

Photo of Tunnel from
www.mlahanas.de/Greeks/Eupalinos.htm

No matter the theory, the physical evidence is impressive. As shown on Fig.1, the main tunnel is about 3,399 feet long with roughly an 8’ x 8’ foot cross section, see Fig.2. Already during construction the north heading encountered “bad ground” and had to deviate first to the right and later to the left of the straight alignment; finally near the point of breakthrough a sharp turn to the

east was made, probably to guarantee that the tunnels would meet. Undoubtedly the final breakthrough was made by "ear," i.e. by listening to the hammering noise of the other heading and the north bore was nearly 2 feet higher than the south heading. Without proper ventilation, excavation by "burn and squelch" was not possible and as the physical evidence shows hammers and chisels were employed. Since steel was not yet invented, bronze or possible soft iron tools were used. Especially in the north tunnel because of its deviations, surveying for alignment with candles and plumb bob strings could not have been easy and modern surveyors would probably refuse to enter an unventilated tunnel full of rock dust and spent air with only a candle. With the south entrance only about 1 foot lower, serious thought had to be given to sloping the water channel downhill. At a modern slope of 1/4 inch per foot, the calculated difference in elevation over the length of the tunnel is 71 feet starting at the north (upper) tunnel entrance, a 3 foot wide "trench," about 4 feet deep was carved down on the east side, see Fig.2. As the trench got deeper and deeper, an estimated 75 feet to 80 feet deep at the south portal, "drop shafts" were used down from the main tunnel. With drop shafts at 40 feet to 50 feet intervals, alignment and vertical control, possibly with plumb bobs, was reasonably easy. The finished grade of the invert was probably controlled with an intermittent flow of water down the new channel. Finally the water was made to flow in an estimated 4,000 hand formed "terracotta" (clay) pipes or open channel clay gutters. Other than guessing, there are no records why the tunnel was abandoned after some 1,500 years of use, only to be rediscovered in 1856 and excavated in 1972-73 by Hermann Kienast of the German Archaeological Institute of Athens. Now the southern half of the tunnel is lit and accessible to tourists.

For readers familiar with the Denver, Colo. area, a rather unexpected development occurred. In an attempt to find a visual illustration for the Eupalino tunnel, the author "hit upon" the large, visible from space, road cut through the hog back on I-70 west of Denver. A rough measurement for the length of the cut is 700 feet or about 1/5 the length of the ancient tunnel and with a play on words, the Greeks could have surveyed and built the tunnel with ease, rather than the modern cut.

Another coincidence, which positively could not have been staged, occurred several years ago when the author walked by a wooden crate the size of a VW car. Following up on the return address, it turned out that a massive granite slab had been sent from Switzerland to Golden, Colo., to test the cutting heads of a tunnel boring machine (TBM) at a local lab. Several months ago the Swiss broke through on a 35.5 mile (187,335 feet) for the Gotthard Base Tunnel which set a new surveying record for an alignment following the curvature of the earth. Maybe we should hire both surveyors and machines to make an equivalent length tunnel from Georgetown to Vail. Oh, by the way the cost of this tunnel is at least $15,000 per foot!

Even though the author is old and gray, he cannot claim to have been at the construction of the Eupalino tunnel and hence have all the "correct" answers. For any body who wishes to contribute to the solution of the puzzle by "walking in the footsteps of his predecessors," the author reserves the right to edit the answers and publish them in a future issue. It, however, has to be kept in mind that the ancients were very keen observers of nature who preferred practical over long and convoluted theoretical solutions.

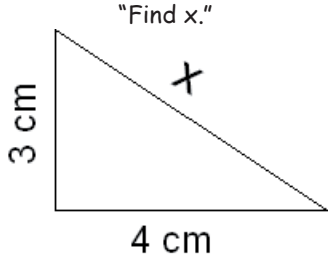
Major References:

- *Internet: "The tunnel of Eupalinos;" also "The tunnel of Samos"*
- *Apostol, Tom M. 2004; The tunnel of Samos; Engineering & Science, No.1*
- *Project "Mathematics" series "www.projectmathematics.com," about 1993.*
- *Kienast, Hermann J. 1973 to 1995, Several publications, all in German.*

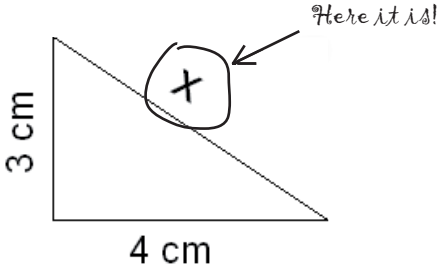
Not Too Good at Math?

When asked the basic geometry question:

"Find x."



one student, who may never get to be an SLS, responded with:



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